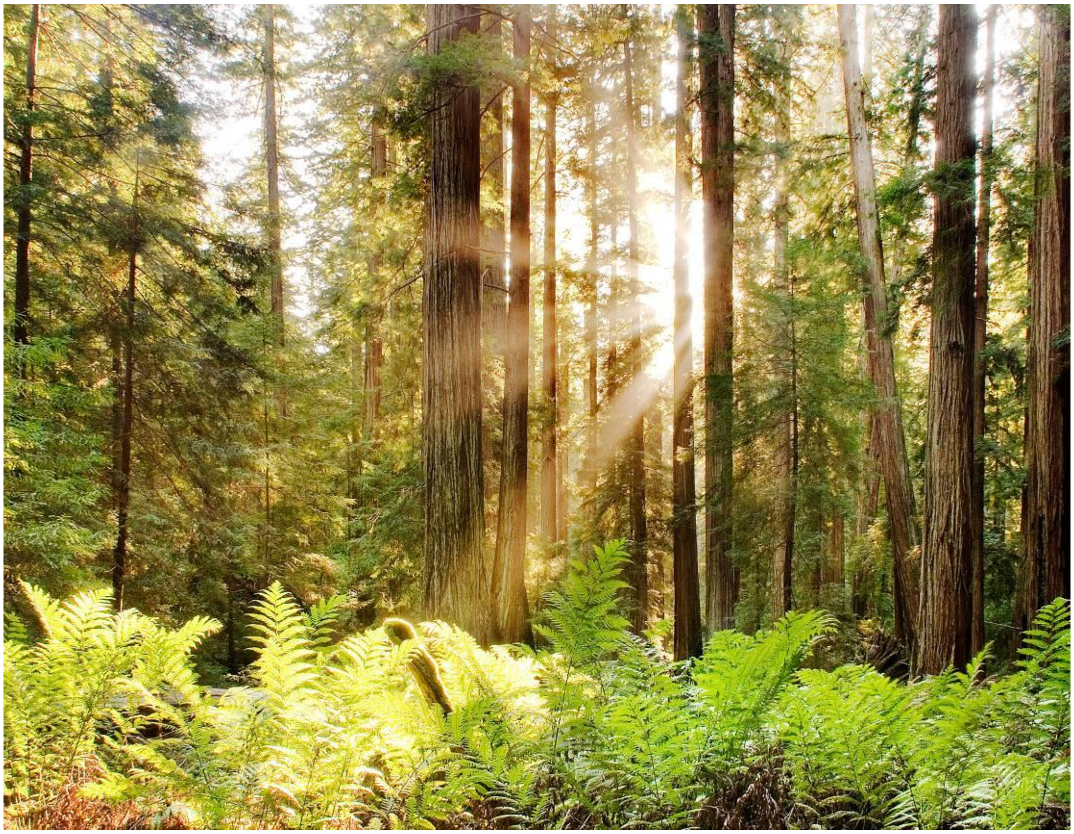

Draft
Environmental Impact Statement/Program Timberland Environmental Impact Report for Authorization of Incidental Take and Implementation of the Mendocino Redwood Company Habitat Conservation Plan/Natural Community Conservation Plan and Timber Management Plan

October 2012

COVER SHEET

Draft Environmental Impact Statement/Program Timberland Environmental Impact Report for Authorization of Incidental Take and Implementation of the Mendocino Redwood Company Habitat Conservation Plan/Natural Community Conservation Plan and Timber Management Plan

Location:	Mendocino County, California
NEPA Co-Lead Agencies:	National Oceanic and Atmospheric Administration – National Marine Fisheries Service United States Fish and Wildlife Service
CEQA Lead Agency:	California Department of Forestry and Fire Protection
CEQA Responsible Agency:	California Department of Fish and Game
Type of Statement:	Draft Environmental Impact Statement/Program Timberland Environmental Impact Report

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ABSTRACT

The National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS), and California Department of Fish and Game (CDFG) have received applications from Mendocino Redwood Company, LLC (MRC) for two federal incidental take permits under the federal Endangered Species Act, and a take permit from the California Department of Fish and Game under the Natural Community Conservation Planning Act. The permits request 80-year authorization to take certain protected species incidental to MRC's forest land management activities on approximately 213,000 ac (86,200 ha) of MRC's forestlands in coastal Mendocino County, California. The covered species are two coho salmon Evolutionarily Significant Units, one Chinook salmon Evolutionarily Significant Unit, two steelhead Distinct Population Segments, California red-legged frog, northern red-legged frog, coastal tailed frog, marbled murrelet, northern spotted owl, Point Arena mountain beaver, and 31 species of plants. MRC is also seeking approval of its Timber Management Plan (TMP) and certification under a Program Timberland Environmental Impact Report (PTEIR) by the California Department of Forestry and Fire Protection (CAL FIRE), in compliance with the California Environmental Quality Act (CEQA) and California Forest Practice Rules (CFPRs). The USFWS and NMFS are joint federal lead agencies under the National Environmental Policy Act (NEPA) and CAL FIRE is state lead agency under CEQA. CDFG is a state responsible agency under CEQA. This Environmental Impact Statement and PTEIR (EIS/PTEIR) analyzes the environmental effects of approving the proposed permits and certifying the PTEIR (the Proposed Action), as well as the environmental effects of four alternatives to the Proposed Action: a No Action/No Project alternative, an enhanced HCP/NCCP (Alternative A), a terrestrial reserves alternative (Alternative B), and an alternative with a shorter (40-year) permit term (Alternative C). The results of the analysis are that the Proposed Action and Alternative A have the fewest significant adverse impacts of all the alternatives.

Cover photo: MRC's Rockport Demonstration Forest, by Leslie Elias.

Suggested citation:
National Marine Fisheries Service, United States Fish and Wildlife Service, California Department of Forestry and Fire Protection, and California Department of Fish and Game. 2012. Draft Environmental Impact Statement and Program Timberland Environmental Impact Report for authorization of incidental take and implementation of the Mendocino Redwood Company Habitat Conservation Plan/Natural Communities Conservation Plan and Timber Management Plan. Prepared by Stillwater Sciences, Berkeley, California, with assistance from CH2M HILL, Portland, Oregon.

EXECUTIVE SUMMARY

Introduction and Background

This Executive Summary provides an overview of the Draft Environmental Impact Statement/Program Timberland Environmental Impact Report (EIS/PTEIR), prepared pursuant to the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). The EIS/PTEIR has been prepared in response to the application by Mendocino Redwood Company, LLC (MRC) for two federal incidental take permits pursuant to Section 10(a)(1)(B) of the federal Endangered Species Act (ESA), one from the U.S. Fish and Wildlife Service (USFWS) and one from the National Marine Fisheries Service (NMFS), and a take permit from the California Department of Fish and Game (CDFG) pursuant to California Fish and Game Code Section 2835. The PTEIR grants MRC the authority to submit Program Timber Harvesting Plans (PTHPs) to the California Department of Forestry and Fire Protection (CAL FIRE) and provides compliance with CEQA and the California Forest Practice Rules (CFPRs). The federal incidental take permits and state take permit, if granted, would authorize the take of protected species incidental to otherwise lawful forest management activities that MRC conducts on its forestland. The proposed term of the permits is 80 years. This EIS/PTEIR evaluates the potential environmental effects if the permit applications are approved. The USFWS and NMFS are co-lead agencies under NEPA. CAL FIRE is lead agency and CDFG is a responsible agency under CEQA.

MRC conducts timber operations and associated activities on its forestland in coastal Mendocino County, California and is seeking incidental take coverage for these activities on 213,000 ac (86,200 ha) of its ownership. The requested take authorizations would cover the incidental take of 11 animal species and 31 plant species. Two of these species—the coho salmon (*Oncorhynchus kisutch*; Central California Coast Evolutionarily Significant Unit) and Point Arena mountain beaver (*Aplodontia rufa nigra*)—are listed as endangered under the ESA. Seven species—the coho salmon (Southern Oregon/Northern California Coast Evolutionarily Significant Unit), Chinook salmon (*Oncorhynchus tshawytscha*; California Coastal Evolutionarily Significant Unit), steelhead (*Oncorhynchus mykiss*; Northern California and Central California Coast Distinct Population Segments), California red-legged frog (*Rana draytonii*), marbled murrelet (*Brachyramphus marmoratus*), and northern spotted owl (*Strix occidentalis caurina*)—are listed as threatened under the ESA. Two animal species, the coho salmon (Central California Coast Evolutionarily Significant Unit) and marbled murrelet, and two plant species, the Humboldt milk-vetch (*Astragalus agnicidus*) and Roderick's fritillary (*Fritillaria roderickii*), are listed as endangered under the California Endangered Species Act (CESA). The coho salmon (Southern Oregon/Northern California Coast Evolutionarily Significant Unit) and the North Coast semaphore grass (*Pleuropogon hooverianus*) are listed as threatened under the CESA. An additional plant species, Baker's meadowfoam (*Limnanthes bakeri*), is listed as rare under the CESA.

As part of the application process for incidental take authorization, MRC has prepared a draft Habitat Conservation Plan (HCP) pursuant to Section 10(a)(2) of the ESA and a Natural Community Conservation Plan (NCCP) pursuant to California Fish and Game Code Section 2820 (the joint document is referred to hereafter as the HCP/NCCP). MRC's proposed HCP/NCCP includes specific measures and strategies developed to protect or enhance ecosystem health, and measures to minimize and mitigate potential effects on covered species. In support of this PTEIR MRC has also prepared a Timber Management Plan (TMP) which addresses the CFPR requirements for a forest landowner to demonstrate "Maximum Sustained Production of High Quality Timber Products," (14 CCR §1092). The TMP, which would be implemented in accordance with the proposed HCP/NCCP, describes harvest levels, timing of harvests, and the management measures and standards that MRC would use to implement the conservation measures of the HCP/NCCP.

Purpose and Need for the Proposed Action

The lead agencies' purpose for the Proposed Action is to protect and conserve covered species and their habitats while enabling the permit applicant (MRC) to continue to conduct forest management activities in compliance with the ESA, CESA, CFPRs, and California's Z'Berg-Nejedly Forest Practice Act. The Proposed Action is needed because normal, otherwise lawful operations of MRC could result in take of the covered species, and the covered species need long-term, comprehensive protection and conservation. The HCP/NCCP provides a long-term solution that assures compliance with the ESA and CESA.

The goals of the proposed HCP/NCCP are to manage habitats for covered species, allow economically viable timber harvesting while simultaneously providing for species viability, and maintain and improve biodiversity on MRC's covered lands. MRC's application for incidental take authorization is driven by the company's need for: (1) approval under state and federal environmental laws of its long-term sustainable forestry practices and conservation strategies (as reflected in the HCP/NCCP and TMP); (2) regulatory stability and certainty; and (3) operation of a successful business, and by the company's objective of maintaining nationally-recognized forest stewardship certification. The Proposed Action would enable MRC to meet its goals and needs while managing its lands using the long-term conservation strategies and sustainable forestry practices reflected in the HCP/NCCP and TMP.

Additional discussion of the purpose and need and the regulatory context for the Proposed Action is provided in Section 1 of the EIS/PTEIR (Purpose and Need).

Scoping

USFWS and NMFS jointly published a Notice of Intent for the preparation of the EIS/EIR[1] for the proposed issuance of incidental take permits to MRC on 6 June 2002 (67 FR 38932-38934). In addition, as part of the federal agencies' tribal trust responsibilities, the USFWS and NMFS also contacted relevant Native American tribes with correspondence dated 4 October 2002 and 22 September 2009. CDFG published the Notice of Preparation for the EIS/EIR on 17 June 2002 (OPR State Clearinghouse, SCH No. 2002062055) as CEQA lead agency. Public scoping meetings were held on 25 June 2002 in Santa Rosa, California, 26 June 2002 in Ukiah, California, and 27 June 2002 in Fort Bragg, California.

In response to MRC's decision to obtain CAL FIRE's certification of a PTEIR, CAL FIRE became the CEQA lead agency and initiated an additional public scoping process. CAL FIRE published a subsequent Notice of Preparation on 10 March 2006 (OPR State Clearinghouse, SCH No. 2006032049). As part of the additional public scoping process, public scoping meetings were

[1] At the time of publication of the Notice of Intent, MRC had not yet decided to prepare a PTEIR for CAL FIRE's certification in place of a standard EIR. The Notice of Intent references the EIS/EIR.

held on 23 March 2006 in Fort Bragg, California and 28 March 2006 in Ukiah, California. The public scoping process and comments received during public scoping are described in the public scoping reports (Appendix C).

The Proposed Action and Alternatives

This EIS/PTEIR analyzed five alternatives:

1. The No Action/No Project alternative. Under the No Action/No Project alternative (referred to hereafter as the No Action alternative), the federal and state lead agencies would not issue incidental take authorizations and MRC would not submit an HCP, NCCP, nor operate under a PTEIR or TMP. MRC would continue to harvest timber on a Timber Harvesting Plan-by-Timber Harvesting Plan (THP-by-THP) basis and conduct other forest management activities according to all applicable federal and state laws and regulations, including the take prohibitions for listed species and provisions of the ESA and CESA. In the absence of a PTEIR and TMP, MRC would seek other means of demonstrating maximum sustained production under the CFPRs.
2. The Proposed Action (Preferred Alternative). The Proposed Action consists of issuance of the federal incidental take permits and the state take permit, and subsequent implementation by MRC of the proposed HCP/NCCP and TMP. The requested take authorizations would cover the incidental take of the 11 animal species and 31 plant species listed below:
    - coho salmon, Central California Coast Evolutionarily Significant Unit (*Oncorhynchus kisutch*)
    - coho salmon, Southern Oregon/Northern California Coast Evolutionarily Significant Unit (*Oncorhynchus kisutch*)
    - Chinook salmon, California Coastal Evolutionarily Significant Unit (*Oncorhynchus tshawytscha*)
    - steelhead, Northern California Distinct Population Segment (*Oncorhynchus mykiss*)
    - steelhead, Central California Coast Distinct Population Segment (*Oncorhynchus mykiss*)
    - California red-legged frog (*Rana draytonii*)
    - northern red-legged frog (*Rana aurora*)
    - coastal tailed frog (*Ascaphus truei*)
    - marbled murrelet (*Brachyramphus marmoratus*)
    - northern spotted owl (*Strix occidentalis caurina*)
    - Point Arena mountain beaver (*Aplodontia rufa nigra*)
    - Humboldt milk-vetch (*Astragalus agnicidus*)
    - small groundcone (*Boschniakia hookeri*)
    - pygmy cypress (*Callitropsis pygmaea*)
    - swamp harebell (*Campanula californica*)
    - California sedge (*Carex californica*)
    - bristly sedge (*Carex comosa*)
    - deceiving sedge (*Carex saliniformis*)
    - green yellow sedge (*Carex viridula* var. *viridula*)
    - Oregon goldthread (*Coptis laciniata*)
    - streamside daisy (*Erigeron biolettii*)
    - coast fawn lily (*Erythronium revolutum*)
    - Roderick's fritillary (*Fritillaria roderickii*)

- Pacific gilia (*Gilia capitata* ssp. *pacifica*)
- glandular western flax (*Hesperolinon adenophyllum*)
- thin-lobed horkelia (*Horkelia tenuiloba*)
- hair-leaved rush (*Juncus supiniformis*)
- Coast lily (*Lilium maritimum*)
- Baker's meadowfoam (*Limnanthes bakeri*)
- Mendocino bush mallow (*Malacothamnus mendocinensis*)
- seacoast ragwort (*Packera bolanderi* var. *bolanderi*)
- Bolander's beach pine (*Pinus contorta* ssp. *bolanderi*)
- white-flowered rein orchid (*Piperia candida*)
- North Coast semaphore grass (*Pleuropogon hooverianus*)
- great burnet (*Sanguisorba officinalis*)
- maple-leaved checkerbloom (*Sidalcea malachroides*)
- Siskiyou checkerbloom (*Sidalcea malviflora* ssp. *patula*)
- beaked tracyina (*Tracyina rostrata*)
- Santa Cruz clover (*Trifolium buckwestiorum*)
- oval-leaved viburnum (*Viburnum ellipticum*)
- running-pine (*Lycopodium clavatum*)
- long-beard lichen (*Usnea longissima*).

The term of the permits would be 80 years. The activities covered under the requested federal and state incidental take authorizations include:

- Silviculture and stand improvement.
- Vegetation management, including planting, manual brush and tree removal, and burning for site preparation.
- Commercial timber operations, which entail felling, limbing, bucking, yarding, loading, and hauling of timber, as well as maintenance and refueling of heavy equipment.
- Road and landing construction, use, maintenance, and decommissioning.
- Drafting of water in support of timber operations and road and landings programs.
- Operation of non-commercial rock pits and quarries.
- Habitat improvement and creation.
- Data collection for research and monitoring associated with the HCP/NCCP conservation measures.
- Previously approved (grandfathered) THPs.

The proposed HCP/NCCP includes conservation and management measures to protect and enhance aquatic, riparian, and terrestrial species and their habitats. Aquatic and riparian measures include:

- Restrictions on timber harvest and equipment use near unstable slopes, watercourses, wetlands, seeps, and springs to minimize disturbance of vegetation and sediment delivery to aquatic habitats.
- Silvicultural restrictions and retention standards for tree canopy, basal area, large trees, old-growth trees, and large woody debris near watercourses, wetlands, seeps, and springs to maintain and enhance ecosystem function.

- Measures to treat exposed soil and maintain stream bank stability in riparian buffer zones to minimize sediment delivery to watercourses.
- Stream habitat improvement activities.

Terrestrial measures include:

- Retention and/or recruitment standards for old-growth trees, snags, wildlife trees, downed large woody debris, hardwoods, closed-cone pine forest, and other unique habitat elements across the landscape to maintain ecosystem function.
- Measures to maintain and enhance terrestrial habitat connectivity for different species at appropriate spatial scales.
- Wildlife surveys, research, and monitoring.
- Measures to protect and increase high quality habitat for the northern spotted owl, marbled murrelet, and Point Arena mountain beaver, including restrictions on forest management and other disturbance near occupied nests or burrows and suitable habitat.
- Measures to protect plant species and vegetation communities of concern, including survey requirements prior to forest management, silvicultural restrictions and retention standards in and near unique and sensitive habitats, and restrictions on timber harvest and equipment use in and near unique and sensitive habitats.

Also included in the Proposed Action are a system-wide Road Management Plan and a detailed monitoring and adaptive management plan that allows for continued feedback and improvement of the conservation measures.

3. Alternative A (Enhanced HCP/NCCP). Under Alternative A, USFWS would issue incidental take permits and CDFG would issue take permits for the same species and covered activities as under the Proposed Action. As under the Proposed Action, the term of the permits would be 80 years. MRC would implement an enhanced HCP/NCCP and a TMP on its covered forestlands that would be similar to the HCP/NCCP and TMP implemented under the Proposed Action, with additional measures primarily to enhance conservation of aquatic and riparian species and habitats. Key provisions of this alternative would include accelerated implementation of the Road Management Plan, a no-cut buffer adjacent to Class I and Large Class II streams[2] equal in width to the height of one site-potential tree (at least 150 ft (46 m), exclusion of heavy equipment in the riparian buffer zone of Small Class II streams and Class III streams, increased recruitment and retention of wildlife trees and hardwoods, and increased habitat connectivity in riparian buffer zones.
4. Alternative B (Terrestrial Reserves). Under Alternative B, USFWS would issue an incidental take permit for the incidental take of marbled murrelet and northern spotted owl only. CDFG would issue a take permit for marbled murrelet only. The permits would have an 80-year term. MRC would implement an HCP for these two species only. A NCCP would not be prepared or implemented under this alternative; rather, MRC would operate

[2] Streams are classified in the CFPRs according to their ability to support aquatic life (CAL FIRE 2012). The lead agencies and MRC also use this stream classification scheme, and thus data pertaining to streams and riparian buffer zones are reported and analyzed in this EIS/PTEIR by stream class. Class I streams have fish present or seasonally present on-site. Class I streams include habitat to sustain fish migration and spawning. Class II streams do not support fish but provide habitat for non-fish aquatic species. Class III streams do not support aquatic life but do transport sediment and organic material downstream to Class I and Class II streams.

under a California Fish and Game Code §2080.1 or §2081 permit. Activities covered under the federal incidental take permit and state take permit would be the same as the Proposed Action. Under this alternative, reserves would be established on portions of MRC's land to provide permanent habitat areas for the northern spotted owl and marbled murrelet. The total area of the reserves would be approximately 48,800 ac (19,750 ha), or 21% of MRC's forestland. To minimize disturbance and promote late-successional habitat conditions, no commercial timber harvest would be allowed in the reserves. MRC's forestlands outside of reserve areas would be subject to more intensive timber management practices (e.g., clearcut) than proposed under the other alternatives, modified on a site-specific basis to avoid take of other listed species.

5. Alternative C (HCP Only, Fewer Covered Species, Shorter Take Authorization Term). Under Alternative C, NMFS and USFWS would each issue MRC an incidental take permit to carry out an HCP covering federally listed species for a term of 40 years. The NMFS incidental take permit would cover coho salmon, Chinook salmon, and steelhead. The USFWS incidental take permit would cover the California red-legged frog, marbled murrelet, and northern spotted owl. CDFG would issue a take permit for coho salmon, Humboldt milk-vetch, Roderick's fritillary, North Coast semaphore grass, and Baker's meadowfoam for a term of 40 years. A NCCP would not be prepared or implemented under this alternative; rather, MRC would operate under a California Fish and Game Code §2080.1 or §2081 permit. Activities covered under the federal incidental take permits and state take permit would be the same as the Proposed Action. However, the duration of the covered activities, including long-term programs such as research, monitoring, and habitat improvement, would be limited to 40 years. After 40 years, management would either revert back to current practices (i.e., No Action) or MRC could seek an extension of the incidental take authorization term.

The alternatives and the covered activities are described in detail in Section 2 of the EIS/PTEIR (Alternatives).

Environmental Effects

Direct and indirect impacts determined to be potentially significant are summarized in Table ES-1 by resource area and alternative. Cumulative impacts are summarized in Table ES-2. Effects that were determined to be "less than significant," "beneficial," or "no effect" are not included in Table ES-1 or ES-2 but are described in Sections 3.2–3.17 (Affected Environment and Environmental Effects) and Sections 4.2–4.17 (Cumulative Effects) of the EIS/PTEIR for each applicable resource. Growth-inducing effects, significant and unavoidable effects, the irreversible and irretrievable commitment of resources, and short-term uses and long-term productivity are addressed in Section 5 of the EIS/PTEIR (Other Required NEPA and CEQA Analyses). There would be no growth-inducing effects under any of the alternatives, and no significant and unavoidable effects under the Proposed Action or Alternatives A, B, or C.

The Proposed Action and Alternative A would result in the fewest potentially significant direct, indirect, and cumulative impacts. The only potentially significant direct, indirect, and cumulative impacts under the Proposed Action would occur for non-covered plant species of concern and vegetation communities of concern as a result of activities not included in PTHPs. These activities could impact plants because no plant survey would be required prior to such activities. Potentially significant direct and indirect impacts under Alternative A would occur for non-covered plants due to non-PTHP activities, and for noise-related disturbance associated with increased helicopter yarding. Noise impacts would not contribute to cumulative impacts. An increase in helicopter yarding under Alternative A would result from a requirement to reduce road construction and road use in order to minimize potential fine sediment delivery to aquatic habitats. With the road restrictions, some of the timber harvested under Alternative A would need to be transported using helicopters instead of trucks. The Proposed Action and Alternative A would have more beneficial effects than the other alternatives, due to the suite of habitat-based and species-specific conservation measures, system-wide Road Management Plan, and monitoring and adaptive management program that would be implemented under the proposed HCP/NCCP and TMP. The Proposed Action is considered the preferred alternative under NEPA because it best meets the purpose and need of the lead federal agencies, considering environmental, economic, and other factors.

The No Action alternative and Alternative B would have the most potentially significant direct, indirect, and cumulative impacts because there would be more timber harvest and fewer long-term, comprehensive conservation measures under these two alternatives than under the Proposed Action and Alternative A. Like the Proposed Action and Alternative A there would be few potentially significant impacts under Alternative C, but the shorter (40 year) term of the proposed HCP under Alternative C would reduce its long-term conservation benefits.

Mitigation measures are proposed to avoid or eliminate potentially significant impacts of the Proposed Action, Alternative A, Alternative B, or Alternative C or reduce them to a less-than-significant level, where feasible. No mitigation measures are proposed when an impact conclusion is “less than significant,” “no effect,” or “beneficial.” Mitigation measures are not required for impacts identified under the No Action alternative because the agencies would not be required to issue or obtain permits or agreements if the agencies chose not to approve the project. For these reasons, mitigation measures are not provided for the No Action alternative even if significant impacts may result.

Table ES-1. Summary of potentially significant direct and indirect impacts and mitigation.

Impacts	Alternative	Level of significance before mitigation	Mitigation guidelines	Level of significance after mitigation
Section 3.2 Geology, Soils, and Geomorphology				
Impact 3.2-1: Increased sediment delivery to stream channels from management-related shallow landsliding.	No Action	potentially significant	not applicable	not applicable
Impact 3.2-2: Increased sediment delivery to stream channels from deep-seated landsliding.	No Action	potentially significant	not applicable	not applicable
Impact 3.2-3: Increased sediment delivery to stream channels from road-related erosion.	No Action	potentially significant	not applicable	not applicable

Impacts	Alternative	Level of significance before mitigation	Mitigation guidelines	Level of significance after mitigation
Impact 3.2-4: Increased sediment delivery to stream channels from management-related shallow landsliding.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding.	less than significant
Impact 3.2-5: Increased sediment delivery to stream channels from management-related surface erosion in harvest areas.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion.	less than significant
Impact 3.2-6: Increased sediment delivery to stream channels from road-related erosion.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach.	less than significant
Section 3.3 Hydrology, Beneficial Uses of Water, and Water Quality				
Impact 3.3-1: Increased flooding, erosion, and siltation potential due to increase in peak flows.	No Action	potentially significant	not applicable	not applicable
Impact 3.3-2: Impairment of water quality and sediment-sensitive beneficial uses due to increased suspended sediment and turbidity.	No Action	potentially significant	not applicable	not applicable
Impact 3.3-3: Impairment of water quality and sediment-sensitive beneficial uses due to increased suspended sediment and turbidity.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding. Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion. Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach.	less than significant

Impacts	Alternative	Level of significance before mitigation	Mitigation guidelines	Level of significance after mitigation
Impact 3.3-4: Impairment of water quality due to reduced dissolved oxygen during summer months.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding.	less than significant
			Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion.	
			Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach.	
Impact 3.3-5: Impairment of water quality due to increased sediment-associated nutrient input.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding.	less than significant
			Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion.	
			Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach.	
Section 3.4 Aquatic and Riparian Habitats and Species of Concern				
Impact 3.4-1: Effects on anadromous salmonids from reduced aquatic habitat quality and quantity.	No Action	potentially significant	not applicable	not applicable
Impact 3.4-2: Effects on coastal-tailed frog from reduced aquatic habitat quality and quantity.	No Action	potentially significant	not applicable	not applicable
Impact 3.4-3: Effects on California red-legged frog and northern red-legged frog from reduced aquatic habitat quality and quantity.	No Action	potentially significant	not applicable	not applicable

Impacts	Alternative	Level of significance before mitigation	Mitigation guidelines	Level of significance after mitigation
Impact 3.4-4: Effects on southern torrent salamander from reduced aquatic habitat quality and quantity.	No Action	potentially significant	not applicable	not applicable
Impact 3.4-5. Effects on foothill yellow-legged frog from reduced aquatic habitat quality and quantity.	No Action	potentially significant	not applicable	not applicable
Impact 3.4-6. Effects on salmonids from reduced aquatic habitat quality and quantity.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding. Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion. Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach.	less than significant
Section 3.5 Vegetation and Plant Species of Concern				
Impact 3.5-1: Effects on Mendocino Pygmy Cypress Forest due to removal of vegetation or habitat degradation.	No Action	potentially significant	not applicable	not applicable
Impact 3.5-2: Effects on all plant species of concern during non-THP activities due to removal of a population or degradation of habitat.	No Action	potentially significant	not applicable	not applicable

Impacts	**Alternative**	**Level of significance before mitigation**	**Mitigation guidelines**	**Level of significance after mitigation**
Impact 3.5-3: Effects on non-covered plant species of concern for all activities due to removal of a population or degradation of habitat.	Proposed Action (HCP/NCCP)	potentially significant	Mitigation Measure 3.5-1: Adopt the CDFG survey protocol and guidance for all covered activities, and for non-PTHP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all plant species of concern.	less than significant
Impact 3.5-4: Effects on non-covered plant species of concern for all activities due to removal of a population or degradation of habitat.	Alternative A (Enhanced HCP/NCCP)	potentially significant	Mitigation Measure 3.5-1: Adopt the CDFG survey protocol and guidance for all covered activities, and for non-PTHP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all plant species of concern.	less than significant
Impact 3.5-5: Effects on Mendocino Pygmy Cypress Forest, outside of the reserves due to the removal of vegetation or habitat degradation.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.5-2: Adopt Mendocino Pygmy Cypress Forest protection measures.	less than significant
Impact 3.5-6: Effects on hardwoods, outside of the reserves due to the removal of vegetation or habitat degradation.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.5-3: Implement protection measures for hardwoods.	less than significant
Impact 3.5-7: Effects on all plant species of concern during non-THP activities due to removal of a population or degradation of habitat, outside of reserves.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.5-4: For non-THP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all species of concern.	less than significant

Impacts	Alternative	Level of significance before mitigation	Mitigation guidelines	Level of significance after mitigation
Impact 3.5-8: Effects on non-covered plant species of concern for all activities due to removal of a population or degradation of habitat.	Alternative C (HCP Only, Fewer Covered Species, Shorter Take Authorization Term)	potentially significant	Mitigation Measure 3.5-1: Adopt the CDFG survey protocol and guidance for all covered activities, and for non-PTHP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all plant species of concern.	less than significant
Section 3.6 Terrestrial Habitat and Wildlife Species of Concern				
Impact 3.6-1: Effects on golden eagle, American peregrine falcon, pallid bat, and/or Townsend's western big-eared bat from potential habitat modifications.	No Action	potentially significant	not applicable	not applicable
Impact 3.6-2: Effects on old-growth trees and stands from timber harvest activities.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.6-1: Restrict harvest of old-growth trees and stands, and protect screen trees.	no effect
Impact 3.6-3: Effects on golden eagle, American peregrine falcon, pallid bat, and/or Townsend's western big-eared bat from potential habitat modifications.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.6-2: Protect rocky outcrops.	less than significant
Section 3.7 Air Quality				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 3.8 Climate and Climate Change				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 3.9 Timber Resources				
none identified	all alternatives	not applicable	not applicable	not applicable

Impacts	Alternative	Level of significance before mitigation	Mitigation guidelines	Level of significance after mitigation
Section 3.10 Hazards and Hazardous Substances				
Impact 3.10-1: Effects on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern due to application of herbicides.	No Action	potentially significant	not applicable	not applicable
Impact 3.10-2. Effects on California Natural Diversity Database Special Community Types, Habitat Elements and non-covered plant species of concern due to application of herbicides.	Proposed Action (HCP/NCCP)	potentially significant	Mitigation Measure 3.10-1. Perform surveys, according to CDFG's guidelines and protocols, for all California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern in the management area prior to herbicide application.	less than significant
Impact 3.10-3. Effects on California Natural Diversity Database Special Community Types, Habitat Elements and non-covered plant species of concern due to application of herbicides.	Alternative A (Enhanced HCP/NCCP)	potentially significant	Mitigation Measure 3.10-1. Perform surveys, according to CDFG's guidelines and protocols, for all California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern in the management area prior to herbicide application.	less than significant
Impact 3.10-4: Effects on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern due to application of herbicides.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.10-2: Perform surveys, according to CDFG's guidelines and protocols, for all California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern in the management area prior to herbicide application.	less than significant

Impacts	Alternative	Level of significance before mitigation	Mitigation guidelines	Level of significance after mitigation
Impact 3.10-5. Effects on California Natural Diversity Database Special Community Types, Habitat Elements and non-covered plant species of concern due to application of herbicides.	Alternative C (HCP Only, Fewer Covered Species, Shorter Take Authorization Term)	potentially significant	Mitigation Measure 3.10-1. Perform surveys, according to CDFG's guidelines and protocols, for all California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern in the management area prior to herbicide application.	less than significant
Section 3.11 Land Use				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 3.12 Traffic				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 3.13 Noise				
Impact 3.13-1: Noise-related disturbance associated with increased helicopter yarding.	Alternative A (Enhanced HCP/NCCP)	potentially significant	Mitigation Measure 3.13-1: Minimize noise-related disturbance from helicopter operations.	less than significant
Impact 3.13-2: Noise-related disturbance associated with increased helicopter yarding.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.13-1: Minimize noise-related disturbance from helicopter operations.	less than significant
Section 3.14 Visual Resources				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 3.15 Recreation				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 3.16 Cultural Resources				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 3.17 Social and Economic Conditions				
none identified	all alternatives	not applicable	not applicable	not applicable

Table ES-2. Summary of potentially significant cumulative impacts and mitigation.

Impacts	Alternative	Level of significance before mitigation	Mitigation guidelines	Level of significance after mitigation
Section 4.2 Geology, Soils, and Geomorphology				
Cumulative effects of increased sediment delivery to stream channels from management-related shallow landsliding, deep-seated landsliding, and road-related erosion.	No Action	potentially significant	not applicable	not applicable
Cumulative effect of increased sediment delivery to stream channels from road-related erosion.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach.	less than significant
Section 4.3 Hydrology, Beneficial Uses of Water, and Water Quality				
Cumulative effects of increased flooding, erosion, and siltation potential due to increase in peak flows.	No Action	potentially significant	not applicable	not applicable
Cumulative effects of impaired water quality and sediment-sensitive beneficial uses due to increased suspended sediment and turbidity.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding. Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion. Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach.	less than significant
Cumulative effects of impaired water quality and beneficial uses due to reduced dissolved oxygen during summer months.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding. Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion. Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach.	less than significant

Impacts	Alternative	Level of significance before mitigation	Mitigation guidelines	Level of significance after mitigation
Cumulative effects of impaired water quality due to increased sediment-associated nutrient input.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding.	less than significant
			Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion.	
			Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach.	
Section 4.4 Aquatic and Riparian Habitats and Species of Concern				
Cumulative effects on coho salmon, Chinook salmon, and steelhead from reduced aquatic habitat quality and quantity.	No Action	potentially significant	not applicable	not applicable
Cumulative effects on coastal-tailed frog, California red-legged frog, northern red-legged frog, southern torrent salamander, and foothill yellow-legged frog from reduced aquatic habitat quality and quantity.	No Action	potentially significant	not applicable	not applicable
Cumulative effects on coho salmon, Chinook salmon, and steelhead from reduced aquatic habitat quality and quantity.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding.	less than significant
			Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion.	
			Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach.	

Impacts	Alternative	Level of significance before mitigation	Mitigation guidelines	Level of significance after mitigation
Cumulative effects on coastal-tailed frog, California red-legged frog, northern red-legged frog, southern torrent salamander, and foothill yellow-legged frog from reduced aquatic habitat quality and quantity.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding. Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion. Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach.	less than significant
Section 4.5 Vegetation and Plant Species of Concern				
Cumulative effects on all plant species of concern during non-THP activities due to removal of a population or degradation of habitat.	No Action	potentially significant	not applicable	not applicable
Cumulative effects on Mendocino Pygmy Cypress Forest due to removal of vegetation or habitat degradation.	No Action	potentially significant	not applicable	not applicable
Cumulative effects on non-covered plant species of concern due to removal of a population or degradation of habitat.	Proposed Action (HCP/NCCP)	potentially significant	Mitigation Measure 3.5-1: Adopt the CDFG survey protocol and guidance for all covered activities, and for non-PTHP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all plant species of concern.	less than significant
Cumulative effects on non-covered plant species of concern due to removal of a population or degradation of habitat.	Alternative A (Enhanced HCP/NCCP)	potentially significant	Mitigation Measure 3.5-1: Adopt the CDFG survey protocol and guidance for all covered activities, and for non-PTHP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all plant species of concern.	less than significant

Impacts	Alternative	Level of significance before mitigation	Mitigation guidelines	Level of significance after mitigation
Cumulative effects on Mendocino Pygmy Cypress Forest outside of the reserves due to the removal of vegetation or habitat degradation.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.5-2: Adopt Mendocino Pygmy Cypress Forest protection measures.	less than significant
Cumulative effects on hardwoods outside of the reserves due to the removal of vegetation or habitat degradation.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.5-3: Implement protection measures for hardwoods.	less than significant
Cumulative effects on all plant species of concern outside of reserves during non-THP activities due to removal of a population or degradation of habitat.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.5-4: For non-THP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all species of concern	less than significant
Cumulative effects on non-covered plant species of concern for all activities due to removal of a population or degradation of habitat.	Alternative C (HCP Only, Fewer Covered Species, Shorter Take Authorization Term)	potentially significant	Mitigation Measure 3.5-1: Adopt the CDFG survey protocol and guidance for all covered activities, and for non-PTHP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all plant species of concern.	less than significant
Section 4.6 Terrestrial Habitat and Wildlife Species of Concern				
Cumulative effects on golden eagle, American peregrine falcon, pallid bat, and/or Townsend's western big-eared bat from possible habitat modifications.	No Action	potentially significant	not applicable	not applicable
Cumulative effects on old-growth trees and stands from timber harvest activities.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.6-1: Restrict harvest of old-growth trees and stands, and protect screen trees.	no effect

Impacts	**Alternative**	**Level of significance before mitigation**	**Mitigation guidelines**	**Level of significance after mitigation**
Cumulative effects on golden eagle, American peregrine falcon, pallid bat, and/or Townsend's western big-eared bat from possible habitat modifications.	Alternative B (Reserves)	potentially significant	Mitigation Measure 3.6-2: Protect rocky outcrops.	less than significant
Section 4.7 Air Quality				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 4.8 Climate and Climate Change				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 4.9 Timber Resources				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 4.10 Hazards and Hazardous Substances				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 4.11 Land Use				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 4.12 Traffic				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 4.13 Noise				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 4.14 Visual Resources				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 4.15 Recreation				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 4.16 Cultural Resources				
none identified	all alternatives	not applicable	not applicable	not applicable
Section 4.17 Social and Economic Conditions				
none identified	all alternatives	not applicable	not applicable	not applicable

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Definition
ac	acre(s)
°C	degrees Celsius
CAL FIRE	California Department of Forestry and Fire Protection
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFPR(s)	California Forest Practice Rule(s)
CFR	Code of Federal Regulations
CRYPTOS	Cooperative Redwood Yield Project Timber Output Simulator
EIR	Environmental Impact Report (state)
EIS	Environmental Impact Statement (federal)
EPA	Environmental Protection Agency
ESA	Endangered Species Act (federal)
°F	degrees Fahrenheit
FR	Federal Register
ft	feet
ha	hectare(s)
HCP	Habitat Conservation Plan
hr	hour(s)
in	inch(es)
km	kilometer(s)
km km^{-2}	kilometers per square kilometer
l	liter(s)
LC	lethal concentrations
LC_{50}	lethal concentration at which half of the test organisms are killed
m	meter(s)
mg	milligram(s)
mi	mile(s)
mi mi^{-2}	miles per square mile
ml	milliliter(s)
mm	millimeter(s)
MRC	Mendocino Redwood Company
NA	not applicable
NCCP	Natural Community Conservation Plan
NCCPA	Natural Community Conservation Planning Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
PM_{10}	Respirable Particulate Matter (less than 10 microns in diameter)
PTEIR	Program Timberland Environmental Impact Report
PTHP	Program Timber Harvesting Plan
SCH	State Clearinghouse
sp.	species (singular)
spp.	species (plural)
ssp.	subspecies (singular)
TCP	6 dihydroxy-2-pyridinoloxyacetic acid
THP	Timber Harvesting Plan
TMP	Timber Management Plan

Acronym	Definition
tons mi^{-2} yr^{-1}	short tons per square mile per year
USC	United States Code
USFWS	United States Fish and Wildlife Service
var.	variety
yd	yard(s)

1 PURPOSE AND NEED

1.1 Introduction and Background

This Environmental Impact Statement and Program Timberland Environmental Impact Report (EIS/PTEIR) has been prepared by National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), and California Department of Forestry and Fire Protection (CAL FIRE) in response to the applications submitted by Mendocino Redwood Company, LLC (MRC) for multispecies incidental take permits under the federal Endangered Species Act (ESA), multispecies take permits under the State of California's Natural Community Conservation Planning Act (NCCPA), and approval of a Timber Management Plan (TMP). MRC is applying for two federal incidental take permits pursuant to Section 10(a)(1)(B) of the ESA, one from USFWS and one from NMFS, and a state take permit from CDFG pursuant to California Fish and Game Code Section 2835. The federal incidental take permits and state take permit, if granted, would authorize for a period of 80 years the take of species that may occur incidental to otherwise lawful forest management activities that MRC conducts on its forestland. As required under Section 10(a)(2) of the ESA, MRC has prepared a draft Habitat Conservation Plan (HCP), and pursuant to California Fish and Game Section 2820 MRC has prepared a draft Natural Community Conservation Plan (NCCP). This joint document is referred to hereafter as the HCP/NCCP. As part of this PTEIR, MRC has also prepared a TMP which addresses the California Forest Practice Rules[3] (CFPRs) requirements for a forest landowner to demonstrate "Maximum Sustained Production of High Quality Timber Products" (14 CCR §1092), and describes the operational practices MRC would use on its timberlands. MRC is seeking certification of its PTEIR by CAL FIRE, in compliance with the California Environmental Quality Act (CEQA) and CFPRs.

MRC conducts timber operations and other activities on its forestland in accordance with the CFPRs, the 1973 Z'Berg-Nejedly Forest Practice Act, other applicable state and federal laws, and MRC's internal management policies and practices. MRC's forest management activities affect a variety of species and their habitats throughout the plan area, including species listed as threatened or endangered under the ESA and California Endangered Species Act (CESA). These activities have the potential to result in take of listed species. In the absence of incidental take authorization, MRC's forest management activities can be limited by ESA and CESA regulations prohibiting take of listed species. To obtain authorization for incidental take, MRC is required to submit the permit applications, and an HCP and NCCP in support of the applications, to the responsible federal and state resource agencies.

An HCP is a comprehensive, long-term land and resource planning document, and is a mandatory component of an application for an incidental take permit pursuant to Section 10(a)(2) of the ESA. The purpose of an HCP is to establish the terms under which a non-federal landowner may take covered species incidental to an otherwise lawful activity, including how the take will be minimized and mitigated to the maximum extent practicable. An HCP must accompany an application for a federal incidental take permit.

[3] Unless otherwise specified, references to the CFPRs in this EIS/PTEIR refer to the 2012 CFPRs (CAL FIRE 2012).

Similar to an HCP, an NCCP is a long-term plan that provides for the regional protection and conservation of plants, animals, and their habitats while allowing compatible economic development and growth. The NCCP is prepared under Section 2835 of the California Fish and Game Code, whereas an HCP is prepared under the ESA. An NCCP differs from an HCP in that it takes a broad-based ecosystem (i.e., “community”) approach to planning in addition to a species-based approach, and in its requirement for independent scientific input regarding conservation goals, principles, strategies, and uncertainties. An NCCP is not the only means of acquiring a take permit for state-listed species, but it is the most ecologically comprehensive method.

Pursuant to the National Environmental Policy Act (NEPA) and CEQA, this joint EIS/PTEIR is being prepared with USFWS and NMFS as joint federal lead agencies under NEPA and CAL FIRE as state lead agency under CEQA. CDFG is a state responsible agency under CEQA. The EIS/PTEIR contains the environmental analyses of the proposed HCP/NCCP and TMP (the Proposed Action) and alternatives to the Proposed Action, including a No Action/No Project alternative. As lead agencies, USFWS, NMFS, and CAL FIRE are responsible for the scope and content of the EIS/PTEIR, and must ensure that all pertinent environmental issues and effects, and a reasonable range of alternatives and their effects, are addressed. CDFG, as a Responsible Agency under CEQA, must assure that the analyses presented in the EIS/PTEIR are adequate for purposes of its issuance of an NCCPA take permit to MRC. The EIS/PTEIR analyzes the potential effects of MRC’s forest management activities as a series of actions that can be characterized as one large, long-term project. As a program EIR, the PTEIR provides a broad, comprehensive effects analysis and an explanation of mitigation measures that would be relied upon in subsequent Program Timber Harvesting Plans[4] (PTHPs) throughout the area covered by MRC’s TMP and proposed HCP/NCCP. Certification of the PTEIR by CAL FIRE, in compliance with CEQA and the CFPRs, grants MRC the authority to submit PTHPs.

1.2 Proposed Action/Project Description

The Proposed Action consists of issuance of the federal incidental take permits and the state take permit, as well as subsequent implementation by MRC of the proposed HCP/NCCP and TMP. In its application for the federal incidental take permits and state take permit, MRC has requested coverage for 11 animal species and 31 plant species for a term of 80 years (Table 1.2-1).

Table 1.2-1. Species covered by incidental take authorization and included in the HCP/NCCP under the Proposed Action.

Common name	Scientific name	Listing status[a]		CRPR status[b]	Take authorization		
		Federal (ESA	State (CESA)		NMFS[c]	USFWS[c]	CDFG[d]
Fish and wildlife							
Coho salmon, Central California Coast Evolutionarily Significant Unit	*Oncorhynchus kisutch*	E	E	NA	yes	–	yes

[4] Where CAL FIRE has certified a PTEIR, a PTHP may be submitted that tiers to the environmental analysis found in the PTEIR. PTHPs are described in Section 2.3.5, Program Timber Harvesting Plans.

Common name	Scientific name	Listing status[a]		CRPR status[b]	Take authorization		
		Federal (ESA	State (CESA)		NMFS[c]	USFWS[c]	CDFG[d]
Coho salmon, Southern Oregon /Northern California Coast Evolutionarily Significant Unit	*Oncorhynchus kisutch*	T	T	NA	yes	–	yes
Chinook salmon, California Coastal Evolutionarily Significant Unit	*Oncorhynchus tshawytscha*	T	–	NA	yes	–	yes
Steelhead, Central California Coast Distinct Population Segment	*Oncorhynchus mykiss*	T	–	NA	yes	–	yes
Steelhead, Northern California Distinct Population Segment	*Oncorhynchus mykiss*	T	–	NA	yes	–	yes
California red-legged frog	*Rana draytonii*	T	–	NA	–	yes	yes
Northern red-legged frog [e]	*Rana aurora*	–	–	NA	–	–	yes
Coastal tailed frog [e]	*Ascaphus truei*	–	–	NA	–	–	yes
Marbled murrelet	*Brachyramphus marmoratus*	T	E	NA	–	yes	yes
Northern spotted owl	*Strix occidentalis caurina*	T	–	NA	–	yes	yes
Point Arena mountain beaver	*Aplodontia rufa nigra*	E	–	NA	–	yes	yes
Plants							
Humboldt milk-vetch	*Astragalus agnicidus*	–	E	1B.1	–	–	yes
Small groundcone	*Boschniakia hookeri*	–	–	2.3	–	–	yes
Pygmy cypress	*Callitropsis pygmaea*	–	–	1B.2	–	–	yes
Swamp harebell	*Campanula californica*	–	–	1B.2	–	–	yes
California sedge	*Carex californica*	–	–	2.3	–	–	yes
Bristly sedge	*Carex comosa*	–	–	2.1	–	–	yes
Deceiving sedge	*Carex saliniformis*	–	–	1B.2	–	–	yes
Green yellow sedge	*Carex viridula* var. *viridula*	–	–	2.3	–	–	yes
Oregon goldthread	*Coptis laciniata*	–	–	2.2	–	–	yes
Streamside daisy	*Erigeron biolettii*	–	–	3	–	–	yes
Coast fawn lily	*Erythronium revolutum*	–	–	2.2	–	–	yes
Roderick's fritillary	*Fritillaria roderickii*	–	E	1B.1	–	–	yes

Common name	Scientific name	Listing status[a]		CRPR status[b]	Take authorization		
		Federal (ESA	State (CESA)		NMFS[c]	USFWS[c]	CDFG[d]
Pacific gilia	*Gilia capitata* ssp. *pacifica*	–	–	1B.2	–	–	yes
Glandular western flax	*Hesperolinon adenophyllum*	–	–	1B.2	–	–	yes
Thin-lobed horkelia	*Horkelia tenuiloba*	–	–	1B.2	–	–	yes
Hair-leaved rush	*Juncus supiniformis*	–	–	2.2	–	–	yes
Coast lily	*Lilium maritimum*	–	–	1B.1	–	–	yes
Baker's meadowfoam	*Limnanthes bakeri*	–	R	1B.1	–	–	yes
Mendocino bush mallow	*Malacothamnus mendocinensis*	–	–	1A	–	–	yes
Seacoast ragwort	*Packera bolanderi* var. *bolanderi*	–	–	2.2	–	–	yes
Bolander's beach pine	*Pinus contorta* ssp. *bolanderi*	–	–	1B.2	–	–	yes
White-flowered rein orchid	*Piperia candida*	–	–	1B.2	–	–	yes
North Coast semaphore grass	*Pleuropogon hooverianus*	–	T	1B.1	–	–	yes
Great burnet	*Sanguisorba officinalis*	–	–	2.2	–	–	yes
Maple-leaved checkerbloom	*Sidalcea malachroides*	–	–	4.2	–	–	yes
Siskiyou checkerbloom	*Sidalcea malviflora* ssp. *patula*	–	–	1B.2	–	–	yes
Beaked tracyina	*Tracyina rostrata*	–	–	1B.2	–	–	yes
Santa Cruz clover	*Trifolium buckwestiorum*	–	–	1B.1	–	–	yes
Oval-leaved viburnum	*Viburnum ellipticum*	–	–	2.3	–	–	yes
Running-pine	*Lycopodium clavatum*	–	–	2.3	–	–	yes
Long-beard lichen	*Usnea longissima*	–	–	–	–	–	yes

NA = not applicable

[a] Listing status under ESA and CESA:
E: endangered
T: threatened
R: rare

[b] CRPR: California Rare Plant Rank; for explanation of number ranking system, see Section 3.5, Vegetation and Plant Species of Concern.

[c] Federal incidental take permit

[d] CDFG take permit under Fish & Game Code Section 2835 *et seq.*

[e] For covered species that are not federally listed, a federal incidental take permit would only take effect if and when the species becomes federally listed.

MRC's proposed HCP/NCCP includes specific conservation strategies developed to protect or enhance ecosystem health, and measures to minimize and mitigate potential effects on covered species. The planning goals of the proposed HCP/NCCP are to manage habitats for covered species, allow economically viable timber harvesting without threatening species viability, and maintain and improve biodiversity on MRC's covered lands. An important component of the proposed HCP/NCCP is a detailed monitoring and adaptive management plan to allow for continued feedback and improvement of the conservation measures.

The TMP, which would be implemented in accordance with the proposed HCP/NCCP, describes MRC's approach to meeting maximum sustained production and includes comprehensive information on MRC's current forest conditions, forest inventory assessment, timber growth and yield modeling, and long-term silviculture and harvest planning. It includes the specific silviculture regimes that would be used on MRC forestlands over the term of the HCP/NCCP and the PTEIR. The TMP describes harvest levels and timing of harvests, as well as the management measures and standards that MRC would use for 80 years to ensure regulatory certainty and adequate funds for implementation. The TMP provides the operational guidelines to implement the conservation measures of the HCP/NCCP.

MRC is also preparing a Master Agreement for Timber Operations and requesting its approval by CDFG, pursuant to California Fish and Game Code Section 1602. The Master Agreement for Timber Operations describes the conservation and management measures MRC would implement to ensure its proposed forest management activities do not have a substantial adverse effect on stream beds, banks, or associated fish and wildlife resources. The conservation and management measures specified in the Master Agreement for Timber Operations are included in the HCP/NCCP. The PTEIR, by analyzing the environmental effects of implementing the HCP/NCCP, provides the necessary analysis for approval of the Master Agreement for Timber Operations. See Section 1.6.2.7 for additional information on the regulatory context of the Master Agreement for Timber Operations.

The proposed HCP/NCCP and TMP would be implemented on MRC's forestland in coastal Mendocino County, California. MRC forestlands are located west of Highway 101 and extend from the upper headwater streams of the Gualala River watershed in southern Mendocino County, north to the Humboldt/Mendocino County line. MRC lands are located within the coastal redwood belt, with vegetation similar to other second-growth forests in Mendocino County. The MRC forestland is predominately redwood and Douglas-fir, with a large component of hardwood.

The EIS/PTEIR assessment area for most environmental resources includes the "primary assessment area" which corresponds to the 213,000 ac (86,200 ha) covered by the proposed HCP/NCCP (Figure 1.2-1). For the analysis of cumulative effects, the assessment area for most environmental resources also includes the "secondary assessment area" which corresponds to an area that bounds timberlands that MRC could potentially acquire during the life of the permit, as well as all property owned by MRC within Mendocino county and not covered by the plan at the time of submittal of the applications for take authorization[5]. Figure 1.2-1 shows the primary and secondary assessment areas as well as the nine inventory blocks that the primary assessment area is divided into based on landscape planning and forest management.

[5] In the HCP/NCCP prepared by MRC, the term "adjustment area" is equivalent to the combined primary and secondary assessment areas in this EIS/PTEIR.

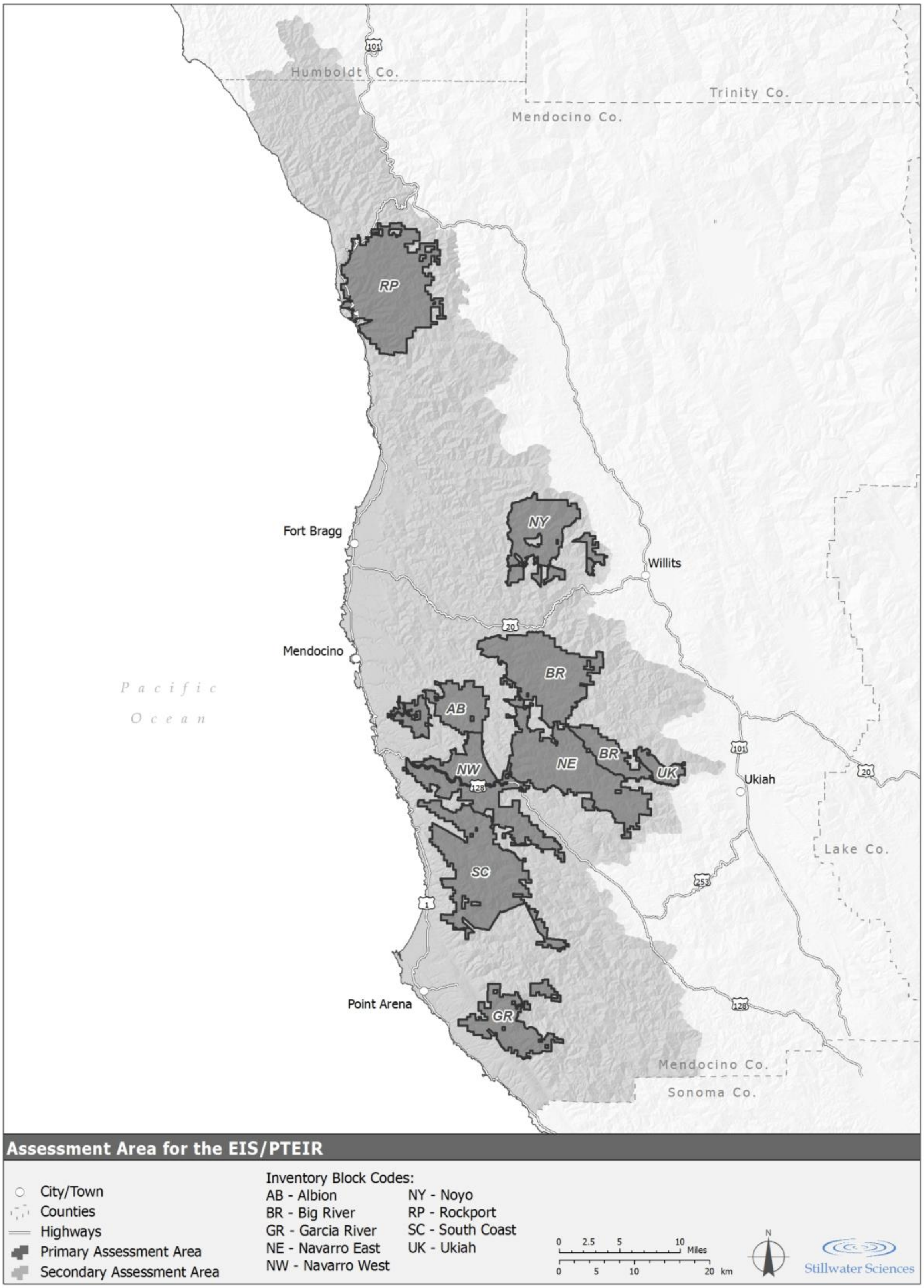

Figure 1.2-1. Project location and EIS/PTEIR assessment areas.

1.2.1 Activities covered under the HCP/NCCP

NMFS, USFWS, and CDFG are proposing to provide MRC with incidental take authorizations for a variety of forest management activities. These activities include:

- Silviculture and stand improvement.
- Vegetation management, including planting, manual brush and tree removal, and burning for site preparation.
- Commercial timber operations, which entail felling, limbing, bucking, yarding, loading, and hauling of timber, as well as maintenance and refueling of heavy equipment.
- Road and landing construction, use, maintenance, and decommissioning.
- Drafting of water in support of timber operations and road and landings programs.
- Operation of non-commercial rock pits and quarries.
- Habitat improvement and creation, including restoring drainage systems disrupted by past land use activities.
- Data collection for research and monitoring associated with the HCP/NCCP conservation measures.
- Previously approved (grandfathered) THPs.

A detailed description of the activities subject to incidental take authorization can be found in Chapter 1.14 of the proposed HCP/NCCP.

1.2.2 Alternate standards to the California Forest Practice Rules

Timber operations generally must comply with the minimum operational (specific prescriptive) standards of the CFPRs. PTHP submitters are authorized to propose alternate standards to most of the CFPRs if the state-certified PTEIR demonstrates that the standards meet specific conditions for compliance with the relevant CFPR operational standards. Alternate standards are in compliance with the operational standards of the CFPRs where the analysis in the PTEIR sufficiently demonstrates that effects would be less than significant and the alternate standards would provide equal or better protection than the standard rule (Board of Forestry and CAL FIRE 2009). This PTEIR provides an analysis of alternate operational standards that may be employed in future PTHPs, as proposed in the TMP, to ensure the proposed operational standards comply with these provisions.

Some of the operational standards (e.g., conservation and management measures) in MRC's proposed HCP/NCCP do not match those contained in the current CFPRs. MRC is therefore proposing a number of alternate standards to the CFPRs. Alternate standards are those for which MRC is proposing to use an alternative approach based on: (1) the HCP/NCCP; (2) the TMP; (3) the Master Agreement for Timber Operations; or (4) a combination of these documents. A complete list of MRC's proposed alternate standards is included as Attachment D to the TMP (the TMP is Appendix A of this EIS/PTEIR). Because the proposed alternate standards are part of the Proposed Action and the other action alternatives (Section 2, Alternatives), their effects are analyzed in Section 3, Affected Environment and Environmental Effects.

1.3 Purpose and Need for the Proposed Action

The lead agencies' purpose for the Proposed Action is to protect and conserve covered species and their habitats, while enabling the permit applicant (MRC) to continue to conduct forest management activities in compliance with the ESA, CESA, California Fish and Game Code, Z'berg-Nejedly Forest Practice Act of 1973, and CFPRs. If granted, the proposed incidental take authorizations and the certified PTEIR would authorize the incidental take of covered species and submittal of PTHPs. The Proposed Action is needed because normal, otherwise lawful operations of MRC could result in take of species presently listed as threatened or endangered. These listed species need long-term, comprehensive protection and conservation. The incidental take authorizations and HCP/NCCP provide a long-term solution that assures compliance with the ESA and CESA. An NCCP is the method MRC selected to comply with the take restrictions of CESA by following the NCCPA.

In addition, the Proposed Action is needed to efficiently comply with the environmental analysis required under the Z'berg-Nejedly Forest Practice Act of 1973, primarily for timber management purposes. The project allows for a more comprehensive review of the cumulative effects and development of more robust landscape-based protection and conservation measures than would be possible on a THP-by-THP basis.

1.4 MRC's Goals and Objectives

MRC has developed its HCP/NCCP and TMP with the purpose of conducting economically viable forest management on its covered lands while concurrently providing for the long-term conservation needs of listed species. MRC's application for incidental take authorization is driven by the company's need for: (1) approval under state and federal environmental laws of its long-term sustainable forestry practices and conservation strategies (as reflected in the HCP/NCCP and TMP); (2) regulatory stability and certainty; (3) operation of a successful business; and (4) maintaining nationally-recognized forest stewardship certification. No-take regulations can reduce or eliminate timber harvest and other forest management activities and severely constrain MRC's ability to operate in a financially viable manner. Because of the potential financial burden to MRC and constraints on habitat improvement, these regulations can also reduce or eliminate incentives for future habitat conservation and restoration. Without an approved HCP/NCCP and the requested incidental take authorizations, MRC would likely not be able to meet these needs and would likely adopt more traditional forestry practices. Thus the Proposed Action (i.e., approval of the HCP/NCCP, certification of the PTEIR and TMP, and issuance of the incidental take authorizations) is needed to make it possible for MRC to manage its lands using the long-term conservation strategies and sustainable forestry practices reflected in the HCP/NCCP and TMP.

1.5 Decisions to be Made

Issuance of incidental take permits by USFWS and NMFS is considered a major federal action that requires analysis and disclosure of the potential environmental effects of the action under NEPA. Likewise, the certification of a PTEIR by CAL FIRE pursuant to the CFPRs and issuance of a take permit by CDFG pursuant to the NCCPA are actions that require analysis of environmental effects under CEQA. In addition, CDFG will approve the Master Agreement for Timber Operations. Associated decisions for which the lead agencies are responsible are described below.

1.5.1 Federal actions

USFWS and NMFS, as federal lead agencies, are required by NEPA to analyze the environmental effects of issuing the requested incidental take permits and subsequent implementation by MRC of the proposed HCP/NCCP. USFWS and NMFS (collectively referred to as the Services) must decide whether to issue the incidental take permits.

Under Section 10(a)(2)(B) of the ESA the Services may issue an incidental take permit if, after public comment on the draft HCP/NCCP and Implementing Agreement and no sooner than 30 days after filing of a final EIS with Environmental Protection Agency, they find that:

- The taking will be incidental to otherwise lawful activities.
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.
- The applicant will ensure that adequate funding for the HCP and procedures to deal with unforeseen circumstances will be provided.
- The taking will not appreciably reduce the likelihood of survival and recovery of covered species in the wild.
- The applicant will ensure that other measures the Services may require as being necessary or appropriate will be provided.
- The Services have received such other assurances as may be required that the HCP will be implemented (USFWS and NMFS 1996).

In addition, the following general permit issuance criteria (per 50 CFR §13.21) must be met:

- The applicant has not been assessed a civil penalty or convicted of any criminal provision of any statute or regulation relating to the activity for which the application is filed, if such assessment or conviction evidences a lack of responsibility.
- The applicant has not failed to disclose material information required, and has not made false statements as to any material fact in connection with the application.
- The applicant has demonstrated a valid justification for the permit and a showing of responsibility.
- The authorization requested does not potentially threaten any wildlife or plant population.
- The applicant is determined to be qualified.

1.5.2 State actions

As the state lead agency, CAL FIRE is required by CEQA to analyze the environmental effects associated with managing MRC's timberlands in accordance with the TMP and the proposed HCP/NCCP. CDFG, acting as a responsible agency under CEQA in approving the proposed NCCP, will rely upon the final PTEIR certified by CAL FIRE when making its CEQA findings. CDFG will use the CEQA analysis in the EIS/PTEIR to issue the Master Agreement for Timber Operations.

1.5.2.1 CAL FIRE

CAL FIRE is the state lead agency ensuring that the PTEIR is in compliance with CEQA. CAL FIRE is responsible for ensuring that:

- The procedural steps in the PTEIR development are completed in accordance with the requirements of CEQA.
- The PTEIR and supporting documents meet generally accepted legal standards.
- The PTEIR meets the intent of the Z’berg-Nejedly Forest Practice Act of 1973.

- The PTEIR is prepared in accordance with the CFPRs (specifically, Article 6.8).

CAL FIRE, prior to certifying the PTEIR, will determine if the level of detail and specificity found in the PTEIR is sufficient to ensure that all potential environmental effects that may arise during PTHP operations are less than significant or can be mitigated to a level of less than significant through the application of mitigations developed in the PTEIR (Board of Forestry and CAL FIRE 2009).

As stated above, CAL FIRE is required to determine the adequacy of a PTEIR similar to any other EIR, under CEQA. In addition, a PTEIR's adequacy must be determined under the CFPRs. The following rule sections specifically address a PTEIRs adequacy under the CFPRs:

- 14 CCR §1092(b)—"…alternate standards may only be accepted by the Director when the PTEIR provides an analysis demonstrating that the implementation will result in impacts which are below the level of significant effect on the environment as defined in the State CEQA Guidelines (14 CCR §15382) and other applicable laws."
- 14 CCR §1092(c)—"Alternate standards may only be used in a PTHP where the analysis of potential impacts and mitigations in the PTEIR is of such detail that a reasonable person could reach a conclusion that the resulting impacts would be less than significant."
- 14 CCR §1092(d)—"…the planning (performance) standards which are to be incorporated into a THP under the functional equivalent process shall be addressed within the PTEIR to achieve the performance objectives set forth in the intent language of the regulation. The PTEIR shall demonstrate how resource protection set forth in the intent of the Act is provided for on the area encompassed by the PTEIR."
- 14 CCR §1092.01(b)—"The PTEIR shall assess impacts and provide mitigation for those on and off-site impacts resulting from timber operations involved with an ownership, portion of an ownership, or multiple ownerships…"
- 14 CCR §1092.01(c)—"The checklist which accompanies a PTHP must be developed in each PTEIR to address the site-specific effects and practices for each ownership, portion of an ownership, or multiple ownerships. The checklist shall indicate mitigation to be applied in all areas of resource protection addressed in the PTEIR for individual and cumulative effects, including but not limited to air, wildlife, water, soil, recreation, hazard reduction, pest protection, noise, aesthetics, cultural resources, areas regulated by the board in Sections 4513, 4551, 4551.5, 4561, and 4581 of the Public Resources Code."
- 14 CCR §1092.02—"In certifying the PTEIR and adopting the CEQA findings, the Director shall certify that the timberland management described in the PTEIR will achieve the resource protection goals in PRC [Public Resources Code] Sections 4513, 4551, 4561, and 4581 and any goals that may be required by CEQA."

PTEIRs, like other CEQA documents, are subject to the review and comment of other agencies and the public. Once a draft PTEIR has been accepted by CAL FIRE as sufficient for public review, it is filed with the State Clearinghouse in accordance with 14 CCR §15087 for a minimum 45 day public review. Consultation with responsible or trustee agencies in accordance with 14 CCR §15086 consists of written comments submitted with regard to the adequacy of the draft PTEIR in disclosing, analyzing and mitigating the project's effects. Similarly, the public is invited to submit comment in writing, or if determined necessary, orally at one or more public hearings. All comments received are responded to in a final PTEIR.

CAL FIRE's preparation of a final PTEIR, certification of the PTEIR, issuance of findings, and project approval follows the procedures found in 14 CCR §15089 through §15092. In some cases, approvals of other non-federal permits and plans necessary for implementation of the PTEIR cannot occur until the PTEIR has been certified by CAL FIRE as lead agency. The Director of CAL FIRE (CCR §1092.01[a]) is responsible for certifying the PTEIR.

1.5.2.2 CDFG

CDFG, as a state responsible agency, must rely on the analysis provided in the final PTEIR certified by CAL FIRE, the lead agency, and decide whether to authorize take of any identified species whose "conservation and management" is provided for in the NCCP. Under the NCCPA, CDFG must make the following findings (paraphrased) in order to approve an NCCP and authorize take (California Fish and Game Code Section 2820[a]):

- The NCCP has been developed consistent with the process identified in the planning agreement entered into pursuant to Section 2810.
- The NCCP integrates adaptive management strategies that are periodically evaluated and modified based on the information from the monitoring program and other sources, which will assist in providing for the conservation of covered species and ecosystems within the plan area.
- The NCCP provides for landscape- or ecosystem-level protection through the creation and long-term management of habitat reserves or other comparable measures.
- Reserve systems and conservation measures in the NCCP area meet guidelines to maintain ecological integrity of large habitat blocks, ecosystem function, and biological diversity.
- The NCCP identifies activities, and any restrictions on those activities, allowed within reserve areas that are compatible with the conservation of species, habitats, natural communities, and their associated ecological functions.
- The NCCP contains specific conservation measures that meet the biological needs of covered species, based upon the best available scientific information.
- The NCCP contains a monitoring and adaptive management program.
- The NCCP includes the estimated timeframe and process by which the reserves or other conservation measures are to be implemented, including obligations of landowners and plan signatories and consequences of the failure to acquire lands in a timely manner.
- The NCCP contains provisions that ensure adequate funding to carry out the conservation actions identified in the plan.

Concurrent with the approval of a final NCCP, CDFG must establish a list of species authorized for take, and must find that the mitigation measures specified in the NCCP are consistent with the intent of the NCCPA (as defined in California Fish and Game Code Section 2821).

1.6 Regulatory Context

1.6.1 Federal law

1.6.1.1 National Environmental Policy Act

NEPA requires federal agencies to identify, avoid, and mitigate any environmental effects of their actions. The Act applies to any action that requires a federal permit or entitlement, is federally funded, is undertaken by a federal agency, or would occur on federal land. The Council on Environmental Quality regulations implementing the procedural provisions of NEPA (40 CFR

§1500–1508) require all federal agencies to analyze the impacts of their proposed actions and to include other agencies and the public in the process.

1.6.1.2 Endangered Species Act

Section 9 of the ESA prohibits unauthorized "take" of endangered species. In addition, Section 4(d) of the ESA authorizes take prohibitions to be extended to threatened species by special regulation. Take is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct," and includes habitat modification. "Harm" has been defined in regulations as including "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering" (40 FR 44412, 46 FR 54748, 50 CFR §17.3, 64 FR 60727). The ESA requires both the Department of Interior (USFWS as implementing agency) and the Department of Commerce (NMFS as implementing agency) to identify critical habitat for all listed species, unless it is determined that designation of critical habitat will not benefit the species. Effects on critical habitat must be considered in the determination by USFWS and NMFS of the degree to which the Proposed Action may adversely affect listed species. Critical habitat has been designated for several species for which MRC is seeking incidental take authorization under the proposed HCP/NCCP, including the marbled murrelet and anadromous salmonids. Information on the listing status and critical habitat designation, if any, is provided for each listed species in Appendix B.

Under Section 10(a)(1)(B) of the ESA, an incidental take permit may be issued to a non-federal entity if take is incidental to an otherwise lawful activity, the incidental take permit application meets all issuance criteria, and an HCP is developed for the activity.

1.6.1.3 Migratory Bird Treaty Act

Compliance with the Migratory Bird Treaty Act will be addressed by USFWS during its review of the HCP. Species listed under the ESA or CESA and subject to the Migratory Bird Treaty Act, but for which MRC is not seeking coverage under its incidental take authorization applications, will be subject to management standards that ensure no "take" occurs. The incidental take permits will serve as a special purpose permit under 50 CFR §21.27 that would grant an exception to the prohibition on take of all covered species identified in 50 CFR §10.13. These species include marbled murrelet and northern spotted owl, which are listed in 50 CFR §10.13 as migratory birds. Over the life of the proposed HCP/NCCP, take for scientific or depredation purposes of birds covered under the Migratory Bird Treaty Act may be necessary. During its review of the HCP, the USFWS will assure that such take complies with the permit procedures of the Migratory Bird Treaty Act.

1.6.1.4 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act prohibits the take, possession, sale, or transport of bald and golden eagles within U.S. jurisdiction. Nothing in the Proposed Action or any of the alternatives provides any relief or direction pertaining to compliance with the Bald and Golden Eagle Protection Act, and all applicable aspects of the Bald and Golden Eagle Protection Act will remain applicable to MRC.

1.6.1.5 Clean Water Act

The U.S. Environmental Protection Agency and the state's regional water quality control boards are the agencies responsible for implementing Section 303(d) of the Clean Water Act. Other aquatic resource protections within the Clean Water Act are implemented by state agencies and covered by state regulations, such as the CFPRs and the Porter-Cologne Water Quality Control Act. See Section 1.6.2.5 for a discussion of the Porter-Cologne Water Quality Control Act and other state water quality regulatory processes.

1.6.1.6 Clean Air Act

The Clean Air Act of 1967, as amended in 1990 (42 United States Code 7401, *et seq.*), established national ambient air quality standards for several pollutants. These ambient air quality standards represent the safest levels for each contaminant, according to the various thresholds of each pollutant for causing adverse health effects. The Environmental Protection Agency, through the Clean Air Act, regulates emissions of certain greenhouse gases through its stationary source emission regulations. Currently, no federal regulations or standards specifically regulate greenhouse gas emissions for the purposes of addressing climate change. However, the Environmental Protection Agency has recognized climate change as a threat to water supply (EPA 2008a). Other air quality protections, including greenhouse gas emission regulations, are implemented by state agencies and covered by state regulations, such as the California Clean Air Act. See Section 1.6.2.6 for a discussion of the California Clean Air Act and other state air quality regulatory processes.

1.6.1.7 National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966 requires federal agencies to take into account the effects of their undertakings on historic properties, and to afford the Advisory Council on Historic Preservation (created by National Historic Preservation Act) a reasonable opportunity to comment. Per Section 106, federal agencies must consult with State Historic Preservation Officers to determine the potential effect of a federal action on historic and archaeological resources that are eligible for the National Register of Historic Places.

The federal lead agencies are coordinating with local Native American tribes to address tribal trust resources. In addition, a programmatic agreement among USFWS, NMFS, the California State Historic Preservation Office, CAL FIRE, and MRC will ensure compliance with the National Historic Preservation Act with regard to the covered activities that have the potential to impact cultural and historic resources.

1.6.2 State law

1.6.2.1 California Environmental Quality Act

CEQA was enacted in 1970 (Public Resources Code Section 21000 *et seq*.) as a system of checks and balances for land-use and management decisions by California and local agencies. As NEPA applies to federal actions, CEQA applies to actions that require a permit or entitlement from a local or state agency, or is funded or undertaken by a local or state agency. CEQA requires preparation of an EIR if the proposed project will result in significant environmental effects. A programmatic EIR, such as a PTEIR, evaluates actions that are similar due to location, timing or potential effects, and can often be mitigated in similar ways, thereby eliminating the need for repetitive review of related actions on a project-by-project basis. Programmatic Environmental

EIR also allow for a more exhaustive consideration of cumulative effects than would be possible if each project was considered individually.

1.6.2.2 California Endangered Species Act and California Native Plant Protection Act

The CESA of 1970 defined rare and endangered wildlife species, prohibited the importation, take, possession, and sale of endangered and rare species, and gave authority to the Fish and Game Commission to identify such animals in California. The 1970 California Species Preservation Act directed CDFG to inventory all threatened fish and wildlife, develop criteria for rare and endangered species and report to the Governor and Legislature every two years on the status of these animals. The California Native Plant Protection Act of 1977 directed CDFG to preserve, protect, and enhance native plants. It gave the Fish and Game Commission the power to designate native plants as endangered or rare and to require permits for collecting, transporting, or selling such plants (CDFG 2000).

Anyone wishing to conduct activities that may “take” (defined in Section 86 of the California Fish and Game Code as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill”) any species listed as threatened or endangered by the State of California must seek a take permit from CDFG. Pursuant to Section 2081 of the California Fish and Game Code, CDFG may grant a permit for the take of endangered, threatened, and candidate species if all of the following conditions are met:

- The take is incidental to an otherwise lawful activity.
- The effects of the authorized take are minimized and fully mitigated.
- The permit is consistent with other regulations.
- Adequate funding is ensured to implement the minimization and mitigation measures, and for monitoring compliance with, and effectiveness of, those measures (California Fish and Game Code Section 2081).

A federal Section 10(a)(1)(B) incidental take permit is considered acceptable for meeting California’s incidental take authorization requirements, provided CDFG finds it is consistent with all the requirements of CESA (referred to as a Consistency Determination under California Fish and Game Code Section 2080.1). As an alternative to a take permit under Section 2081 or 2080.1, individuals or organizations whose activities may affect California natural communities can prepare an NCCP (described below), which can also lead to issuance of a permit authorizing take of both listed and unlisted species, pursuant to California Fish and Game Code Section 2835.

1.6.2.3 Natural Community Conservation Planning Act

The NCCPA promotes the protection of natural habitats and communities in California through the implementation of an NCCP. The NCCP program is administered by CDFG and is a voluntary, cooperative effort to identify and provide for the regional or area-wide protection of plants, animals, and their habitats, while allowing compatible economic activity. Similar to the HCP process and federal incidental take permits, an approved NCCP provides take authorization for take of state-listed species when it is incidental to otherwise legal activities. In contrast to a permit under Section 2081, take authorization under an NCCP can be granted for both listed and unlisted species. CDFG's approval of an NCCP is a discretionary action that must comply with CEQA. The NCCPA also requires coordination with federal wildlife agencies with respect to the ESA.

In addition to measures to protect habitat, communities, and biological diversity at a landscape or ecosystem level, an NCCP must include an adaptive management and monitoring program, a timeline for implementing the plan, and assurances that adequate funding will be available. The NCCP process also includes a provision for establishing a public participation process and inclusion of independent scientific input.

1.6.2.4 California Forest Practice Act and Forest Practice Rules

The Z'berg-Nejedly Forest Practice Act of 1973 authorizes the Board of Forestry and Fire Protection to adopt rules (the CFPRs) that govern all timber-harvest-related activities on private and non-federal public forestlands in California. The CFPRs include resource protection measures that are required for regulated timber activities, and are enforced by CAL FIRE through the approval of Timber Harvesting Plans (THPs). The California Secretary of Resources has certified the regulation of timber harvesting operations by CAL FIRE and Board of Forestry and Fire Protection as CEQA functional equivalents; therefore a THP substitutes for an EIR for CEQA compliance. In 1998 the Board of Forestry and Fire Protection adopted PTEIR/PTHP rules (CCR §1092 *et seq.*) that extended the program EIR concept found in CEQA to include THPs as functional equivalents under CEQA. Where CAL FIRE has certified a PTEIR, a PTHP may be submitted that tiers to the environmental analysis found in the PTEIR.

In addition to timber harvesting rules related to sustained production, the CFPRs also include rules intended to avoid, minimize, or mitigate effects on other resource values such as water quality, fish and wildlife habitat, recreation, and cultural resources. The rules contain guidelines for assessing site-specific effects and developing mitigation measures that involve the participation of a review team. The review team is chaired by CAL FIRE and is comprised primarily of representatives of the Regional Water Quality Control Board, CDFG, and California Geological Survey. The review team assists the CAL FIRE Director in determining if plans are in conformance with Board rules, in evaluating the potential environmental impacts of timber operations, and considering feasible alternatives or additional mitigation. The rules also contain prescriptive rules such as Watercourse and Lake Protection Zone[6] rules (e.g., harvest restrictions in riparian buffer zones), sensitive species rules (e.g., buffer zones and timing restrictions), and anadromous salmonid protection rules.

On 7 October 2009, the Board of Forestry and Fire Protection adopted a set of regulations for commercial timber harvesting on private land in watersheds inhabited by listed anadromous salmonid species (Chinook salmon, coho salmon, and steelhead). The rules, known as the Anadromous Salmonid Protection rules, were adopted as permanent regulations. They replaced rules (termed Threatened or Impaired Watershed Rules) which had been in place on an interim basis since their adoption in July 2000.

The goals of the Anadromous Salmonid Protection rules are to promote achievement of properly functioning salmonid habitat, contribute to recovery of salmonid species and restoration of salmonid habitats, and protect riparian zones from catastrophic wildfires. The Anadromous Salmonid Protection rules do not explicitly ensure take avoidance, and do not provide incidental

[6] A Watercourse and Lake Protection Zone is defined by the 2012 CFPRs as "a strip of land, along both sides of a watercourse or around the circumference of a lake or spring, where additional practices may be required for protection of the quality and beneficial uses of water, fish and riparian wildlife habitat, other forest resources and for controlling erosion." The standard width of the Watercourse and Lake Protection Zone and/or the associated basic protection measures is determined using specific guidelines outlined in the 2012 CFPRs.

take authorization. To accomplish the Anadromous Salmonid Protection goals, Class I and Class II[7] Watercourse and Lake Protection Zone widths and silvicultural requirements were revised to better reflect current science for protecting riparian function. These revisions established a core zone, increased overstory canopy closure requirements for greater distances on Class I watercourses, and recognized two subcategories of Class II watercourses—Large and Standard—both with unique tree retention and core zone requirements. In addition, the Anadromous Salmonid Protection rules include enhanced standards for small, headwater watercourses (Class III watercourses): harvesting restrictions for trees in the channel zone; expansion of Equipment Limitation Zones along Class III watercourses; and retention of hardwoods, advanced regeneration or larger conifer trees, standing dead trees, and down woody debris and logs in the Class III channel and Equipment Limitation Zones.

1.6.2.5 Porter Cologne Water Quality Control Act

California's Porter Cologne Water Quality Control Act establishes the State Water Resources Control Board and the nine Regional Water Quality Control Boards, with the primary responsibility of coordination and control of water quality regulations in the state. The Act authorizes Regional Water Quality Control Boards to develop Basin Plans that establish water quality objectives necessary to reasonably protect designated beneficial uses, such as municipal and domestic water supplies, fish and wildlife habitat, recreation, and others. The beneficial uses of water in the assessment area, as designated in the Water Quality Control Plan for the North Coast Region (Basin Plan) (NCRWQCB 2001a) are discussed in detail in Section 3.3 (Hydrology, Beneficial Uses of Water, and Water Quality). The Regional Water Quality Control Boards are also responsible for implementation, monitoring, and enforcement of their Basin Plans.

MRC's forestlands are within the jurisdiction of the North Coast Regional Water Quality Control Board. The North Coast Basin Plan contains several water quality objectives that may be affected by timber harvest activities, such as objectives for turbidity, floating material, and suspended sediment. The Basin Plan also contains guidelines specific to timber harvest activities, and pursuant to their authority under the Porter-Cologne and Clean Water Acts, the North Coast Regional Water Quality Control Board can regulate timber harvest practices that may affect water quality. Additionally, under the CFPRs, THPs are required to comply with Basin Plan provisions. As part of its long-term sustainable forest management plan, MRC has entered into a water quality memorandum of understanding with the North Coast Regional Water Quality Control Board to meet the Basin Plan's water quality objectives (NCRWQCB 2007). The North Coast Regional Water Quality Control Board and MRC will develop Ownership-wide Waste Discharge Requirements that include by reference the water quality control measures contained in the HCP/NCCP. The intent is that the waste discharge requirements will: (1) incorporate the HCP/NCCP water quality measures; (2) protect the beneficial uses of waters on MRC's land that could be affected by MRC's activities; and (3) comply with the Porter-Cologne Act, the Basin Plan, and the Clean Water Act. The analysis in the EIS/PTEIR may support issuance of the waste discharge permits.

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[7] Streams are classified in the CFPRs according to their ability to support aquatic life (CAL FIRE 2012). The lead agencies and MRC also use this stream classification scheme, and thus data pertaining to streams and riparian buffer zones are reported and analyzed in this EIS/PTEIR by stream class. Class I streams have fish present or seasonally present on-site. Class I streams include habitat to sustain fish migration and spawning. Class II streams do not support fish but provide habitat for non-fish aquatic species. Class III streams do not support aquatic life but do transport sediment and organic material downstream to Class I and Class II streams.

Under Section 303(d) of the federal Clean Water Act, the Regional Water Quality Control Boards can list water bodies as “water quality limited” for sediment or temperature. This designation is assigned to streams where established water quality objectives are not being met or where beneficial uses are not protected. Placement of a waterbody on the 303(d) List acts as the trigger for developing a pollution control plan, called a Total Maximum Daily Load for each water body and associated pollutant/stressor on the list. The Total Maximum Daily Load serves as the means to attain and maintain water quality standards for the impaired water body. Conservation strategies included in the proposed HCP/NCCP are intended to be consistent with Total Maximum Daily Load objectives. The North Coast Regional Water Quality Control Board has the opportunity to review the proposed HCP/NCCP for its potential effects on water quality.

1.6.2.6 Air quality regulations

Air quality is regulated through the efforts of various federal, state, regional, and local government agencies pursuant to authority granted by legislative and executive acts. These agencies work jointly and individually to improve air quality through legislation, regulations, planning, policy making, education, and a variety of programs.

California Clean Air Act

The California Clean Air Act requires that air quality plans be prepared for areas of California that have not met state air quality standards for ozone, carbon monoxide, nitrogen dioxide, and sulfur dioxide. Among other requirements of the California Clean Air Act, the plans must include a wide range of implemental control measures, which often include transportation control measures and performance standards. In order to implement the transportation-related provisions of the California Clean Air Act, local air pollution control districts have been granted explicit authority to adopt and implement transportation controls.

Greenhouse gas regulations

A summary of selected state regulations and standards related to greenhouse gas emissions from forest management practices is provided below.

Executive Order S-3-05

Executive Order S-3-05 was signed into law in 2005, and calls for a reduction of greenhouse gas emissions to 2000 levels by 2010, a reduction of greenhouse gas emissions to 1990 levels by 2020, and a reduction of greenhouse gas emissions to 80% below 1990 levels by 2050. The order also includes a reporting requirement for California Environmental Protection Agency to the governor and legislature. The public review draft report, *Climate Action Team Proposed Early Actions to Mitigate Climate Change in California*, was released in April 2007 (CAT 2007). The California Air Resources Board released its Expanded List of Early Action Measures in October 2007.

California Global Solutions Act of 2006 (Assembly Bill 32)

Assembly Bill 32 is California’s legislative effort aimed at reducing greenhouse gas emissions. This law requires California Air Resources Board to design and implement emission limits, regulations, and other measures, such that statewide greenhouse gas emissions are reduced in a technologically feasible and cost-effective manner to 1990 levels by 2020 (representing a 25% reduction from the levels of 2006).

Pursuant to Assembly Bill 32, California Air Resources Board must develop an implementation program and adopt control measures to achieve the maximum technologically feasible and cost-effective greenhouse gas reductions. Assembly Bill 32 requires California Air Resources Board to prepare a Scoping Plan to achieve reductions in greenhouse gas emissions in California. In December 2008, California Air Resources Board finalized the Assembly Bill 32 Scoping Plan for Board review (CARB 2008). The Scoping Plan was amended and re-approved by the California Air Resources Board in 2011 (CARB 2011a). The Assembly Bill 32 Scoping Plan contains the key strategies California will use to reduce the greenhouse gas emissions that are thought to cause climate change. With respect to forestry practice, the Scoping Plan provides:

> *"The 2020 Scoping Plan target for California's forest sector is to maintain the current 5 million metric tons of CO_2 [carbon dioxide] equivalent of sequestration through sustainable management practices, potentially including reducing the risk of catastrophic wildfire, and the avoidance or mitigation of land-use changes that reduce carbon storage."*

The California Air Resources Board goals recognize that California's forestlands reduce greenhouse gas emissions (specifically carbon dioxide emissions) by sequestering atmospheric carbon in trees and plants. The California Air Resources Board (2008, 2011a) estimated that California's forestlands currently have a net annual sequestration of 5 million metric tons of carbon dioxide equivalent. The California Air Resources Board has requested that the Board of Forestry undertake a program that maintains this current level of sequestration and develop opportunities to increase the level of sequestration.

Senate Bill 97

Senate Bill 97 requires the Office of Planning and Research to prepare, develop, and transmit to the California Resources Agency guidelines for the feasible mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions. The Office of Planning and Research is further required to periodically update the guidelines to incorporate new information or criteria established by California Air Resources Board pursuant to the California Global Warming Solutions Act of 2006. On 30 December 2009, the California Resources Agency adopted *CEQA Guidelines Amendments for Determining the Significance of Impacts from Greenhouse Gas Emissions*. Consistent with the existing CEQA Guidelines Section 15064.7, the *Amendments* add Section 15064.4, which provides that in making a significance determination related to effects of greenhouse gas emissions on the environment, a lead agency should consider the following factors (among others): "The extent to which the project may increase or reduce greenhouse gas emissions as compared with the existing environmental setting" and "The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions."

1.6.2.7 Section 1600 of the California Fish and Game Code

Section 1600 *et seq.* of the California Fish and Game Code provides that CDFG must be notified before any entity begins a project that will "substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the department, or use any material from the streambed." If CDFG determines that a proposed project may substantially adversely affect existing fish or wildlife resources, a Lake or Streambed Alteration Agreement must be obtained and the proposed project, unless otherwise exempt, must be reviewed in accordance with CEQA. MRC has notified CDFG regarding a long-term streambed alteration agreement called a Master Agreement for Timber Operations which relies on the CEQA analysis in this EIS/PTEIR as part of its programmatic approach to permitting stream crossings and water drafting.

1.6.2.8 The California Coastal Act of 1976 and the Federal Coastal Zone Managemant Act

The California Coastal Act of 1976 mandates that the California Coastal Commission protect and enhance the coastal zone, an area specifically designated and mapped by the legislature. Local governments work with the California Coastal Commission to develop Local Coastal Plans that are the primary means for implementing the policies of the Coastal Act at the local level. The Coastal Act protects lands for timber production and its requirements do not overlap or conflict with timber harvesting practices regulated by CAL FIRE. The environmental protections and highway capacity restrictions included in the California Coastal Act also restrict converting zoned timberland from timber harvesting uses.

New development that may cause a change in the density or intensity of land use in the coastal zone requires a coastal development permit from either the California Coastal Commission or the local government. Certain activities are exempt from coastal development permits, including timber operations conducted under a THP submitted pursuant to the provisions of the Z'berg-Nejedly Forest Practice Act of 1973.

The federal Coastal Zone Management Act requires each coastal state to prepare a coastal management program; the California Coastal Act and the California Coastal Management Program comprise the State of California's coastal management program. The Coastal Zone Management Act contains a federal consistency requirement that triggers a review by the California Coastal Commission of applications for federal permits that reasonably can be expected to affect any land or water use or natural resources within the coastal zone. If the California Coastal Commission determines that the action will have an effect, it must assess whether the activities meet the requirements of the California Coastal Management Program. The lead agencies must coordinate with the California Coastal Management Program to determine whether a consistency determination is required. The forest management measures proposed by MRC are consistent with the policies for environmentally sensitive habitat areas and wetlands included in the California Coastal Act and the California Coastal Management Program. MRC has committed to ongoing coordination with the California Coastal Commission and to providing the proposed HCP/NCCP to the California Coastal Commission for review.

1.7 Public Scoping

USFWS and NMFS jointly published the Notice of Intent for the preparation of an EIS/EIR[8] for the proposed issuance of incidental take permits to MRC on 6 June 2002 (67 FR 38932–38934). In addition, as part of the federal agencies' tribal trust responsibilities, the USFWS and NMFS also contacted relevant Native American tribes with correspondence dated 4 October 2002 and 22 September 2009. Simultaneously, CDFG published the Notice of Prepation for the MRC EIS/EIR on 17 June 2002 (OPR State Clearinghouse, SCH No. 2002062055) as CEQA lead agency at that time. Public scoping meetings were held on 25 June 2002 in Santa Rosa, California; 26 June 2002 in Ukiah, California; and 27 June 2002 in Fort Bragg California (Appendix C).

In response to MRC's decision to obtain CAL FIRE's certification of a PTEIR, CAL FIRE became the CEQA lead agency and initiated an additional public scoping process. CAL FIRE

[8] At the time of Notice of Intent publication, MRC had not yet decided to prepare a PTEIR for CAL FIRE's certification in place of a standard EIR. The Notice of Intent references the EIS/EIR.

published a subsequent Notice of Preparation on 10 March 2006 (OPR State Clearinghouse, SCH No. 2006032049. As part of the additional public scoping process, public scoping meetings were held on 23 March 2006 in Fort Bragg, California and 28 March 2006 in Ukiah, California. The public scoping process and comments received during public scoping are described in the public scoping reports (Appendix C).

2 ALTERNATIVES

2.1 Development of Alternatives

The No Action alternative, Proposed Action, and the other alternatives are described in this section. Alternatives to the Proposed Action were developed by the federal and state lead agencies based on comments received during public scoping and potential alternatives suggested by the lead agencies. An initial list of proposed alternatives was developed, from which a final set of alternatives was selected for analysis in this EIS/PTEIR (Table 2.1-1).

Table 2.1-1. Alternatives initially proposed and those selected for analysis.

Alternatives initially proposed	Selected for analysis?	Alternatives selected for analysis
No Action	Yes	No Action
Proposed Action (80-year incidental take authorization and HCP/NCCP)	Yes	Proposed Action (80-year incidental take authorization and HCP/NCCP)
Enhanced aquatic protection/riparian buffers	Yes (combined into Alternative A)	Alternative A (80-year incidental take authorization and enhanced HCP/NCCP)
Reduced effects on sensitive species (or additional covered species)		
Terrestrial reserves and increased habitat connectivity	Yes	Alternative B (80-year incidental take authorization and terrestrial reserves)
Shorter incidental take authorization term (10, 15, 25 or 50 years)	Yes (combined into Alternative C)	Alternative C (40-year incidental take authorization, fewer covered species and HCP/2080 *et seq*. only)
Fewer covered species		
Application of Northwest Forest Plan/Forest Ecosystem Management Assessment Team standards	No	
Restoration	No	
Mixed use	No	
THP/process-based	No	

As required by NEPA and CEQA, the alternatives to the Proposed Action must include a reasonable range of alternatives that are potentially feasible and meet the purpose and need. Additionally, CEQA requires that the alternatives be capable of avoiding or substantially lessening one or more of the potentially significant effects of the project. Initial alternatives that did not meet these criteria were rejected (i.e., not selected for analysis in this EIS/PTEIR).

2.1.1 Alternatives selected for detailed analysis

Alternatives to analyze in detail were selected from the initial list of alternatives based on their ability to meet the purpose and need for the Proposed Action (see Section 1, Purpose and Need). The alternatives selected for detailed analysis include the Proposed Action, a No Action alternative, and three additional alternatives that represent a reasonable and potentially feasible range of alternatives to the Proposed Action (Table 2.1-1). A detailed description of the analyzed alternatives is provided in Sections 2.2 through 2.6, and in Appendix D. A brief comparative summary of the analyzed alternatives is presented in Table 2.1-2.

The description of the alternatives in Sections 2.2 through 2.6 includes details of the conservation and management measures that would be implemented under each alternative. These measures, and the projected environmental conditions that would result from their implementation, provide the basis for the comparative analysis of effects of each alternative in Section 3 (Affected Environment and Environmental Effects). Section 2.1.2, below, describes the use of timber modeling to predict future forest conditions under each alternative.

Table 2.1-2. Comparison of alternatives selected for detailed analysis in the EIS/PTEIR.

No Action (No incidental take authorization, No HCP/NCCP)	Proposed Action (Incidental take authorization, HCP/NCCP, and TMP)	Alternative A (Incidental take authorization, Enhanced HCP/NCCP)	Alternative B (Incidental take authorization, Terrestrial reserves)	Alternative C (Shorter incidental take authorization term, HCP only, fewer covered species)
Federal ESA compliance for covered species				
Federal incidental take permit not issued. Take prohibitions for listed species apply. HCP not prepared.	Federal incidental take permit issued for 80-year term under ESA (Section 10[a]1[B]). HCP prepared.	Same as Proposed Action.	80-year federal incidental take permit issued for marbled murrelet and northern spotted owl only outside of reserves under ESA (Section 10[a]1[B]). Take prohibitions for other listed species apply. HCP prepared.	Federal incidental take permit issued for 40-year term. HCP prepared.
California ESA compliance for covered species				
Take prohibitions for listed species apply. State of California NCCP not prepared.	State take permit issued for 80-year term under NCCPA (California Fish & Game Code Section 2835 *et seq*.) NCCP prepared.	Same as Proposed Action.	State take permit issued for 80-year term under CESA (California Fish and Game Code Section 2080.1 or 2081) for state-listed HCP-covered species only (i.e., marbled murrelet) outside of reserves. Take prohibitions for other state-listed species apply. NCCP not prepared.	State take permit issued for 40-year term under CESA (California Fish and Game Code Section 2080.1 or 2081) for state-listed covered species only. Take prohibitions for other state-listed species apply. NCCP not prepared.
Covered species				
None	Coho salmon (2 Evolutionarily Significant Units), Chinook salmon, steelhead (2 Distinct Population Segments), red-legged frogs, coastal tailed frog, marbled murrelet, northern spotted owl, Point Arena mountain beaver, and 31 species of plants.	Same as Proposed Action.	Marbled murrelet and northern spotted owl.	Coho salmon (2 Evolutionarily Significant Units), Chinook salmon, steelhead (2 Distinct Population Segments), California red-legged frog, marbled murrelet, northern spotted owl, and state-listed plants.

No Action (No incidental take authorization, No HCP/NCCP)	Proposed Action (Incidental take authorization, HCP/NCCP, and TMP)	Alternative A (Incidental take authorization, Enhanced HCP/NCCP)	Alternative B (Incidental take authorization, Terrestrial reserves)	Alternative C (Shorter incidental take authorization term, HCP only, fewer covered species)
Timber harvesting and forest management activities				
Forest management per MRC's 2000 Management Plan (MRC 2000a, MRC's Option A (MRC 2000b), 2012 CFPRs, and other applicable federal and state regulations. General harvest approach is transition to uneven-aged silviculture within 40 years, with 10 year re-entry cycle. Selection harvest predominates in upland areas, with selection and high-retention selection harvest in riparian stands.	Forest management per MRC's proposed HCP/NCCP (MRC 2012), TMP (Appendix A), and applicable federal and state regulations. General harvest approach is transition to uneven-aged silviculture within 40 years, with goal of converting hardwood-dominated stands back to conifer dominance. Re-entry cycle is 20 years. Focus is to create and maintain dense, multistoried, uneven-aged stands with a variety of diameter classes. Selection harvest predominates in upland areas, with selection and high-retention selection harvest in riparian stands.	Similar to Proposed Action, with additional measures to conserve and enhance aquatic and riparian habitats. General harvest approach is similar to Proposed Action, but with no-harvest riparian buffer (≥150 ft) along Class I and large Class II streams, and increased use of high retention selection in other riparian buffers.	No harvesting and limited management in reserves for ecological purposes only. Harvesting and management outside reserves per applicable federal and state regulations. General harvest approach outside reserves is predominantly clearcut and commercial thinning in upland areas and selection and high-retention selection in riparian buffers.	Same as Proposed Action through year 40.

No Action (No incidental take authorization, No HCP/NCCP)	Proposed Action (Incidental take authorization, HCP/NCCP, and TMP)	Alternative A (Incidental take authorization, Enhanced HCP/NCCP)	Alternative B (Incidental take authorization, Terrestrial reserves)	Alternative C (Shorter incidental take authorization term, HCP only, fewer covered species)
Covered activities				
None	Silviculture and stand improvement. Vegetation management, including planting, manual brush and tree removal, and burning for site preparation. Commercial timber operations, which entail felling, limbing, bucking, yarding, loading, and hauling of timber, as well as maintenance and refueling of heavy equipment. Road and landing construction, use, maintenance, and decommissioning. Drafting of water in support of timber operations and road and landings programs. Operation of non-commercial rock pits and quarries. Habitat improvement and creation. Data collection for research and monitoring associated with the HCP/NCCP conservation measures. Previously approved (grandfathered) THPs.	Same as Proposed Action.	Silviculture (including clearcut) and stand improvement. Vegetation management, including planting, manual brush and tree removal, and burning for site preparation. Commercial timber operations, which entail felling, limbing, bucking, yarding, loading, and hauling of timber, as well as maintenance and refueling of heavy equipment. Road and landing construction, use, maintenance, and decommissioning. Drafting of water in support of timber operations and road and landings programs. Operation of non-commercial rock pits and quarries. Data collection for research and monitoring associated with the HCP conservation measures. Previously approved (grandfathered) THPs.	Same as Proposed Action through year 40.

2.1.2 Modeling forest conditions under each alternative

MRC uses a timber model called CRYPTOS (Cooperative Redwood Yield Project Timber Output Simulator), modified by MRC to fit conditions on the company's timberlands, to estimate timber growth and yield under different management strategies. By forecasting and comparing multiple strategies, the CRYPTOS timber model (referred to hereafter as the timber model) enables MRC to identify the management strategies that best meet the company's objectives. A detailed description of the timber model, including the modeling methodology, silvicultural prescriptions used under each alternative, retention standards, harvest triggers, and other model components, is provided in Appendix E. Timber modeling results for the applicable resource areas are presented in Section 3 (Affected Environment and Environmental Effects) of this EIS/PTEIR and other appendices referenced therein.

For the purposes of this EIS/PTEIR, the lead agencies used output data from MRC's timber model to describe predicted forest conditions under each alternative. Modeled conditions provide a basis for relative comparison of the potential environmental effects of the Proposed Action and the alternatives for many of the resource areas. The timber modeling was done by MRC at the request of the state and federal agencies. The agencies reviewed MRC's modeling approach and outputs during several meetings in 2008, 2009, and 2010 as part of EIS/PTEIR development. All information provided by MRC, including timber modeling data, was independently reviewed by the lead agencies prior to inclusion in this EIS/PTEIR.

The analysis in Section 3 (Affected Environment and Environmental Effects) of this EIS/PTEIR relies in large part on the results of timber modeling, which provide simulated forest conditions for management strategies under each alternative for a period of 100 years. Although the term of the requested federal and state incidental take authorization is 80 years, a 100-year planning horizon was modeled to provide necessary data (e.g., long-term sustained yield) for PTEIR purposes. Data from the timber model are reported in 10-year increments (i.e., decades) for analysis purposes. Reporting of modeled harvest and growth, or other data based on harvest and growth, begins with decade one because the data represent the additive result of harvest or growth over the entire decade. There is no starting condition (i.e., decade zero or year zero) for these types of data. Data representing a "snapshot" of forest condition (e.g., number of trees per acre) begin with year zero (the starting condition) and are reported as the condition at the end of each 10-year period.

Harvest occurs in the timber model whenever a harvest trigger is met. Harvest triggers consist of specific numerical measures of forest condition, such as the basal area of conifer trees in a modeled stand. Stands are the smallest geographic units (polygons) used in the model. The size and extent of stands is based on vegetation, topography, and sensitivity attributes, as well as regulatory considerations. Timber model results reflect the periodicity of harvest. In the model, harvest occurs only in decades when harvest triggers are met, thus harvest is modeled to occur in some decades but not in other decades. The timber model logic is based on the assumption that harvest is maximized, after applying specific allowances and constraints for each stand, such as frequency of harvest and basal area retention standards. However, actual harvest may not be maximized in some cases. For example:

- For harvests under Alternative B outside the reserves, the model uses even-aged silviculture (e.g., clearcut) to the maximum extent allowable under the CFPRs. In reality, however, harvest levels could be lower than those predicted by the model for a variety of reasons.

- Harvest restrictions for salmonids under the No Action alternative would likely be applied on a THP-by-THP basis. These restrictions were not modeled because of the potential for variability among individual stands.

Other potential reasons that actual harvest levels could be lower than those modeled include economic conditions causing reduced demand for lumber and other forest products.

The timber model does not have the capability to accurately simulate all of the specific conservation and management measures that would be implemented under each alternative. Simplifying assumptions were made in the model regarding the effect of these measures on timber harvest under each alternative. For example, the width of streamside buffers in the model could not be varied to match the range of possible widths under the alternatives. Also, specific tree retention under the alternatives could not be directly modeled. To overcome these model limitations, the model's basal area retention settings were used to approximate the likely average, or general results of specific conservation and management measures that could not be directly modeled for each alternative. Different alternatives were assigned different basal area retention prescriptions in the model, as described in Appendix E. Because of the simplifying assumptions made, timber modeling data are used solely to compare and contrast the relative differences among alternatives to support the analysis of effects in the EIS/PTEIR (Section 3, Affected Environment and Environmental Effects). The data are not intended to represent actual conditions. The uncertainty in the timber model's accuracy should be taken into account when interpreting results, and especially when comparing model results that are similar. Model results that are very similar should generally be considered equivalent.

2.1.3 Alternatives considered but not analyzed

Several alternatives to the Proposed Action that were initially proposed by the public or the lead agencies were considered but subsequently eliminated from analysis. These alternatives, listed in Table 2.1-1, were not selected for analysis because they could not feasibly be carried out for technical, economic, environmental, or social reasons. The alternatives eliminated from analysis, and the reasons for their elimination, are described below.

2.1.3.1 Application of Northwest Forest Plan/Forest Ecosystem Management Assessment Team standards

Public scoping comments included the suggestion that MRC manage its forestlands in accordance with the standards and guidelines in the Northwest Forest Plan (USDA Forest Service and USDI Bureau of Land Management 1994). Applying forest management measures described in the Northwest Forest Plan to the lands owned by MRC was eliminated from further consideration because it would not be economically feasible. The Northwest Forest Plan includes standards and guidelines developed by the Forest Ecosystem Management Assessment Team for managing federal forestlands in the range of the northern spotted owl.

The Northwest Forest Plan land management standards and guidelines were designed for federal forestlands, and thus consider the management issues and mandates pertinent to federal land managers. Such considerations emphasize multiple uses by the public (e.g., recreation) rather than commercial operations. Public recreation on MRC's forestlands would not be feasible, primarily due to legal liabilities. For these reasons, the federal management standards and guidelines are not directly applicable to private timberland management (in this case, timber harvesting operations by MRC).

The Northwest Forest Plan standards were developed to provide protection for a wide variety of unlisted and listed species. They include the establishment of late-successional reserves and riparian reserves in which timber harvest (except limited thinning and salvage) is prohibited. Under the Northwest Forest Plan, riparian management prescriptions include interim fixed-width 300-ft (91-m), 150-ft (46-m), and 100-ft (30-m) no-cut buffers along either side of Class I, Class II, and Class III streams, respectively. Adherence to these and other Northwest Forest Plan standards would substantially affect MRC's operations by precluding timber harvesting on a large portion of MRC's timberlands. The Northwest Forest Plan standards would therefore be incompatible with MRC's economic and operational requirements and inconsistent with its management objectives. Because MRC would not apply for, nor accept incidental take authorization with Forest Ecosystem Management Assessment Team standards, there would be no permit decision for the federal and state resource agencies to make.

The large reductions in harvestable acreage that would result from implementing federal forest management policies could adversely affect MRC's contribution to the regional economy. Implementing the Northwest Forest Plan's management policies could result in layoffs and contribute to regional unemployment.

Although this alternative was not considered for analysis, Alternative B incorporates the concept of unharvested reserves linked by riparian corridors. Likewise, the Proposed Action and Alternative A incorporate protection and restoration measures for riparian buffers as well as reserves or equivalent management standards (e.g., the Lower Alder Creek Management Area).

2.1.3.2 Restoration

Public scoping comments included the suggestion that MRC manage its forestlands with restoration of the natural forest and aquatic ecosystems as the primary management goal. Creation of a conservation land trust to facilitate restoration was also suggested. Designation of a large portion of MRC forestland for restoration to natural conditions (i.e., pre-European influence) would preclude continued economically viable timber harvest on these lands.

Although an alternative with a primary and predominant focus on restoration was not considered in detail, the Proposed Action includes restoration objectives for certain habitats and would therefore achieve some of the restoration recommendations and concerns voiced by the public. For example, the Proposed Action includes measures to restore the natural conifer dominance in Aquatic Management Zones[9] to improve riparian function, including stream shading and large woody debris recruitment potential. Further, MRC has expressed a willingness to sell lands through fee title or conservation easements when consistent with its management goals. For example, under the Proposed Action and Alternative A, MRC would identify marbled murrelet habitat recruitment stands in which harvest would be prohibited for the first 20 years of the HCP/NCCP and which the wildlife agencies would have the option to purchase from MRC for conservation purposes. In addition, Alternative B would include restoration of natural forest and aquatic ecosystem conditions in the no-harvest reserves through natural processes and selected habitat enhancement measures.

[9] Aquatic Management Zone is a term used by MRC to describe the riparian corridor along a stream channel for purposes of conservation and management. The Aquatic Management Zone is similar in extent and purpose to the Watercourse and Lake Protection Zone used in the CFPRs to describe allowable forest management activities in riparian buffer zones.

A restoration alternative was eliminated from further consideration because, in the form proposed during public scoping, it would not be economically feasible for MRC and would be incompatible with management objectives. The agencies would not expect MRC to apply for incidental take authorization, therefore long-term conservation assurances would not be met.

2.1.3.3 Mixed use

A mixed use alternative was proposed by the lead agencies during the development of the initial suite of alternatives. This alternative would include the sale and conversion of some of MRC's forestlands to non-timber uses such as vineyards or rural residences. Management on forestlands retained by MRC would likely be the same as under the Proposed Action. Under a mixed use alternative, converted lands would be removed from timber production.

A mixed use alternative has the potential to result in significant environmental effects. Conversion of forestland to agricultural, residential, or other non-forest uses would contribute to habitat fragmentation and could limit or eliminate the value of converted lands as habitat for most native plant and animal species. Land conversion could also result in direct, indirect, and cumulative effects on listed and sensitive species and their habitats. CEQA requires an analysis of alternatives that mitigate one or more of the proposed project's potential environmental effects. There is no requirement to consider alternatives that have greater impacts.

Although it is possible that MRC could sell portions of its forestland and still continue to operate an economically viable forest products business, the sale and conversion of its forestland for agriculture or development would be inconsistent with MRC's management objectives and incompatible with the project objectives.

A mixed use alternative is infeasible for economic and environmental reasons and was dismissed from further consideration.

2.1.3.4 THP/Process-based compliance

Under this alternative, MRC would implement a long-term (50–80 years) process for the approval of its THPs, with a special focus on avoiding and minimizing take of listed species, preserving critical habitats and other key natural communities, ensuring habitat connectivity, and protecting or improving other environmental factors. Under this alternative, MRC would design and implement a process for THP approval, including survey requirements and performance standards, which all future THPs submitted by MRC would have to follow. The process would set survey, avoidance, mitigation, and conservation standards that exceed the CFPR standards. It would be specifically tailored to the endangered, threatened, and other at-risk species and natural communities present within MRC's planning area, and would identify potential conservation opportunities at the time each THP is submitted. To the extent possible, this process would incorporate data and analysis gathered from the monitoring and adaptive management of THPs previously implemented under a Section 10/2835 permit, and use it to monitor and address cumulative and ecosystem-level effects.

Under this alternative there would be no pre-determined areas within MRC's timberlands that would be either barred from timber harvest (including northern spotted owl activity centers) or pre-approved for timber harvest, nor would there be pre-determined areas to be set-aside or subject to stricter use restrictions. These measures and restrictions would instead be determined at the time of THP submittal.

The primary benefit of this approach over a long-term, programmatic planning approach like an HCP or NCCP is that it can more closely examine the existing conditions of each THP area nearer in time to the likely effects.

A disadvantage of this approach is that it would not use a landscape-scale harvest planning approach and thus would not allow prediction of the amount and location of future harvest. If MRC cannot predict its likely harvest, it would not be able to meet CAL FIRE's standards for demonstrating maximum sustained yields. Another disadvantage of this approach is that it would not provide the same long-term conservation assurances as would an HCP/NCCP, and it would not meet MRC's objective of receiving regulatory certainty. Furthermore, a THP-by-THP approach is not well suited to comprehensive watershed and cumulative effects analysis and management because often the impact of an individual THP on the environment is minimal and its effects are not easily considered in a cumulative context.

Under this alternative it would be difficult or impossible for MRC to meet regulatory requirements. Due to the lack of long-term conservation and regulatory assurances, this alternative is incompatible with the project objectives and would not be a feasible alternative.

2.2 No Action Alternative

The No Action alternative was developed to evaluate the effects of "no action" or "no project" relative to existing conditions. Under the No Action alternative, NMFS, USFWS, and CDFG would not authorize incidental take and MRC would not submit an HCP or NCCP. MRC would conduct its forest management activities according to the 2012 CFPRs and measures outlined in its 2000 Management Plan (MRC 2000a) and 2000 Option A (MRC 2000b). The Option A specifies how MRC would achieve maximum sustained production of high-quality timber products pursuant to 14 CCR §913.11. The No Action alternative was developed under the assumption that the conservation and management measures contained in MRC's 2000 Management Plan and 2000 Option A[10], rather than the measures in MRC's current Planning Agreement (MRC 2009a) and Option A (MRC 2008a), would be implemented if MRC did not pursue an HCP, NCCP, or federal and state incidental take authorization. This is because the current documents were developed by MRC to implement interim conservation measures and comply with maximum sustained production requirements during development of the proposed HCP/NCCP. Without incidental take authorization and the HCP/NCCP, MRC would not continue to implement measures in the 2009 Planning Agreement or the 2008 Option A.

Under the No Action alternative, MRC would continue to harvest timber on a THP-by-THP basis according to all applicable federal and state laws and regulations, including CEQA, the take prohibitions for listed species and provisions of the ESA and CESA, and the CFPRs. Each future THP would continue to be subject to review by CAL FIRE and Review Team agencies[11] to ensure compliance with the CFPRs and other applicable mitigation requirements.

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[10] The lead agencies recognize that in reality, under the No Action alternative (i.e., without take authorization or an HCP/NCCP) MRC could modify its Management Plan (MRC 2000a), Option A (MRC 2000b), and other policies at its discretion as long as it continues to comply with the CFPRs and other applicable laws and regulations. However, for purposes of the alternatives analysis the lead agencies consider these provisions to be in effect throughout the 80-year EIS/PTEIR analysis period.

[11] CDFG staffing levels in the Timber Program have declined recently. Future availability for THP review is expected to be variable.

2.2.1 ESA and CESA compliance for covered species

Under the No Action alternative, NMFS and USFWS would not issue incidental take permits and the HCP/NCCP would be not be implemented. Take prohibitions for species listed under the ESA would apply. MRC would consult with USFWS and NMFS as necessary to ensure compliance with take prohibitions for federally listed species.

Under the No Action alternative, CDFG would not issue take permits and the NCCP would not be implemented. Take prohibitions for species listed under CESA would apply. MRC would consult with CDFG as necessary to ensure compliance with take prohibitions for state-listed species.

2.2.2 Covered activities

None. Because no federal or state incidental take authorizations would be issued under this alternative, there would be no covered activities.

2.2.3 Timber harvesting and forest management activities

Timber harvest and forest management activities under the No Action alternative would continue to be governed by the CFPRs. MRC would also continue to operate under the provisions of its 2000 Management Plan (MRC 2000a) and 2000 Option A (MRC 2000b). These standards and guidelines are consistent with, and in most cases exceed, the minimum requirements of the CFPRs.

Under the 2012 CFPRs, MRC's timberlands in the primary assessment area are considered industrial timberlands because they exceed 2,500 ac (1,012 ha) in total. The region containing the primary and secondary assessment areas is within the Coast Forest District (14 CCR §907) and as such all timber management activities are regulated by the relevant district-specific CFPR sections under Subchapters 4, 5, and 6 (e.g., 14 CCR §914, §915, §916, §917, §918, §919, §921, §923, and §929). The watersheds in the primary and secondary assessment areas are home to anadromous salmonids and MRC's timber management activities therein are therefore subject to the Anadromous Salmonid Protection Rules contained in the CFPRs (14 CCR §916.9 and §923.9) in addition to all other Coast District CFPRs.

2.2.3.1 Silvicultural prescriptions and timber harvesting

MRC's management under the No Action alternative would emphasize a transition from approximately 40%[12] to 90% uneven-aged silviculture (mostly individual tree and group selection) within 40 years. A table of silviculture prescriptions that would be employed by MRC under this alternative is provided in Appendix E.

Other timber harvesting and forest management actions under the No Action alternative would include:

- Silviculture limited to high retention selection in Watercourse and Lake Protection Zone buffers, selected State Park buffers, and certain other buffer areas;
- Silviculture limited to selection in Coastal Zone, Coastal Zone Special Treatment Areas, neighboring landowner buffers, county road and scenic buffers, and Skunk Railroad buffer;

[12] An estimate of 40% uneven-aged silviculture was calculated for 2006 and 2007, which were typical harvest years.

- Cable yarding and tractor yarding each used for approximately 49% of average annual conifer area; approximately 2% by helicopter; and
- Minimum re-entry period of 10 years in uneven-aged stands.

Under the No Action alternative, all modeled silviculture regimes assume that the retained trees are the most vigorous trees in the stand for each of the size classes. No silviculture regimes were designed to model the effects of harvesting only the dominant and co-dominant trees in a stand. Furthermore, the selection of trees for harvest on partial cuts would prioritize diseased and suppressed trees prior to removing co-dominant and dominant trees. However, recruitment and retention of older structural elements, such as snags and large woody debris would represent exceptions to this priority.

Hardwoods are also modeled for control or removal within each of the silviculture regimes. The targeted hardwood basal area retention level under the No Action alternative would average 15% of the conifer basal area across the primary assessment area, the specific retention level depending on site-specific attributes. MRC believes its forestlands have a much higher component of hardwood than existed prior to commercial timber harvest activities. By one estimate, the hardwood contribution to standing volume increased by a factor of three from 1953 to 1994 due to fire suppression and heavy clearcutting without post-harvest control treatments (Regional Committee on Hardwood Retention 1996). In these stands, hardwoods typically make up the dominant overstory species. Under the No Action alternative, MRC would return a majority of this area for redwood and Douglas-fir stand growth in a proportion similar to that which MRC believes originally existed on the ownership where hardwoods are more typically the understory species.

Under the No Action alternative, MRC anticipates that restoration of stands back to conifer dominance would be largely completed and selection harvest regimes, with 50% or more original stand retention, would become the predominant silviculture treatment on MRC forestlands by year 40.

All modeled silviculture assumes stocking levels at or above state regulations (14 CCR §913). Modeled partial cuts assume conifer basal area retention levels well above minimum retention levels in the state regulations (see Appendix E).

2.2.3.2 Timber stand regeneration and improvement

Current management practices for regenerating harvested stands and promoting their growth would continue to be implemented under this alternative. Regeneration activities in the primary assessment area under the No Action alternative include tree planting, site preparation, vegetative management, and pre-commercial thinning. The level and degree to which these practices would be used would depend on the regeneration method for a particular harvest unit (for example, even-aged vs. uneven-aged harvest), the amount of basal area remaining after harvesting in uneven-aged units, proximity to special treatment areas (for example, Watercourse and Lake Protection Zones and nest site buffer areas), and the post-harvest existence of special elements (for example, large trees) requiring protection. For areas where the retained conifer basal area is initially below 50 ft^2 (4.6 m^2) of basal area per acre, such as rehabilitation and variable retention, an initial conifer stocking of 300 stems per acre is assumed.

Regeneration work is designed to improve conditions for the growth of new trees on a site that has been harvested and where openings are left in the forest canopy. Site preparation includes removal of a portion of post-harvest slash material, brush, and in some cases stumps, with the use of mechanical, manual, or burning techniques. Under the No Action alternative, MRC would treat 400 to 500 ac (162 to 202 ha) on an annual basis. Burning would be restricted to areas of heavy slash concentrations, primarily in the form of spot burning. Herbicides would be applied by hand to achieve MRC's desired tree species mix and growth on forestlands (see Section 2.2.12 regarding hardwoods), with application restrictions near watercourses (see Section 2.2.11, Aquatic and riparian habitat management).

2.2.4 Maximum sustained production of high-quality timber products

The standards and guidelines in MRC's Management Plan (MRC 2000a), 2000 Option A document (MRC 2000b), and the CFPRs include harvest levels balanced with growth and inventory to ensure long-term sustained yield and maximum sustained production over a 100-year period. Non-timber forest values are also considered in the calculation of maximum sustained production and include improvements to terrestrial wildlife habitat, improvements to aquatic habitat, and increased attention to community issues such as viewshed, recreational opportunities, and economic vitality. These considerations impact the determination of maximum sustained production through silvicultural logic constraints, land typing constraints, targeted forest conditions (California Wildlife Habitat Relationships), and harvest level constraints. The models used to determine maximum sustained production incorporate all of these constraints.

Maximum sustained production would be achieved under the No Action alternative (as discussed in further detail in Section 3.9, Timber Resources). Table 2.2-1 shows the modeled harvest, in acres, using each silvicultural method by decade over the 100-year planning horizon. This modeled harvest serves as the basis for the long-term sustained yield calculation under the No Action alternative. Timber modeling assumptions are described in Section 2.1.2 (Development of Alternatives, Modeling forest conditions under each alternative). A detailed description of the timber model is provided in Appendix E.

2.2.4.1 Monitoring thresholds and maximum sustained production compliance

Since the acquisition of inventory and growth data is an ongoing MRC management activity, the underlying assumptions of the baseline inventory and rate of growth would be monitored and improved by MRC over time, as necessary. While the impact of necessary adjustments is not expected to substantially change the projections of harvest in MRC's 2000 Option A, certain circumstances would require a review by CAL FIRE and may trigger a revision of the document. These circumstances are:

- A deviation from the average conifer harvesting volume projections in any 10-year period which exceeds 10%. To the extent that hardwood markets fluctuate, a variation of total volume (conifer and hardwood) harvested greater than 10% may occur without triggering a revision of the Option A (MRC 2000b).
- A change of ownership which results in either an increase or a decrease to MRC's ownership by more than 10%.
- A net change (reduction) from catastrophic events of more than 10% of MRC's timber inventory.
- Any deviation from MRC's 2000 Option A or Management Plan that could result in a significant change in timber operations and could result in significant adverse effects on watershed, fish, or wildlife values.
- A deviation greater than 10% from the baseline inventory estimates, or modeled projections, as the result of ongoing inventory and growth monitoring.

MRC would notify CAL FIRE if any of these deviations or changes occurs.

Table 2.2-1. Acres harvested by silvicultural method by decade—No Action alternative.

Silvicultural method	Decade									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Clearcut	0	0	0	0	0	0	0	0	0	0
Coastal Zone Selection	272	71	347	71	383	71	383	71	383	71
Commercial Thinning	0	0	0	0	0	0	0	0	0	0
Floodplain Selection	27	31	133	205	379	464	506	554	618	588
High Retention Selection	112	789	2,562	3,223	6,026	6,310	7,406	7,667	7,874	8,050
High Retention Selection (Carbon)	0	182	7	268	7	268	7	268	7	268
Medium Retention Selection	195	662	922	1,515	1,606	1,885	1,798	2,110	2,147	2,359
Rehabilitation	1,698	1,263	0	0	0	0	0	0	0	0
Seed Tree Removal	583	840	95	380	197	72	165	2	24	82
Selection	17,126	45,329	73,110	102,578	121,882	141,306	151,145	158,040	161,622	164,873
Selection (Stepped Approach)	866	2,451	2,427	2,266	4,650	990	324	125	35	78
Selection (Old Growth II)	15	64	47	74	179	110	180	110	203	110
Small Class II Selection	0	0	0	0	0	0	0	0	0	0
Transition	7,076	5,780	1,552	0	0	0	0	0	0	0
Variable Retention	10,486	17,081	7075	3,866	5,827	1,917	340	170	88	8
Total	**38,454**	**74,544**	**88,277**	**114,445**	**141,134**	**153,393**	**162,255**	**169,117**	**172,999**	**176,487**

2.2.5 Management of hazardous substances

Under the No Action alternative, MRC would continue to use a variety of hazardous substances that are necessary for forestland management. The types of hazardous substances used by MRC include herbicides (and adjuvants), petroleum products (e.g., gasoline, diesel fuel, motor oil) used by heavy equipment to harvest and transport forest products, and tree marking paint. MRC does not use pesticides other than herbicides. There is the potential for release of hazardous substances into the environment through operation of equipment, accidental spills, and general use.

Under California Assembly Bill 2185, businesses that handle hazardous materials in California are required to prepare a Hazardous Materials Business Plan, used to assist emergency responders in identifying hazardous materials and their storage locations in the event of an emergency. MRC is required to file a Hazardous Materials Business Plan with Mendocino County Division of Environmental Health (an approved Certified Unified Program Agency by the State of California). The Hazardous Materials Business Plan consists of general business information; basic information on the location, type, quantity and health risks of hazardous materials; and emergency response and training plans. In general, a Hazardous Materials Business Plan is required if a facility handles a hazardous material, or a mixture containing a hazardous material, in a quantity equal to or greater than 55 gallons[13], 500 pounds, or 200 cubic feet at any one time during the year. MRC maintains Hazardous Materials Business Plans for three areas where hazardous materials are stored: the Navarro shop, the MRC-Fort Bragg site, and the MRC-Ukiah site.

Under the No Action alternative, herbicide application would not differ substantially from existing conditions and such use would continue to be regulated by the State Department of Agriculture and by the Environmental Protection Agency. MRC's current policy governs use of herbicides as follows:

- Herbicides would only be applied by ground-based equipment, either as backpack foliar applications or direct stem injection frill treatments.
- MRC would not apply herbicides to the following buffers to control native species:
    - within 150 feet of Class I streams.
    - within 100 feet of Class II streams.
    - within 25 feet of Class III streams (if there is any moisture present).
- If exotic plants are detected in these buffer zones, MRC would only apply herbicides labeled for aquatic use to address the exotic plants.

MRC has an Herbicide Spill Contingency Plan providing internal guidelines on the transport, mixing and loading, containerization and containment, security, and spill response for all herbicides used on company lands.

2.2.6 Management of fire hazards

MRC forestlands are located entirely within CAL FIRE's State Responsibility Area and CAL FIRE maintains responsibility for emergency services in this area. MRC policy is to provide support and coordination with CAL FIRE during emergency operations on MRC forestlands.

[13] Crankcase, hydraulic, transmission, gearbox, and differential oils may each be present or "handled" in quantities up to 55 gallons without requiring an inventory.

Under the No Action alternative, MRC's response to wildfire would follow its current (2011) Fire Suppression Plan or updates to this plan in the future. The Fire Suppression Plan contains fire prevention procedures that specify the general requirements for both contractors and employees. These fire prevention procedures, in total, provide the best likelihood of preventing fires and also preparedness for containing the spread of uncontrolled fire.

2.2.7 Post-fire timber salvage

Under the No Action alternative, MRC may harvest timber in burned areas to salvage trees that are likely to die or that are not viable for timber production. Management practices and procedures would follow those specified in the 2012 CFPRs (14 CCR §913.3[b]; 14 CCR §916.9[u]; 14 CCR §1052[b-c]), including:

- No salvage logging is allowed in a Watercourse and Lake Protection Zone without an approved plan that sets forth objectives, goals, and measurable results for streamside salvage operations.
- Estimate in the THP the expected level of stocking to be retained following operations.
- Ensure that stocking levels upon completion of operations meet the CFPR requirements (14 CCR §912.7[b]) or, if stocking levels cannot be met immediately, replant the harvested area to ensure that CFPR stocking requirements are met within five years.
- Mark all trees to be harvested or retained prior to felling operations.
- Emergency notices must comply with all operational provisions applicable to a "timber harvesting plan," "THP," and "plan" contained in the CFPRs.
- On emergency notices, in-lieu practices for Watercourse and Lake Protection Zones, exceptions to rules, and alternate practices are not allowed unless necessary to protect public health and safety.

In addition to these CFPR measures, MRC would implement the old-growth conservation measures in its 2000 Management Plan when conducting post-fire salvage:

- Retain all residual old-growth trees.
- No harvest in Type I (unharvested) old-growth stands.
- Single-tree selection allowed in Type II (previously harvested) old-growth stands, but preserve the character and functionality of the stand.

The management practices and measures described above for post-fire timber salvage are substantially the same as the practices and measures MRC currently uses when conducting post-fire timber salvage.

2.2.8 Mass wasting and sediment management

Under the No Action alternative, MRC would implement the measures for mass wasting and sediment management specified in its 2000 Option A (MRC 2000b), Management Plan (MRC 2000a), and the 2012 CFPRs. MRC's mass wasting and sediment management practices include:

- Harvest in inner gorge of Class I streams only if approved by a California Professional Geologist.
- In watersheds with listed salmonids:
    - operations on inner gorge slopes > 65% would be reviewed by a California Professional Geologist, and

   - areas of exposed soil ≥ 100 ft^2 (9.3 m^2) within Class I or II Watercourse and Lake Protection Zones would be treated to reduce erosion potential.
- Restrictions on use of heavy equipment within Watercourse and Lake Protection Zones and on unstable slopes.
- Tractor operations generally prohibited on slopes > 65%, on slopes > 50% where erosion hazard rating is high or extreme, or on slopes > 50% that lead without flattening to watercourse or lake; exceptions allowed if explained and justified.
- On slopes 50–65% where Erosion Hazard Rating is moderate, heavy equipment is limited to existing tractor roads or new roads indicated in the THP and approved by CAL FIRE Director.
- Potential slope instability would be identified using California Geological Survey landslide maps, past THPs, and a shallow landslide stability model, SHALSTAB.
- No tractor harvest or construction of roads or landings would occur in areas identified as likely to deliver sediment to a watercourse via mass wasting, unless the site is inspected and approved by a California Professional Geologist (cable or helicopter harvest that retains > 50% of pre-harvested basal area is excepted).
- Roads within Watercourse and Lake Protection Zones with significant sediment production capacity would be treated to reduce erosion potential.

2.2.9 Road management

Management policies and practices for the approximately 2,100 mi (3,380 km) of roads on MRC's forestlands are described in MRC's Management Plan (MRC 2000a). Under the No Action alternative, MRC would follow these policies and practices, as well as those specified in the 2012 CFPRs. MRC's Management Plan includes the following regarding road inventory, inspection, and maintenance:

- MRC would inventory and map all roads on its ownership to develop sediment mitigation procedures and prioritize sediment control projects. The inventory and sediment source identification would be repeated every 10 years.
- Road inspection and maintenance under the No Action alternative would primarily be conducted in association with active approved THPs, although some road management activities may occur opportunistically outside of THP boundaries.
- No comprehensive road maintenance program would be developed.

Under this alternative, MRC would continue to implement its current road management practices as developed through its watershed analysis program, which generally follows the guidelines for the construction, reconstruction, and maintenance of roads and landings published in the Handbook for Forest and Ranch Roads (Weaver and Hagans 1994) and meet the standards and practices specified in the CFPRs (14 CCR §923). These include:

- New roads and landings would be planned and located, when feasible, to avoid unstable areas, Watercourse and Lake Protection Zones, routes near the bottoms of steep and narrow canyons, and marshes and wet meadows.
- New roads would be located on natural benches, flatter slopes, and areas of stable soils to minimize effects on watercourses.
- Temporary roads and associated landings would be decommissioned after use.
- No road construction under saturated soil conditions.

- Annual monitoring of roads, landings, culverts, bridges, and erosion control structures and additional monitoring of trouble spots or other identified areas during winter and major storms.
- The number of watercourse crossing structures (i.e., culverts and bridges) would be minimized. If needed, watercourse crossing structures would be designed to allow unimpeded natural movement of sediment bedload in all streams, passage of fish of all life stages in Class I streams, and to accommodate a 100-year flood, including sediment and debris.
- An adequate number of drainage facilities and structures would be planned for roads and landings to minimize erosion on roadbeds, landing surfaces, sidecast, and fills.
- Drainage facilities shall be in place and functional by 15 October of each year.
- Drainage structures that cannot pass a 50-year flood would be removed prior to winter.
- Drainage ditches would be maintained to allow free flow of water and prevent erosion.
- Permanent stream crossings would be maintained to prevent diversion of stream overflow down the road should the drainage structure become plugged.
- Erosion control structures such as rolling dips, rocked fords, and outsloping would be used wherever possible.
- Road running surfaces in logging areas would be treated to reduce erosion by rocking, watering, chemically treating, asphalting, oiling, or another method.
- Use of heavy equipment for maintenance of roads or landings is prohibited in a Watercourse and Lake Protection Zone during wet weather.
- Watercourse and Lake Protection Zone roads with capacity for significant discharge of sediment would be treated by mulching, covering with slash, and/or seeding.
- Mainline roads would be maintained to ensure fire access.
- The 2012 CFPRs include additional measures in watersheds with listed anadromous salmonids. These measures include restrictions on road location and design, seasonal restrictions on road construction and maintenance, and others.

Under the No Action alternative, the following winter hauling restrictions would be implemented per MRC's 2000 Management Plan (MRC 2000a):

- Winter period defined as 15 November to 15 April.
- No winter loading or hauling during rain, if road surface is saturated, or if water is flowing in roadside ditches.
- At first measurable rain, trucks would make final trip out of woods or, if not yet in the woods, would return home for the day.

The 2012 CFPR measures (14 CCR §914.7) regarding winter operating restrictions include:

- No mechanical site prep or harvesting (cable, helicopter, and balloon yarding excepted) without a winter period operating plan.
- Winter loading and hauling limited to roads with stable operating surfaces.
- In watersheds with listed anadromous salmonids, the requirement to conduct timber operations per the restriction contained in a full winter operating plan is extended to 15 October to 1 May.

Under the No Action alternative, MRC would implement the water drafting standards for dust abatement described in its 2000 Management Plan (MRC 2000a), as follows:

- Velocity of water entering intake pipe would be < 0.33 feet per second.
- All approaches to drafting locations would be rocked.
- Intakes would be screened, with openings of 3/32 in (2.4 mm) or smaller.
- Water usage restricted to ensure flows are kept above critical levels.
- Modifications to drafting locations would minimize disturbance of streambed, bank, and vegetation.

The following 2012 CFPR water drafting measures (14 CCR §916.9) apply in watersheds with listed anadromous salmonids:

- Avoid water drafting within Flood Prone Zone of Class I streams.
- Drafting must comply with California Fish and Game Code Section 1600.
- Pump intakes would be properly screened.
- Approaches to drafting sites would be rocked.
- Sediment barriers would be installed outside normal high water mark.
- Water drafting trucks in streams and floodplains would use measures to prevent soil and water contamination from leaks of oil or hydraulic fluid.
- Avoid dewatering the stream and ensure specified flow bypass requirements.
- Drafting operators would be required to keep detailed logs of drafting activity and submit the data to CAL FIRE.

Stream channel modifications associated with water drafting, such as damming or excavation, may also occur under this alternative. Any such modifications would be contingent on approval by CDFG pursuant to a streambed alteration agreement.

2.2.10 Site preparation

Under the No Action alternative, MRC would conduct site preparation activities in accordance with the 2012 CFPRs (14 CCR §915), which include the following measures:

- Use of heavy equipment prohibited when soils are saturated.
- Retain large organic debris.
- No broadcast burning in Class I or II Watercourse and Lake Protection Zones.
- Downed woody debris removed within 100 ft (30 m) of public roads, 50 ft (15 m) of private roads, and 100–200 ft (30–61 m) of inhabited structures.
- Dispose of debris and slash piles by 1 April of following year.
- In watersheds with listed anadromous salmonids, no ignition within Watercourse and Lake Protection Zones, Equipment Exclusion Zones, or Equipment Limitation Zones. Burning should not consume large woody debris in a channel, Watercourse and Lake Protection Zones, Equipment Exclusion Zone, or Equipment Limitation Zone.

2.2.11 Aquatic and riparian habitat management

Under the No Action alternative, MRC would implement the measures for aquatic and riparian habitat management as specified in its 2000 Management Plan (MRC 2000a), and the 2012 CFPRs.

Where applicable, timber modeling parameters used to simulate the effects of riparian and other management measures are referenced below. Because the timber model is unable to capture the site specific details of how various riparian management approaches would be applied on the ground under the different alternatives, model parameters (e.g., riparian buffer widths, basal area retention) were set to best approximate the differences among the alternatives. For example, although the width of the Watercourse and Lake Protection Zone for Class I streams would range from 100–150 ft (30–46 m) under the No Action alternative depending on bank slope, the Watercourse and Lake Protection Zone width was modeled as 150 ft (46 m), with appropriate basal area retention standards to approximate actual conditions as closely as possible. A detailed description of the timber model parameters for riparian buffers, as well as other areas, is provided in Appendix E.

2.2.11.1 Class I streams

Stream buffer widths

Under the No Action alternative, the following Class I Watercourse and Lake Protection Zone widths would be implemented per MRC's 2000 Management Plan and/or 2000 Option A:

- 100–150 ft (30–46 m) depending on bank slope (modeled as 150 ft [46 m] horizontal distance)[14].

The following 2012 CFPR (14 CCR §916.9) Class I Watercourse and Lake Protection Zones widths apply in watersheds within the coastal anadromy zone:

- Zones for confined Class I channels in the coastal anadromy zone are:
  - Channel zone (width defined by Watercourse Transition Line).
  - Core zone (width ≥ 30 ft [9 m]).
  - Inner zone (width ≥ 70 ft [21 m]).
  - Outer zone (width ≥ 30 ft [9 m]) (only needed if adjacent upland silviculture is even-aged).
  - Special operating zone (may be required only where adjacent upland silviculture is even-aged; width = 25 ft [7 m]).
- Zones for Class I streams with a Flood Prone Zone or Channel Migration Zone (i.e., unconfined channels) in the coastal anadromy zone are:
  - Channel migration zone (width defined by Watercourse Transition Line).
  - Core zone (width ≥ 30 ft [9 m]).

[14] Modeled buffer widths were developed to comply with CFPRs for protection of anadromous salmonids in watersheds with threatened or impaired values at the time the modeling prescriptions for the alternatives were developed (2008–2009). These rules have since changed and the 2012 CFPRs include protection measures that apply in watersheds with listed anadromous salmonids and in streams within the coastal anadromy zone (14 CCR §916.9 and §923.9). Due to added management restrictions in riparian buffers in these streams and watersheds, the 2012 CFPRs in some cases allow narrower buffer widths than those modeled for this EIS/PTEIR. The modeled riparian buffer widths for all alternatives comply with the 2012 CFPRs.

- Inner zone A (width 70–120 ft [21–36 m]).
- Inner zone B (width variable: extends from outer bound of inner zone A to end of Flood Prone Zone).
- Outer zone (required only where adjacent upland silviculture is even-aged; width = 50 ft [15 m]).

Watercourse and Lake Protection Zone and Equipment Limitation Zone equipment use

Under the No Action alternative, the following Class I Watercourse and Lake Protection Zone equipment use limitations would be implemented per MRC's 2000 Management Plan:

- Equipment excluded from all Class I Watercourse and Lake Protection Zones except for use on existing roads or skid trails with no signs of slope instability, or for construction of watercourse crossings.
- When equipment used in Watercourse and Lake Protection Zones or Equipment Limitation Zones, trails and landings would be packed with slash and debris following completion of operations.

Under the No Action alternative, the following Class I Watercourse and Lake Protection Zone equipment use limitations would be implemented per the 2012 CFPRs (14 CCR §916.9):

- No use of heavy equipment in Channel zone and core zone.
- In inner zone and outer zone, heavy equipment limited to bank slopes < 35% with low or moderate Erosion Hazard Rating.
- Do not drag or skid logs through Watercourse and Lake Protection Zones.
- Minimize turning of heavy equipment in Watercourse and Lake Protection Zones.
- In inner zone A and B of floodprone (unconfined) channels: skid trails, falling, and yarding should not alter drainage or flow patterns.
- Protect secondary channels and critical habitat from disturbance.
- Use full suspension cable yarding when possible.

Canopy retention

Under the No Action alternative, the following Class I Watercourse and Lake Protection Zone canopy retention measures would be implemented per MRC's 2000 Management Plan and/or 2000 Option A:

- ≥ 70% of canopy cover would be retained or recruited.

In watersheds within the coastal anadromy zone, the following 2012 CFPR (14 CCR §916.9) canopy retention measures apply in Class I Watercourse and Lake Protection Zones:

- Channel zone—retain all trees.
- Core zone—retain all trees.
- Inner zone (and inner zone A for unconfined channels)—80% overstory canopy retention, at least 25% of which is conifer.
- Outer zone (and inner zone B for unconfined channels) (only needed if adjacent upland silviculture is even-aged)—50% overstory canopy retention, at least 25% of which is conifer.
- Special operating zone (if deemed necessary by Registered Professional Forester due to even-aged management)—retain midstory and understory trees.

Basal area retention

Under the No Action alternative, the following Class I Watercourse and Lake Protection Zone basal area retention measures would be implemented per MRC's 2000 Option A and/or 2000 Management Plan:

- Retain > 200 ft^2 (19 m^2) of basal area.
- Retain > 75% of basal area of pre-harvest stand.

The 2012 CFPRs do not have basal area retention requirements for Class I Watercourse and Lake Protection Zones.

Large tree retention

Under the No Action alternative, the following Class I Watercourse and Lake Protection Zone large tree retention measures would be implemented per MRC's 2000 Management Plan and/or 2000 Option A:

- Retain six trees ≥ 32 in (81 cm) diameter at breast height per acre (as required for high retention selection silviculture in Watercourse and Lake Protection Zones.
- If instream large woody debris demand is high or moderate, recruit and permanently retain 20 trees per 330 lineal ft (10 on each side) with greatest potential for large woody debris input.
- Retention priority would be given to the largest 20% of the trees within 60 ft (18 m) of the channel.

In watersheds within the coastal anadromy zone, the following 2012 CFPR (14 CCR §916.9) Class I large tree retention measure applies:

- Retain the 13 largest conifer trees (live or dead) on each acre of the area that encompasses the core and inner zones.

Large woody debris

Under the No Action alternative, the following Class I Watercourse and Lake Protection Zone large woody debris retention measures would be implemented per MRC's 2000 Management Plan:

- All large woody debris in channel and Watercourse and Lake Protection Zones would be retained, except for road obstruction or instream enhancement.
- In Watercourse and Lake Protection Zones, seven downed logs per acre (≥ 16 in [41 cm] average diameter and 10 ft [3 m] long) averaged over 40 ac (16 ha).

The following 2012 CFPR (14 CCR §916.9) Class I large woody debris retention measures apply:

- Trees retained to meet large tree retention standards along Class I streams should be those most conducive to large woody debris recruitment to the channel.
- Retain and protect downed large woody debris in the Watercourse and Lake Protection Zone that currently or may in the future provide large woody debris recruitment to stream channels.
- Retain all pre-existing large wood and debris within the channel zone.
- No sanitation or salvage in the Class I Watercourse and Lake Protection Zone.

Silviculture

Under the No Action alternative, the following Class I Watercourse and Lake Protection Zone silviculture treatments would be implemented per MRC's 2000 Option A and/or 2000 Management Plan:

- High retention selection only.
- No sanitation or salvage.

In watersheds within the coastal anadromy zone, the following additional 2012 CFPR (14 CCR §916.9) silvicultural measures apply in Class I Watercourse and Lake Protection Zones:

- No timber operations in Channel zone or core zone.
- No sanitation or salvage logging in any zone.
- In inner and outer zones, modified commercial thinning or single-tree selection only.
- Where inner gorge extends beyond Class I Watercourse and Lake Protection Zone and bank slope is > 55%, no even-aged management permitted.
- Increase the quadratic mean diameter of trees in the inner zone.

Exposed soil

Under the No Action alternative, the following Class I Watercourse and Lake Protection Zone exposed soil treatments would be implemented per MRC's 2000 Management Plan and the 2012 CFPRs (14 CCR §916.9):

- ≥ 75% ground surface cover within the Watercourse and Lake Protection Zone would be retained to prevent soil erosion.
- Areas of exposed soil ≥ 100 ft^2 (9 m^2) within Watercourse and Lake Protection Zones would be treated to reduce erosion potential.
- Trails and landings in Watercourse and Lake Protection Zone would be packed with slash and debris following use.
- Watercourse and Lake Protection Zone roads with capacity for significant sediment production would be mulched, covered with slash, and/or seeded.

Bank stability

Under the No Action alternative, the following Class I Watercourse and Lake Protection Zone bank stability measures would be implemented per MRC's 2000 Management Plan:

- Restrictions on harvest on steep & inner gorge slopes.
- Restrictions on harvest on unstable slopes.
- Restrictions on heavy equipment use in Watercourse and Lake Protection Zones.
- Understory and overstory canopy retention requirements.
- Restrictions on road construction.
- Treatment of exposed/disturbed soil.
- Water drafting approaches must be rocked.
- Livestock leases would include mitigation measures to protect stream banks and riparian buffer zones.

In watersheds within the coastal anadromy zone, the 2012 CFPRs (14 CCR §916.9) specify additional measures for Class I watercourses, including:

- Retention of all trees in channel zone and Channel Migration Zone.

- All operations on inner gorge slopes > 65% must be reviewed by a California Professional Geologist.
- Soils must be stabilized on tractor road stream crossings, disturbed road cut banks and fills, and any other areas that may deliver deleterious amounts of fine sediment to streams.

2.2.11.2 Class II streams

The 2012 CFPRs differentiate between large (“Class II-L”) and standard (“Class II-S”) Class II watercourses (14 CCR §916.9). In watersheds with listed salmonids, the CFPRs identify Class II-L streams as follows:

- Stream order is 2nd or 3rd order.
- Blue line streams not identified as Class I.
- Drainage area sufficient to produce mid-summer flow (flows into Class I stream until 15 July).
- Summer flow duration until 15 July.
- Diagnostic channel characteristics, or those that indicate 15 July flow duration (e.g., bankfull width and depth, channel slope, presence of seeps or springs, biotic indicators).

Class II streams not meeting the above criteria are considered Class II-S.

Stream buffer widths

Under the No Action alternative, MRC’s 2000 Management Plan specifies a Class II Watercourse and Lake Protection Zone width of 75–110 ft (23–34 m) depending on bank slope (modeled as 75-ft [23-m] horizontal distance).

In watersheds with listed anadromous salmonids, the 2012 CFPRs (14 CCR §916.9) define the following Class II-L and Class II-S Watercourse and Lake Protection Zone widths:

- Class II-L[15] streams:
    - Channel zone (width defined by the Watercourse Transition Line).
    - Core zone (width = 30 ft [9 m]).
    - Inner zone (width = 70 ft [21 m]).
- Class II-S streams:
    - Channel zone (width defined by the Watercourse Transition Line).
    - Core zone (width 0–15 ft [0–5 m], depending on bank slope).
    - Inner zone (width 35–85 ft [11–26 m], depending on bank slope).

Watercourse and Lake Protection Zone and Equipment Limitation Zone equipment use

Under the No Action alternative, MRC’s 2000 Management Plan specifies the same limitations on equipment use in the Watercourse and Lake Protection Zone of Class II streams as in Class I streams (MRC 2000a).

[15] All designated Class II-L watercourses incorporate Class II-L CFPR management practices for a distance of 1,000 ft, or total length of Class II (whichever is less) measured from the confluence with a Class I watercourse. After 1,000 ft, Class II-S management practices apply.

The following additional Class II Watercourse and Lake Protection Zone equipment use limitations would be implemented per the 2012 CFPRs:

- The timber operator shall not construct or reconstruct roads, construct or use tractor roads or landings in Class II watercourses, in the Watercourse and Lake Protection Zone, marshes, wet meadows, and other wet areas unless when explained and justified in the THP by the Registered Professional Forester, and approved by the Director, except as follows:
  - At prepared tractor road crossings as described in 2012 CFPRs (§914.8[b]).
  - At existing road crossings.
  - At new tractor and road crossings approved as part of the California Fish and Game Code process (California Fish and Game Code Section 1600 *et seq.*).

Canopy retention

Under the No Action alternative, Class II Watercourse and Lake Protection Zone canopy retention measures would be the same as Class I watercourses, per MRC's 2000 Option A and 2000 Management Plan.

In watersheds within the coastal anadromy zone salmonids, additional 2012 CFPRs (14 CCR §916.9) measures apply.

- In Class II-L streams (for a distance of 1,000 ft [305 m] or total length of Class II, whichever is less), retain ≥ 80% overstory canopy (at least 25% of which is conifer).
- In Class II-S streams, the measures in MRC's 2000 Option A and 2000 Management Plan (same as Class I measures) provide canopy retention equal to or exceeding 2012 CFPR restrictions.

Basal area retention

Under the No Action alternative, the following Class II Watercourse and Lake Protection Zone basal area retention measures would be implemented per MRC's 2000 Option A and 2000 Management Plan:

- Retain > 200 ft^2 (19 m^2) of basal area.
- Retain > 75% of basal area of pre-harvest stand.

The 2012 CFPRs do not have basal area retention requirements for Class II streams.

Large tree retention

Under the No Action alternative, the following large tree retention measures would be implemented in Class II Watercourse and Lake Protection Zones, per MRC's 2000 Management Plan:

- If instream large woody debris demand is high or moderate, recruit and permanently retain 10 trees per 330 linear ft (five on each side) with greatest potential for large woody debris input.
- Retention priority would be given to the largest 20% of the trees within 60 ft (18 m) of the channel.

In watersheds within the coastal anadromy zone, the following additional 2012 CFPR (14 CCR §916.9) tree retention measure applies in Class II-L Watercourse and Lake Protection Zones:

- Retain the 13 largest conifer trees (live or dead) on each acre of the area that encompasses the core and inner zones.

Large woody debris

Under the No Action alternative, Class II Watercourse and Lake Protection Zone large woody debris retention measures in MRC's 2000 Management Plan are the same as the Class I standards.

The 2012 CFPR large woody debris retention measures for Class II streams in anadromous salmonid watersheds are the same as for Class I streams.

Silviculture

Under the No Action alternative, the following silviculture treatments would be implemented in Class II Watercourse and Lake Protection Zones, per MRC's 2000 Option A and 2000 Management Plan:

- High retention selection only.
- No sanitation salvage.

The following 2012 CFPR (14 CCR §916.9) silvicultural measures apply in Class II-L Watercourse and Lake Protection Zones (for a distance of 1,000 ft [305 m] or total length of Class II, whichever is less) within the coastal anadromy zone:

- No sanitation or salvage logging in any zone.
- Modified commercial thinning or single-tree selection only.
- Increase the quadratic mean diameter of trees > 8 in (20 cm) diameter at breast height.

Exposed soil

Under the No Action alternative, the following exposed soil treatments would be implemented in Class II Watercourse and Lake Protection Zones, per MRC's 2000 Management Plan and the 2012 CFPRs (14 CCR §916.9):

- Areas of exposed soil ≥ 100 ft^2 (9 m^2) within Watercourse and Lake Protection Zones would be treated to reduce erosion potential.
- Trails and landings in the Watercourse and Lake Protection Zone would be packed with slash and debris following use.
- Watercourse and Lake Protection Zone roads with capacity for significant sediment production would be mulched, covered with slash, and/or seeded.
- ≥ 75% ground surface cover within the Watercourse and Lake Protection Zone would be retained to prevent soil erosion.

Bank stability

Under the No Action alternative, bank stability measures in all Class II Watercourse and Lake Protection Zones are the same as the Class I standards.

2.2.11.3 Class III streams

Stream buffer widths

Under the No Action alternative, the following Class III measures would be implemented per MRC's 2000 Management Plan (MRC 2000a):

- The Class III buffer is an Equipment Limitation Zone.
- Equipment Limitation Zone width per the 2012 CFPRs.

The 2012 CFPR (14 CCR §916.4) measures apply for Class III Equipment Limitation Zones, as follows:

- Equipment Limitation Zone width ≥ 25 ft (8 m) where bank slope is < 30%.
- Equipment Limitation Zone width ≥ 50 ft (15 m) where bank slope is ≥ 30%.

Watercourse and Lake Protection Zone and Equipment Limitation Zone equipment use

MRC's 2000 Management Plan specifies the same limitations on equipment use in the Equipment Limitation Zone of Class III streams as in Class I and II streams (MRC 2000a).

The following additional Class III Equipment Limitation Zone measures would be implemented per the 2012 CFPRs (14 CCR §916.3):

- The timber operator shall not construct or reconstruct roads, construct or use tractor roads or landings in Class III watercourses unless when explained and justified in the THP by the Registered Professional Forester, and approved by the Director, except as follows:
    - At prepared tractor road crossings as described in 2012 CFPRs (14 CCR §914.8[b]).
    - Crossings of Class III watercourses that are dry at the time of timber operations.
    - At existing road crossings.
    - At new tractor and road crossings approved as part of the California Fish and Game Code process (California Fish and Game Code Section 1600 *et seq.*).

In watersheds with listed anadromous salmonids, additional 2012 CFPR (14 CCR §916.9) Class III Equipment Limitation Zone measures include:

- 30 ft (9 m) Equipment Limitation Zone (from the Watercourse Transition Line) on each side of watercourse where bank slope is < 30%.
- Additional 20 ft (6 m) Equipment Limitation Zone where bank slope is > 30%.
- No new construction of tractor roads in Equipment Limitation Zone.
- No ground-based equipment on slopes > 50%.
- Ground-based operations in Equipment Limitation Zone limited to methods that do not cause sediment delivery to stream.

Canopy retention

MRC's 2000 Management Plan and 2000 Option A do not have Class III canopy retention requirements.

The following 2012 CFPR (14 CCR §916.5) Class III canopy retention measures apply:

- No overstory retention required.
- 50% retention of understory is required.

Basal area retention

MRC's 2000 Management Plan and 2000 Option A do not have Class III basal area retention requirements.

The 2012 CFPRs do not have basal area retention requirements for Class III streams.

Large tree retention

MRC's 2000 Management Plan and 2000 Option A do not have Class III large tree retention requirements.

The 2012 CFPRs do not stipulate large tree retention measures in Class III watercourses in watersheds without listed anadromous salmonids.

In watersheds with listed anadromous salmonids, the following 2012 CFPR (14 CCR §916.9) Class III tree retention measures apply:

- Retain hardwoods, where feasible, within the Equipment Limitation Zone.
- Retain all countable trees needed to achieve resource conservation standards in 14 CCR §912.7 within the Equipment Limitation Zone.
- Retain all trees in the Equipment Limitation Zone and channel zone that show visible indicators of providing bank or bed stability, excluding sprouting conifers that do not have boles overlapping the channel zone.

Large woody debris

MRC's 2000 Management Plan and 2000 Option A do not have Class III large woody debris retention requirements.

In watersheds within the coastal anadromy zone, 2012 CFPR (14 CCR §916.9) large woody debris measures include:

- Retain all pre-existing large wood and debris within the channel zone.
- Retain all pre-existing large wood on the ground within the Equipment Limitation Zone that is stabilizing sediment.
- No initiation of burning in Equipment Limitation Zone.

Silviculture

Under the No Action alternative, no sanitation salvage would be permitted in Class III Equipment Limitation Zones, per MRC's 2000 Option A and 2000 Management Plan.

The following 2012 CFPR silvicultural measures apply in Class III streams in watersheds with and without anadromous salmonids:

- All hardwoods and snags in the channel zone and Equipment Limitation Zone would be retained.
- Must retain adequate countable trees needed to achieve resource conservation standards in 14 CCR §912.7.

Exposed soil

MRC's 2000 Management Plan specifies the following Class III exposed soil measures:

- Trails and landings in Equipment Limitation Zone would be packed with slash and debris following use.

The 2012 CFPR measures for Class III Equipment Limitation Zones in watersheds without listed salmonids include:

- Retain ≥ 75% ground surface cover within the Watercourse and Lake Protection Zone to prevent soil erosion.
- Remove soil deposited in Class III watercourses before concluding operations or before 15 October.
- Stabilize exposed soil on approaches to crossings in Class III Equipment Limitation Zone.

In watersheds with listed anadromous salmonids, additional 2012 CFPR measures to stabilize Class III exposed soils include:

- Retain all trees in Equipment Limitation Zone and channel zone that stabilize stream bed or banks.
- Retain all pre-existing large wood on the ground within the Equipment Limitation Zone that is stabilizing sediment.
- Stabilize bare soil >100 ft^2 (9 m^2).
- No initiation of burning in Equipment Limitation Zone.

Bank stability

MRC's 2000 Management Plan and 2000 Option A do not specify Class III bank stability measures.

The 2012 CFPRs do not specify bank stability measures for Class III Equipment Limitation Zones in watersheds without listed salmonids beyond exposed soil treatments described above. In watersheds with listed anadromous salmonids, an additional 2012 CFPR Class III measure to stabilize banks applies:

- Retain all trees in Equipment Limitation Zone and channel zone that stabilize stream bed or banks.

2.2.11.4 Wetlands and other aquatic habitats

The management of wetlands, wet meadows, seeps, and springs is not specified in MRC's 2000 Management Plan (MRC 2000a) or 2000 Option A (MRC 2000b).

The 2012 CFPR (14 CCR §916.3) measures for management of wetlands and other aquatic habitats include:

- Wetlands, wet meadows, and other wet areas receive same protections as Class II streams if Class II aquatic habitat is present (see applicable measures above for Class II streams).
- No construction/reconstruction of roads or construction/use of tractor crossings or landings in wetlands, marshes, or wet meadows (some exceptions apply).
- Retain and protect non-commercial vegetation in meadows and wet areas.
- Protect soil in meadows and wet areas to the maximum extent possible.

2.2.11.5 Watershed analysis

Under the No Action alternative, MRC would continue with its ongoing Level 2 watershed analysis[16] efforts in Total Maximum Daily Load-listed watersheds. Monitoring results would be used to develop or adjust management practices in order to meet applicable targets for reducing sediment or temperature impairment in listed streams.

[16] MRC's watershed analysis is conducted using the methodology of the Washington Forest Practices Board (WFPB 1995, and revisions). Level 2 is the most detailed, rigorous, and time consuming of the two levels of analysis, and must be performed by qualified resource specialists.

2.2.11.6 Stream habitat improvement

Under the No Action alternative, MRC would make stream habitat improvements per its 2000 Management Plan (MRC 2000a) and 2000 Option A (MRC 2000b):

- Stream habitat improvement would occur opportunistically, on a THP-by-THP basis.
- Foresters, with guidance from biologists, would look for ways to add more large woody debris to stream channels.
- Targeted restoration or stream habitat improvement projects would not be required, and performance monitoring would not be assured.

2.2.12 Terrestrial habitat management

Under the No Action alternative, MRC would continue to implement a variety of measures to protect habitat for terrestrial species per its 2000 Management Plan, 2000 Option A, and the 2012 CFPRs, as well as ongoing discussion with federal and state resource agencies to determine target objectives for these habitat elements, often on a plan-by-plan basis. MRC's 2000 Management Plan contains a number of policies that are directed toward improving habitat for over 140 special status terrestrial and avian species. Policies have been established for breeding raptors, rare and endangered plants, snags, large woody debris, unharvested and previously harvested old-growth stands, residual-old growth trees, and hardwoods. The practices implementing the policies described in MRC's 2000 Management Plan and 2000 Option A are detailed below, as are 2012 CFPR measures to protect terrestrial species.

2.2.12.1 Wildlife tree retention and recruitment

Under the No Action alternative, the following wildlife tree retention and recruitment measures would be implemented as per MRC's 2000 Management Plan (MRC 2000a) and 2000 Option A (MRC 2000b):

- Retain all snags and specific nest trees (i.e., used by a listed/sensitive bird species) in every THP, unless a snag or tree poses a safety or excessive fuel loading hazard.
- Retain trees with raptor nests or other signs of raptor use.
- Map snag locations and record tree morphology in every THP, as part of long-term monitoring project.
- In Watercourse and Lake Protection Zone and other wildlife emphasis areas (e.g., northern spotted owl sites, unique areas), recruit at least 2–3 snags per acre (≥ 16 in [41 cm] diameter at breast height and 10 ft [3 m] long), averaged over 40 ac (16 ha).
- In general forested areas, recruit at least 1–2 snags per acre.
- If snag density is deficient (per above), recruit live cull trees or green trees to meet targets.

The 2012 CFPRs (14 CCR §919) specify measures for wildlife tree retention, including:

- Retain all snags except for approved exceptions due to safety and fire hazard, insect or disease control, or if no significant impact on wildlife habitat needs would result. Snags may also be cut when merchantable and included in a THP (14 CCR §919.1).
- Establish buffer zones around trees with an active nest of a listed/sensitive bird species (size specified in 14 CCR §919.3).

Also see applicable measures described for old growth and hardwoods, below.

2.2.12.2 Downed large woody debris

Under the No Action alternative, the following large woody debris measures would be implemented per MRC's 2000 Management Plan (MRC 2000a) and 2000 Option A (MRC 2000b):

- Retain all large woody debris in Watercourse and Lake Protection Zones (except for road obstruction or riparian and stream restoration).
- In THP areas, retain unmerchantable logs remaining after timber operations. In Watercourse and Lake Protection Zones, recruit at least 7 downed logs per acre (≥ 16 in [41 cm] diameter at breast height and 10 ft [3 m] long), averaged over 40 ac (16 ha).
- In general forested areas, recruit and retain at least 5 downed logs per acre.

The 2012 CFPRs (14 CCR §916.9) specify measures to retain large woody debris in watersheds with listed anadromous salmonids, including:

- Retain and protect downed large woody debris in the Watercourse and Lake Protection Zone that currently or may in the future provide large woody debris recruitment to stream channels.
- Retain all pre-existing large wood and debris within the channel zone.
- Retain all pre-existing large wood on the ground within the Equipment Limitation Zone that is stabilizing sediment.

2.2.12.3 Old growth

Old-growth trees are defined in MRC's 2000 Management Plan as those existing prior to 1800 and ≥ 48 in (122 cm) diameter at breast height, and old-growth Douglas-fir trees as those existing prior to 1800 and ≥ 36 in (91 cm) diameter at breast height. MRC's 2000 Management Plan also states that any tree (conifer or hardwood) could be considered old growth if it existed prior to 1800 and exhibited a preponderance of species-specific old-growth characteristics. Old-growth stands are defined in MRC's 2000 Management Plan (MRC 2000a) as Type I and Type II stands, following the then-current definition of the Forest Stewardship Council-United States. Under the No Action alternative, MRC would continue to manage Type I old-growth stands, and would use the most current definition provided by the Forest Stewardship Council-United States, as described below.

Per MRC's 2000 Management Plan and 2000 Option A, and the 2010 Forest Stewardship Council-United States old growth definitions (FSC-US 2010), the following old growth definitions and management measures would be implemented:

- No harvest in un-entered old-growth stands ≥ 3 ac (1.2 ha) (FSC-US [2010] Type I old-growth stands).
- Limited harvest in stands ≥ 5 ac (2 ha) with an average of ≥ 6 old-growth trees per acre, only to enhance or accelerate development of old-growth characteristics.
- Preserve individual residual old-growth trees with significant wildlife value (e.g., large limbs, cavities, nesting platforms).
- Pursue permanent conservation easements in un-entered old-growth stands ≥ 3 ac (1.2 ha) (FSC-US [2010] Type I old-growth stands).

The 2012 CFPRs (14 CCR §919.16) do not have specific retention standards for old-growth trees, but do require the Registered Professional Forester to discuss how the harvesting of late-successional stands, that could significantly reduce the amount and distribution of such stands, affects functional wildlife value.

2.2.12.4 Hardwood retention

Under the No Action alternative, the following hardwood retention measures would apply across the landscape and would be implemented per MRC's 2000 Option A and 2000 Management Plan:

- Overall goal is to achieve MRC's desired hardwood-conifer balance across the landscape.
- Retain all true oaks >18 in (46 cm) diameter at breast height, with exception of those requiring removal for safety, roads, or yarding corridors.
- Retain 15% of the total post-harvest basal area in hardwoods (if hardwoods comprised at least 15% basal area prior to harvest).
- Review all THPs to identify and retain hardwood trees that enhance wildlife habitat.

In watersheds with listed anadromous salmonids, 2012 CFPR measures (14 CCR §916.9) would apply in Watercourse and Lake Protection Zones:

- Retain hardwoods sufficient to provide a deciduous vegetation component to the riparian zone for aquatic nutrient inputs.
- Retain hardwoods in the Watercourse and Lake Protection Zone inner zones A & B of floodprone (unconfined) streams if they provide or may contribute to salmonid habitat.
- Retain hardwoods in the Equipment Limitation Zone of Class III streams, where feasible.

In watersheds with listed anadromous salmonids and where harvest adjacent to Class III streams is even-aged:

- Retain ≥ 15 ft^2 (1.4 m^2) basal area per acre of hardwoods in Equipment Limitation Zone where it exists prior to harvest, including the largest hardwood trees.
- Retain all hardwoods in Equipment Limitation Zone when < 15 ft^2 (1.4 m^2) basal area per acre is present before harvest.

2.2.12.5 Unique habitats

Under the No Action alternative, the following unique habitats would be managed per MRC's 2000 Management Plan, 2000 Option A, and/or 2012 CFPRs, as summarized below.

Closed-cone pine forest

There are no specific management measures for closed-cone pine forest in MRC's Management Plan and no CFPR (2012) requirements. As for other rare vegetation communities, CEQA compliance is required in all THPs.

Oak woodlands

No harvest in oak woodlands, per MRC's 2000 Option A.

Rocky outcrops and other unique habitats

The 2012 CFPRs (14 CCR §919.3) include restrictions to protect sensitive species that may use rocky outcrops and other unique habitats. Peregrine falcon measures include:

- Establish a buffer ≥ 10 ac (4 ha) around any active peregrine falcon nest.
- No timber operations from 1 February–1 April within buffer, or until 15 July if nest is occupied.

- No helicopter logging within 0.5 mi (0.8 km) of nest.

The 2012 CFPRs (14 CCR §919.3) include similar protection measures for golden eagles and other bird species that may nest in rocky outcrops.

2.2.12.6 Habitat connectivity

As described in MRC's 2000 Management Plan (MRC 2000a), harvest planning under the No Action alternative would incorporate considerations to maintain and enhance terrestrial habitat connectivity for different species at appropriate spatial scales. In addition, the 2012 CFPRs (14 CCR §897) general objectives relating to habitat connectivity would apply, including retention/recruitment of late and diverse successional stage habitat components for wildlife concentrated in Watercourse and Lake Protection Zones and, as appropriate, to provide for functional connectivity between habitats.

2.2.13 Listed and sensitive species management

Under the No Action alternative, MRC would continue to follow its existing management policies and practices to avoid the take of species listed as threatened or endangered under the ESA or CESA. MRC would remain subject to existing and new regulatory requirements, including federal and state laws prohibiting the unauthorized take of listed species, and the 2012 CFPRs prohibiting approval of any THP that would result in the unauthorized take of a listed species.

Species not listed as threatened or endangered under the ESA or CESA would also be protected to varying degrees under the No Action alternative. These include species recognized by the CDFG as Species of Special Concern or fully protected by the State of California, and species designated as sensitive by the Board of Forestry and Fire Protection.

2.2.13.1 Coho salmon, Chinook salmon, and steelhead

MRC would implement the 2012 CFPRs and may solicit technical assistance from NMFS and CDFG on a THP-by-THP basis to increase protections for listed anadromous salmonids. However, MRC would supplement the 2012 CFPR standards for watersheds with listed anadromous salmonids by consulting with NMFS and CDFG on a THP-by-THP basis in some instances to ensure take avoidance.

2.2.13.2 Northern spotted owl

Under the No Action alternative, MRC would be required to comply with the 2012 CFPRs (14 CCR §919.9) and no-take standards for northern spotted owls, such as those currently included in its Northern Spotted Owl Resource Plan (MRC 2010).

Per the Northern Spotted Owl Resource Plan (MRC 2010), for northern spotted owl habitat that is within 0.7 mi (1.1 km) of a THP, measures include:

- Restrictions on operations within 1,000 ft (305 m) of an activity center during the breeding and non-breeding seasons.
- Retain ≥ 500 ac (≥ 202 ha) of Nesting/Roosting/Foraging habitat, where ≥ 200 ac (≥ 81 ha) would be Nesting/Foraging.
- Retain > 100 ac (> 40 ha) of Nesting/Roosting habitat; if there is ≤ 100 ac (≤ 40 ha) of Nesting/Roosting habitat, then no harvest.

- Harvest allowed in Nesting/Roosting habitat between 100–200 ac (40–81 ha), provided Nesting/Roosting habitat is not contiguous with the core area and is maintained with ≥ 60% canopy cover ≥ 16 in (41 cm) diameter at breast height trees.
- Harvest allowed in Nesting/Roosting habitat ≥ 200 ac (≥ 81 ha), provided that:
    - Contiguous Nesting/Roosting habitat within/extending beyond the core area is retained so that ≥ 2/3 of the pre-harvest basal area in the Nesting/Roosting stand to be harvested is maintained post-harvest, comprising ≥ 100 ft^2 (9 m^2) of basal area with ≥ 60% canopy cover and average stand diameter ≥ 16 in (41 cm) per acre; and
    - Nesting/Roosting habitat not contiguous with the core area is maintained with ≥ 60% canopy cover of ≥ 16 in (41 cm) diameter at breast height trees.
- Before harvesting timber in Nesting/Roosting habitat where Nesting/Roosting habitat < 200 ac (< 81 ha) or harvest would reduce the Nesting/Roosting habitat to < 200 ac (< 81 ha), MRC staff would conduct a field review to confirm acreage of suitable Nesting/Roosting habitat.
- Operations would be limited to ≤ 50% of available suitable habitat in any one year.

MRC would also be required to restrict noise disturbance within 1,000 ft (305 m) of any northern spotted owl activity center during the breeding season (1 February–31 July). Timber operations could occur after 15 May if the activity center is determined to be inactive because northern spotted owls are absent, non-nesting, or failed to nest successfully.
Control measures for barred owl may or may not be implemented under the No Action alternative, but there would be no economic incentive to implement barred owl control under the No Action alternative.

2.2.13.3 Marbled murrelet

MRC's Management Plan (MRC 2000a) and 2000 Option A designate 1,400 ac (567 ha) as a marbled murrelet management area using high retention selection harvest. Under the No Action alternative, MRC would manage land to comply with no-take standards, with CDFG technical assistance.

The 2012 CFPR measures (14 CCR §919.11) for marbled murrelet include:

- "If CDFG determines jeopardy or a take will occur as a result of operations proposed in the THP, the Director shall disapprove the THP unless the THP is accompanied by authorization by a wildlife agency acting within its authority under state or federal endangered species acts."

No-take standards applied by agencies include:

- No harvest core and 300-ft (91-m) buffer.
- Breeding season disturbance buffer, width from core based on noise levels.

No control measures for corvids would be implemented under the No Action alternative.

2.2.13.4 Point Arena mountain beaver

Measures for Point Arena mountain beaver are not specified in MRC's Management Plan (MRC 2000a), 2000 Option A (MRC 2000b), or in the 2012 CFPRs. Under the No Action alternative, agency no-take standards for this species would apply.

No-take standards applied by the wildlife agencies include:

- Manage to comply with no-take standards, with USFWS technical assistance.
- Minimum 100 ft (30 m) no-harvest around burrow areas.
- Up to 400 ft (122 m) no-cut around burrows if contiguous habitat extends that far from burrow.

2.2.13.5 California red-legged frogs

Measures for California red-legged frogs are not specified in MRC's Management Plan (MRC 2000a), 2000 Option A (MRC 2000b), or in the 2012 CFPRs. Under the No Action alternative, agency no-take standards would apply. MRC would solicit technical assistance from USFWS and CDFG on a THP-by-THP basis to ensure take avoidance.

2.2.13.6 Plant species of concern

Under the No Action alternative, MRC would continue to operate in a manner consistent with the 2012 CFPRs (14 CCR §898.2(e) and §919.4) and CEQA (14 CCR §15380) standards for plant species of concern, including take-avoidance and minimization measures. The CFPRs and CEQA guidelines require seasonally-appropriate floristic surveys for federally listed and/or state-listed plant species if necessary to avoid a significant impact[17]. For any documented species, management strategies would be determined on a THP-by-THP basis to ensure that impacts of activities covered under THPs are not significant and that take is avoided where necessary. MRC would use these survey protocols, if necessary to avoid a significant impact, and mitigation standards to support impact determinations in THPs for all plant species of concern, including those designated as California Rare Plant Rank species.

2.2.14 Monitoring and adaptive management

Under the No Action alternative, no formalized adaptive management program would be implemented.

MRC would continue to conduct certain research and monitoring activities on its forestlands, as described in MRC's 2000 Management Plan (MRC 2000a) and 2000 Option A (MRC 2000b). These activities may include:

- watershed analysis;
- forest inventory;
- surveys and outmigrant trapping for salmon and steelhead;
- surveys for northern spotted owl and marbled murrelet; and/or
- surveys for other animal species (e.g., forest raptors, furbearers, songbirds).

[17] Surveys would be necessary in cases when not enough is known about a plant's location or habitat requirements to avoid a significant impact. In lieu of surveys, CAL FIRE may require other measures that ensure avoidance, such as on-site training and plant/habitat identification tools for licensed timber operators, "walk-through surveys" prior to operations, or project-specific mitigation. Examples where a survey may not be necessary include sites where the scoping did not discover any sensitive species in the project area, where the project area includes no suitable habitat, or when a timber operation has been planned in a manner that clearly avoids potential impacts.

Surveys may occasionally include the capture, handling and limited relocation of animal species. Under the No Action alternative, which does not include any authorization for take of any listed species, a separate research or recovery permit issued under Section 10(a)(1)(A) of the federal ESA would be issued to MRC to authorize any take associated with juvenile salmon surveys and outmigrant trapping, northern spotted owl banding activities, and California red-legged frog capture and handling. Likewise, MRC would be conducting these activities under a Scientific Collecting Permit issued by the CDFG.

MRC would also comply with provisions of the 2012 CFPRs (14 CCR §916.11), which may require inspections to ensure compliance with watercourse protection measures.

2.3 Proposed Action/Proposed Project (Preferred Alternative)

Under the Proposed Action/Proposed Project (hereafter referred to as the Proposed Action), the lead agencies would authorize the incidental take of federally listed and state-listed species on MRC's covered lands. Take would be authorized in association with conducting timber harvesting and related operations in accordance with existing federal and state regulations. Take of federally listed species would be authorized pursuant to two federal incidental take permits, one from NMFS and one from USFWS. Take of state-listed species would be authorized pursuant to a California take permit. The federal incidental take permits and California take permit would have 80-year terms. This alternative is considered the preferred alternative under NEPA because it best meets the purpose and need of the lead federal agencies, considering environmental, economic, and other factors.

If approved, MRC would also implement an HCP/NCCP and TMP on its forestlands within the primary assessment area (see Section 1.2 [Proposed Action/Project Description], Figure 1.2-1). MRC would continue to conduct timber harvesting and related operations in accordance with existing federal and state regulations, including selected portions of the 2012 CFPRs. Activities for which MRC is seeking coverage are listed in Section 2.3.2. These activities, which would be conducted in association with MRC's timber operations and implementation of the proposed HCP/NCCP and TMP, would be subject to the provisions of the federal incidental take permits and state take permit.

The Proposed Action includes the majority of the provisions of the No Action alternative, plus additional conservation and management measures contained in the proposed HCP/NCCP and TMP, as described below.

2.3.1 ESA and CESA compliance for covered species

Under the Proposed Action, NMFS and USFWS would each issue MRC an incidental take permit covering federally listed species for a term of 80 years under ESA Section 10(a)(1)(B). If approved, the federal incidental take permit(s) will take effect for covered fish and wildlife species that are federally listed at the time the permit is issued. For covered species that are not federally listed, an incidental take permit will take effect if and when the species becomes federally listed. There are two species covered in the HCP/NCCP for which this would apply: northern red-legged frog and coastal tailed frog. The ESA does not prohibit take of plants; therefore, federal incidental take permits do not apply to plants.

Under the Proposed Action, CDFG would issue MRC a take permit covering state-listed species for a term of 80 years under the NCCPA (California Fish and Game Code Section 2835 *et seq.*).

California Fish and Game Code Section 2835 also authorizes take of species not presently listed under the CESA.

Species for which federal incidental take permits and a state take permit would be granted (and are included in the HCP/NCCP) are listed in Table 2.3-1.

Table 2.3-1. Species covered by incidental take authorization and included in the HCP/NCCP under the Proposed Action.

Common name	Scientific name	Listing status[a]		CRPR status[b]	Take authorization		
		Federal (ESA)	State (CESA)		NMFS[c]	USFWS[c]	CDFG[d]
Fish and wildlife							
Coho salmon, Central California Coast Evolutionarily Significant Unit	*Oncorhynchus kisutch*	E	E	NA	yes	–	yes
Coho salmon, Southern Oregon/Northern California Coast Evolutionarily Significant Unit	*Oncorhynchus kisutch*	T	T	NA	yes	–	yes
Chinook salmon, California Coastal Evolutionarily Significant Unit	*Oncorhynchus tshawytscha*	T	–	NA	yes	–	yes
Steelhead, Central California Coast Distinct Population Segment	*Oncorhynchus mykiss*	T	–	NA	yes	–	yes
Steelhead, Northern California Distinct Population Segment	*Oncorhynchus mykiss*	T	–	NA	yes	–	yes
California red-legged frog	*Rana draytonii*	T	–	NA	–	yes	yes
Northern red-legged frog [e]	*Rana aurora*	–	–	NA	–	–	yes
Coastal tailed frog [e]	*Ascaphus truei*	–	–	NA	–	–	yes
Marbled murrelet	*Brachyramphus marmoratus*	T	E	NA	–	yes	yes
Northern spotted owl	*Strix occidentalis caurina*	T	–	NA	–	yes	yes
Point Arena mountain beaver	*Aplodontia rufa nigra*	E	–	NA	–	yes	yes
Plants							
Humboldt milk-vetch	*Astragalus agnicidus*	–	E	1B.1	–	–	yes
Small groundcone	*Boschniakia hookeri*	–	–	2.3	–	–	yes
Pygmy cypress	*Callitropsis pygmaea*	–	–	1B.2	–	–	yes
Swamp harebell	*Campanula californica*	–	–	1B.2	–	–	yes
California sedge	*Carex californica*	–	–	2.3	–	–	yes
Bristly sedge	*Carex comosa*	–	–	2.1	–	–	yes
Deceiving sedge	*Carex saliniformis*	–	–	1B.2	–	–	yes

Common name	Scientific name	Listing status[a]		CRPR status[b]	Take authorization		
		Federal (ESA)	State (CESA)		NMFS[c]	USFWS[c]	CDFG[d]
Green yellow sedge	*Carex viridula* var. *viridula*	–	–	2.3	–	–	yes
Oregon goldthread	*Coptis laciniata*	–	–	2.2	–	–	yes
Streamside daisy	*Erigeron biolettii*	–	–	3	–	–	yes
Coast fawn lily	*Erythronium revolutum*	–	–	2.2	–	–	yes
Roderick's fritillary	*Fritillaria roderickii*	–	E	1B.1	–	–	yes
Pacific gilia	*Gilia capitata* ssp. *pacifica*	–	–	1B.2	–	–	yes
Glandular western flax	*Hesperolinon adenophyllum*	–	–	1B.2	–	–	yes
Thin-lobed horkelia	*Horkelia tenuiloba*	–	–	1B.2	–	–	yes
Hair-leaved rush	*Juncus supiniformis*	–	–	2.2	–	–	yes
Coast lily	*Lilium maritimum*	–	–	1B.1	–	–	yes
Baker's meadowfoam	*Limnanthes bakeri*	–	R	1B.1	–	–	yes
Mendocino bush mallow	*Malacothamnus mendocinensis*	–	–	1A	–	–	yes
Seacoast ragwort	*Packera bolanderi* var. *bolanderi*	–	–	2.2	–	–	yes
Bolander's beach pine	*Pinus contorta* ssp. *bolanderi*	–	–	1B.2	–	–	yes
White-flowered rein orchid	*Piperia candida*	–	–	1B.2	–	–	yes
North Coast semaphore grass	*Pleuropogon hooverianus*	–	T	1B.1	–	–	yes
Great burnet	*Sanguisorba officinalis*	–	–	2.2	–	–	yes
Maple-leaved checkerbloom	*Sidalcea malachroides*	–	–	4.2	–	–	yes
Siskiyou checkerbloom	*Sidalcea malviflora* ssp. *patula*	–	–	1B.2	–	–	yes
Beaked tracyina	*Tracyina rostrata*	–	–	1B.2	–	–	yes
Santa Cruz clover	*Trifolium buckwestiorum*	–	–	1B.1	–	–	yes
Oval-leaved viburnum	*Viburnum ellipticum*	–	–	2.3	–	–	yes
Running-pine	*Lycopodium clavatum*	–	–	2.3	–	–	yes
Long-beard lichen	*Usnea longissima*	–	–	–	–	–	yes

NA = not applicable
[a] Listing status under ESA and CESA:
E: endangered
T: threatened
R: rare
[b] CRPR: California Rare Plant Rank; for explanation of number ranking system, see Section 3.5, Vegetation and Plant Species of Concern.
[c] Federal incidental take permit.
[d] CDFG take permit under Fish & Game Code Section 2835 *et seq*.

[e] For covered species that are not federally listed, a federal incidental take permit would only take effect if and when the species becomes federally listed.

2.3.2 Covered activities

Activities covered under the federal and state incidental take authorizations would include the following:

- Silviculture and stand improvement.
- Vegetation management, including planting, manual brush and tree removal, and burning for site preparation.
- Commercial timber operations, which entail felling, limbing, bucking, yarding, loading, and hauling of timber, as well as maintenance and refueling of heavy equipment.
- Road and landing construction, use, maintenance, and decommissioning.
- Drafting of water in support of timber operations and road and landings programs.
- Operation of non-commercial rock pits and quarries.
- Habitat improvement and creation.
- Data collection for research and monitoring associated with the HCP/NCCP conservation measures.
- Previously approved (grandfathered) THPs.

The conservation measures included in MRC's proposed HCP/NCCP and the management measures in the proposed TMP are summarized in Sections 2.3.3 through 2.3.15.

Other activities may occur in the primary assessment area that are not covered by the proposed HCP/NCCP and for which incidental take would not be authorized. Examples of activities not covered by the proposed HCP/NCCP include herbicide use, removal of trees that are utility hazards, recreation (including hunting and fishing), grazing, harvest of minor forest products (firewood, greenery, and mushrooms), unauthorized use of MRC roads, construction of cell phone facilities, and emergency fire suppression by CAL FIRE or other firefighting agencies.

2.3.3 Timber harvesting and forest management activities

Timber harvest and forest management activities under the Proposed Action would continue to be governed by the CFPRs and the standards and guidelines set forth in MRC's TMP, with additional measures contained in the proposed HCP/NCCP.

2.3.3.1 Silvicultural prescriptions and timber harvesting

Silvicultural and timber harvesting activities conducted under the Proposed Action would generally be the same as under the No Action alternative, with the following additional HCP/NCCP measures:

- Focus on rehabilitation, uneven-aged silviculture, and canopy retention.
- Target is 90% uneven-aged silviculture within 40 years, with minimum re-entry period of 20 years for uneven-aged stands and an average 75 ft^2 (7 m^2) post-harvest basal area.
- Restricted heavy equipment use in Aquatic Management Zones, Equipment Limitation Zones, Equipment Exclusion Zones, and specific Terrain Stability Units.

2.3.3.2 Timber stand regeneration and improvement

Timber stand regeneration and improvement activities conducted under the Proposed Action would generally be the same as under the No Action alternative, except that site preparation or burning would not be conducted on steep, dissected topography, inner gorge, or steep streamside slopes. In addition, ignition for spot burning within Aquatic Management Zones would be prohibited.

2.3.4 Maximum sustained production of high quality timber products

Maximum sustained production would be governed by the standards and guidelines set forth in MRC's TMP, with additional measures contained in the proposed HCP/NCCP. Harvest levels would be balanced with growth and inventory to ensure long-term sustained yield and maximum sustained production over the covered period.

Maximum sustained production would be achieved under the Proposed Action (as discussed in further detail in Section 3.9, Timber Resources). Table 2.3-2 shows the modeled harvest, in acres, using each silvicultural method by decade over the 100-year planning horizon. This modeled harvest serves as the basis for the long-term sustained yield calculation under the Proposed Action. Timber modeling assumptions are described in Section 2.1.2 (Development of Alternatives, Modeling forest conditions under each alternative). A detailed description of the timber model is provided in Appendix E.

Table 2.3-2. Acres harvested by silvicultural method by decade—Proposed Action.

Silvicultural method	Decade									
	1	2	3	4	5	6	7	8	9	10
Clearcut	0	0	0	0	0	0	0	0	0	0
Coastal Zone Selection	332	36	398	51	398	51	398	51	398	51
Commercial Thinning	0	0	0	0	0	0	0	0	0	0
Flood Plain Selection	44	53	65	179	239	283	293	293	318	306
High Retention Selection	89	264	1,714	3,096	4,978	6,501	7,578	8,231	8,194	8,686
High Retention Selection (Carbon)	0	189	0	261	0	261	0	261	0	261
Medium Retention Selection	52	0	82	0	330	93	413	113	413	140
Rehabilitation	8,035	3,743	0	0	0	0	0	0	0	0
Seed Tree Removal	50	44	114	10	38	0	0	0	0	0
Selection	26,025	39,058	75,426	78,032	82,157	81,390	84,996	82,403	85,742	82,673
Selection (Stepped Approach)	0	0	0	0	0	0	0	0	0	0
Selection (Old Growth II)	33	68	66	78	217	78	242	78	260	78
Small Class II Selection	1,150	1,563	1,943	2,294	2,164	2,463	2,263	2,510	2,293	2,510
Transition	20,435	15,473	600	0	0	0	0	0	0	0
Variable Retention	12,245	10,209	499	278	121	78	394	112	18	0
Total	**68,491**	**70,700**	**80,908**	**84,280**	**90,644**	**91,198**	**96,577**	**94,052**	**97,636**	**94,705**

2.3.4.1 Monitoring thresholds and maximum sustained production compliance

Under the Proposed Action, the underlying assumptions of the baseline inventory and rate of growth described in MRC's TMP (Appendix A) would be tested and improved over time, as necessary. While the impact of necessary adjustments is not expected to substantially change the projections of harvest in the TMP, certain circumstances would require a review by CAL FIRE and may trigger a revision of the TMP and PTEIR. They are:

- A deviation from average harvest acreage projections, adjusted for changes in ownership (see next bullet) in any 10-year period which exceeds 10%.
- A change of ownership which results in either an increase or a decrease to MRC's covered lands by the amount prescribed in the proposed HCP/NCCP (Chapter 1) (MRC 2012) and the Implementation Agreement for the HCP/NCCP. Any change, as described in the aforementioned chapters, that necessitates an amendment of the HCP/NCCP may require an addendum to the PTEIR, a supplement to the PTEIR, or possibly a new PTEIR. Such instances will be evaluated on a case-by-case basis consistent with 15 CCR §15162(a).
- A change of forest conditions from catastrophic events that result in an "unforeseen circumstance," as described in the proposed HCP/NCCP, Chapter 14 (MRC 2012).
- A negative deviation greater than 10% from the baseline inventory estimates, or modeled projections, as the result of ongoing inventory and growth monitoring.

MRC would notify CAL FIRE if any of these deviations or changes occurs.

2.3.5 Program Timber Harvesting Plans

Under the Proposed Action, MRC would prepare Program Timber Harvesting Plans (PTHPs) in place of THPs.

In 1998 the Board of Forestry and Fire Protection adopted rules (14 CCR §1092 *et seq*.) that provided for the programmatic review and tiering of timber harvesting activities. The rules authorized the Director to approve PTHPs where a PTEIR had been certified for the ownership (or multiple ownerships) (Board of Forestry and Fire Protection and CAL FIRE 2009). PTHPs undergo a more limited and expedited review and approval process, tiering to the analysis and mitigations found in the PTEIR, as compared with the review of a typical THP (Board of Forestry and Fire Protection and CAL FIRE 2009). An example PTHP and a sample PTHP checklist are provided with the TMP (Appendix A).

The following information is summarized from *Guidance in the Preparation and Review of Program Timberland Environmental Impact Reports* (Board of Forestry and Fire Protection and CAL FIRE 2009).

The contents of a PTHP differ substantially from a THP. Of primary importance is the requirement that the PTHP be "linked" to a PTEIR that has been certified by the Director. PTHPs prepared by MRC under the Proposed Action would be linked to this EIS/PTEIR. The PTHP must also indicate whether there are any standards or practices that deviate from the standard operational rules that were reviewed in the PTEIR. Those standards or practices (herein referred to as alternate standards) must be listed on the checklist developed in the PTEIR that accompanies the PTHP. The PTHP must also provide explanation and justification for any other operational practices that deviate from the standard rules which were not reviewed in the PTEIR but are allowed in the CFPRs. The PTHP does not contain a cumulative effects analysis, but instead relies upon the PTEIR cumulative effects analysis and the mitigations developed for any cumulative effects identified in the PTEIR checklist.

The review of a PTHP also differs from a THP by requiring a determination that:

- The PTHP is in compliance with the PTEIR and PTHP rules (14 CCR §1092 [inclusive]).
- The activities proposed under the PTHP are within the scope of the analysis conducted in the PTEIR.
- The PTEIR provides the disclosure, effects analysis, and mitigation and avoidance measures required under CEQA.

Occasionally, activities will be proposed in a PTHP that were not considered in the development of the PTEIR. In such instances, the PTHP may be written to address issues not covered in the PTEIR:

- By relying on any of the standard operational rules (which have already been through CEQA in the Board rulemaking process), or
- Through explanation and justification of any operational practices that are allowed under the standard rules.

All PTHPs will go through a state agency review process, which will include an office review and, if CAL FIRE deems it necessary, a field inspection. Over time, certain impacts that have not been fully addressed in the PTEIR may be identified in some PTHPs; some of these impacts may be initially identified as potentially significant. There are steps included in the PTHP review process to identify these impacts and to determine how they will be avoided or minimized (reduced to a level of less-than-significant), including specific steps to identify and avoid or minimize any new, potentially significant impacts to sensitive plant species or Species of Special Concern that are not covered under the HCP/NCCP. A description of the state agency review process and specific steps to avoid potentially significant adverse environmental impacts identified in a PTHP are described in the TMP (Appendix A).

2.3.6 Alternate standards to the CFPRs

MRC has proposed a variety of alternate management and conservation practices (i.e., alternate standards) in its TMP and HCP/NCCP. The development of alternate standards to the CFPRs is allowed under the CFPRs (14 CCR §1092 *et seq*.).

The environmental effects of the proposed alternate standards are analyzed for each applicable resource category in this EIS/PTEIR (see Section 3, Affected Environment and Environmental Effects). A complete list of MRC's proposed alternate standards is included as an appendix to the TMP (Appendix A).

2.3.7 Management of hazardous substances

Same as the No Action alternative.

2.3.8 Management of fire hazards

Same as the No Action alternative.

2.3.9 Post-fire timber salvage

Under the Proposed Action, MRC may harvest timber in burned areas to salvage trees that are likely to die or that are not viable for timber production, in accordance with the prescriptions in MRC's proposed HCP/NCCP, including:

- MRC would not reduce the conservation measures for Terrain Stability Units (Section 2.3.10), including the prohibition on logging in inner gorges of Terrain Stability Unit 1 and Terrain Stability Unit 2, unless the wildlife agencies concur.
- MRC would develop site-specific erosion control measures to avoid or minimize sediment delivery to watercourses, wetlands, wet meadows, wet areas, seeps, and springs. Erosion control measures would include surface erosion control in upland areas, installation of erosion control and drainage structures on roads and stream crossings, and erosion monitoring of roads and crossings in burned areas.
- MRC would not reduce the conservation measures for Aquatic Management Zones (Section 2.3.13), including the prohibition on salvage logging, unless the wildlife agencies concur.
- MRC would meet proposed HCP/NCCP objectives for retention of downed large woody debris in Class I and Large Class II Aquatic Management Zones (Section 2.3.13) and in general forested areas (Section 2.3.14).
- MRC would retain, per acre, one additional snag and wildlife tree over and above the number specified in the proposed HCP/NCCP (Section 2.3.14).
- MRC would not harvest: (a) old-growth trees; (b) trees in which the diameter of the entrance hole leading to a cavity is greater than 3 in (7.6 cm) and 10 ft (3 m) or more above the ground; (c) nest trees of northern spotted owls; (d) trees that are potential habitat for marbled murrelet; (e) trees over 24 in (61 cm) diameter at breast height with basal hollows that are more than 12 in (30 cm) in any horizontal dimension and extend at least 6 in (15 cm) vertically inside the cavity from the topmost point of the entrance hole; (f) trees with known raptor nests; or (g) granary trees.
- MRC would, with concurrence of the wildlife agencies, restore damaged red-legged frog breeding sites or create new sites in adjacent, unaffected areas.
- MRC would receive approval from the wildlife agences before taking any actions after a fire in the Lower Alder Creek Management Area (the proposed marbled murrelet protection area; Section 2.3.15).
- MRC would not conduct salvage operations within 100 ft (30 m) of known Point Arena mountain beaver burrow systems (Section 2.3.15).
- MRC would conduct a rare plant survey during the blooming season, if the burned area has over-wintered since the fire event.
- MRC would protect known and newly detected rare plants according to the proposed HCP/NCCP conservation measures for rare plants (Section 2.3.15).
- MRC would, after consulting and concurring with the wildlife agencies, suspend efforts at reforestation and erosion control (unrelated to watercourses) at the site of a rare plant occurrence for two years to allow its seed bank to replenish.

2.3.10 Mass wasting and sediment management

The mass wasting and sediment management measures implemented by MRC under the Proposed Action would largely be the same as under the No Action alternative, including measures required under the 2012 CFPRs. Additional HCP/NCCP measures include:

- No harvest in inner gorges (in Terrain Stability Units 1 and 2) without field review by California Professional Geologist and an aquatic resource expert; minimum retention upon review would be high-retention selection harvest.
- Harvest on steep streamside slopes (in Terrain Stability Units 1 and 2) and steep dissected topography (in Terrain Stability Unit 3) subject to Aquatic Management Zone retention standards: (1) retain ≥ 50% overstory canopy in unit outside Aquatic Management Zones; (2) with exception of one-time entry for shelterwood and seed-tree removal, retain at least 8 trees per acre ≥ 18 in (46 cm) diameter at breast height or 4 trees per acre ≥ 24 in (61 cm) diameter at breast height (see other details below under Aquatic and Riparian Habitat).
- Heavy equipment excluded from inner gorges and other steep streamside slopes (in Terrain Stability Units 1, 2, and 3, as applicable).

2.3.11 Road management

Under the Proposed Action, MRC would implement a system-wide Road Management Plan. The road-related measures implemented under the Proposed Action would include those described under the No Action alternative, with additional measures contained in the proposed HCP/NCCP. Appendix E (*Road, Landing, and Skid Trail Standards*) of MRC's proposed HCP/NCCP (MRC 2012) includes detailed descriptions of the standards and protocols for inventory, inspection, construction, maintenance, and decommissioning of roads, landings, skid trails, rock pits, water drafting sites, and other features associated with the road system. Key elements are summarized below.

- Conduct annual inspections of all permanent roads and roads being actively used.
- Conduct five inspections over five years after work completion on all seasonal roads and associated road points constructed, reconstructed, or decommissioned.
- Conduct at least one inspection of a new temporary road each year for a period of four years following construction.
- Inspect all roads with permanent structures (culverts or bridges) during the road inventory update at 10-year intervals unless a road is decommissioned or has maintenance-free structures.
- If damage to the road surface, drainage facilities, water bars, or water crossings is discovered, make repairs immediately if feasible, or within 24 hours, to eliminate the likelihood of related sediment reaching a stream.
- In coho core watersheds, treat at least 70% of the controllable erosion sites with a high priority and 50% of the sites with a moderate priority within 10 years of HCP/NCCP implementation. Treat the remainder of the high and moderate priority sites by year 20 of HCP/NCCP implementation and all low priority sites by year 40.
- Outside the coho core watersheds, treat one-third of the controllable erosions sites with high and moderate priorities every 10 years; resulting in treatment of all high and moderate sites by year 30 of HCP/NCCP implementation and all low priority sites by year 40.
- No new roads or landings on inner gorge slopes, steep streamside slopes, steep convergent swales, or historically active mass wasting features without approval of both a California Professional Geologist and an aquatic resource expert.
- New watercourse crossings on inner gorge topography would not be constructed if there is a reasonable alternative; where there is no reasonable alternative, the crossing must be approved by California Professional Geologist and an aquatic resource expert.

- No roads near bottoms of steep narrow canyons, within the Aquatic Management Zone parallel to a Class I, II, or III watercourse, or in areas with high mass wasting hazard.
- No new landings in Class I, II, or III Aquatic Management Zones unless specific placement has a lower risk for sediment delivery than other locations outside the Aquatic Management Zone.
- Consult with the wildlife agencies prior to landing construction and fully implement any required mitigation measures.
- Decommission roads and landings if feasible (if not, maintain to road plan standards).
- Locate waterbreaks on roads to prevent road drainage from discharging directly into a watercourse, wet area, seep, spring, or onto mass wasting hazards.
- Drainage from roads or landing surfaces shall not be directed across the head, toe, or lateral margin of known mass wasting features.
- Fix blocked culverts and other imminent problems before the start of the next winter season.
- Install the necessary protective structures on all culverts at watercourse crossings in which water is flowing at the time of installation. Install other permanent drainage structures no later than 15 October. Protective structures would not be used on Class I streams.

Under the Proposed Action, winter hauling and heavy equipment use would be limited as follows:

- During early winter period (15 October until cumulative water year precipitation totals 4 in [10 cm]):
  - No tractor or other heavy equipment use for 24 hours after ≥ 0.5 in (1.3 cm) of rainfall in previous 24 hours.
  - No tractor or other heavy equipment use after 4 in (10 cm) of cumulative precipitation in the water year (or National Weather Service forecasts ≥ 30% chance of exceeding this threshold).
- During mid-winter period (end of Early Winter period until 31 March):
  - No tractor or heavy equipment use.
  - No use of landings in Aquatic Management Zone.
  - No construction, reconstruction, or abandonment of roads.
  - No use of roads, skid trails, or landings if soil is saturated, surface is unstable, or visibly turbid water may reach a watercourse.
  - Use of roads and landings limited to permanent surfaces (e.g., rock), unless the road or landing is located at least 200 ft (61 m) from a watercourse and has no drainage to watercourse.
  - No loading or hauling when soils are saturated or when sediment can be transported to a watercourse.
- During late winter period (1 April to 1 May):
  - No loading, hauling, or skidding when soils are saturated or when sediment can be transported to a watercourse.
  - No tractor or other heavy equipment use for 48 hours after ≥ 0.5 in (1.3 cm) of rainfall in a previous 24-hour period.

Under the Proposed Action, the following water drafting measures apply:

- Water for dust abatement generally obtained by drafting from Class I and Class II streams, ponds, or other water impoundments on MRC property, following standards set by the

CFPRs (see No Action) and specific criteria detailed in the CDFG master streambed alteration agreement (Master Agreement for Timber Operations) and summarized in Appendix E of the HCP/NCCP (MRC 2012).

2.3.12 Site preparation

In addition to 2012 CFPR measures, site-specific HCP/NCCP measures would include:

- No site preparation or burning on steep, dissected topography, inner gorge, or steep streamside slopes.
- No initiation of prescribed or broadcast burning in the Aquatic Management Zone of Class I, large or small Class II, or Class III Aquatic Management Zones.

2.3.13 Aquatic and riparian habitat management

Under the Proposed Action, MRC would continue to protect aquatic and riparian resources, as well as wetlands, seeps, and springs, by implementing the aquatic and riparian management measures specified in the CFPRs and its proposed HCP/NCCP. MRC would continue with its ongoing Level 2 watershed analysis[18] efforts (WFPB 1995) in Total Maximum Daily Load-listed watersheds. Monitoring results would be used to develop or adjust management practices in order to meet applicable targets for reducing sediment or temperature impairment in listed streams.

Aquatic and riparian management measures conducted under the Proposed Action would be similar to those conducted under the No Action alternative, with additional measures included in the proposed HCP/NCCP. Under the HCP/NCCP, Class I, II, and III watercourse protection areas would be classified as Aquatic Management Zones, with the specific management measures described below.

2.3.13.1 Class I Streams

Stream buffer widths

For Class I streams, Aquatic Management Zone width would be 130–190 ft (40–58 m), depending on bank slope, yarding method, and floodprone and channel migration zone boundaries. For analysis purposes, Class I Aquatic Management Zone width was modeled as 150 ft (46 m) horizontal distance.

Class I Aquatic Management Zones are further divided into inner, middle, and outer bands, with an additional 10 ft (3 m) no harvest band adjacent to the stream:

- Inner band width is 50 ft (15 m) for all bank slope classes.
- Middle band width is 50 ft (15 m) for slopes 0–30%, 80 ft (24 m) for slopes 30–50%, or 100 ft (30 m) for slopes > 50%. Width of middle band in Class I streams can vary due to width of flood prone zone or channel migration zone (band starts at edge of flood prone zone or channel migration zone). For slopes > 50%, width of middle band may be reduced by 20–25 ft (6–8 m) for cable or helicopter yarding.

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[18] MRC's watershed analysis is conducted using the methodology of the Washington Forest Practices Board (WFPB 1995, and revisions). Level 2 is the most detailed, rigorous, and time consuming of the two levels of analysis, and must be performed by qualified resource specialists.

- Outer band width is 30 ft (9 m) for slopes 0–30%, 20 ft (6 m) for slopes 30–50%, or 40 ft (12 m) for slopes > 50%. For slopes > 50%, width of outer band may be reduced by 20–25 ft (6–8 m) for cable or helicopter yarding.

Aquatic Management Zone equipment use

- Equipment is generally excluded from Class I Aquatic Management Zone, with limited exceptions such as erosion control/road decommissioning, use of existing roads, construction of watercourse crossings, or in cases where alternative yarding methods would cause greater risk of sediment delivery.

Canopy retention

Canopy retention in Class I Aquatic Management Zone as follows:

- Inner band: 85%.
- Middle band: 70%.
- Outer band: 50%.

Basal area retention

Basal area retention in Class I Aquatic Management Zone as follows:

- Inner and middle Aquatic Management Zone bands (and floodprone/channel migration zone): 200–300 ft^2 (19–28 m^2) per acre (conifer basal area), or 75% of pre-harvest conifer basal area, whichever is larger, based on the site class of the Aquatic Management Zone.
- Outer band: no basal area targets (canopy retention only, as described above).

Large tree retention

Considering all trees ≥ 12 in (30 cm) diameter at breast height in Class I Aquatic Management Zones, retain the largest trees to the following percentages, based on the sensitivity of the stream channel to large woody debris (calculated over a 328-ft [100-m] reach):

- Inner band: 10–30%.
- Middle band: 5–15%.
- Outer band: none.
- Selection of the largest trees would progress systematically through size classes demarcated at 4 in (10 cm) diameter at breast height intervals, beginning with the largest size class.

Large woody debris

- Retain all large woody debris in Aquatic Management Zone, except where removal or relocation is needed to clear road obstruction or for instream enhancement.
- Retain all trees leaning across the plane of the channel zone, even if they are not one of the largest trees.

Silviculture

Silviculture in Class I Aquatic Management Zone:

- High retention selection only.
- No sanitation or salvage.
- Retain all old-growth trees.

- No harvest within 10 ft (3 m) of the bankfull channel, except for limited selection of redwood clumps (50% of redwood stems > 8 in [20 cm] diameter at breast height can be removed per entry).
- One entry in outer band allowed for shelterwood and seed tree removal (if entered, no harvest allowed in inner band).
- Re-entry period same as for adjacent upland stands if Aquatic Management Zone stand meets trigger of 200–300 ft^2 (19–28 m^2) per acre (conifer basal area), or 75% of pre-harvest conifer basal area, whichever is larger, based on the site class of the Aquatic Management Zone.

Exposed soil

Same as No Action alternative.

Bank stability

Measures in MRC's proposed HCP/NCCP and TMP (Appendix A) would apply. Bank stability measures would be the same as described under the No Action alternative, plus:

- Do not initiate prescribed burning in the Aquatic Management Zone.
- Restrictions on harvest in inner gorge and steep streamside slopes (see Section 2.3.10, above).
- Restrictions on roads, landings, crossings, and use of heavy equipment in inner gorge and steep streamside slopes (see Section 2.3.11, above).
- Retain all trees within 10 ft (3 m) of bankfull channel, except for limited selection of redwood clumps (50% of redwood stems > 8 in [20 cm] diameter at breast height can be removed per entry).

2.3.13.2 Class II streams

Class II streams are divided into the following Large and Small categories:

- Large Class II streams are those with: (1) contributing watershed area > 100 ac (40 ha), (2) perennial flow during normal or below normal rainfall years, or (3) coastal tailed frogs present.
- Small Class II streams are those with contributing watershed area < 100 ac (40 ha).

Stream buffer widths

Width of Large Class II Aquatic Management Zone is 100–150 ft (30–46 m), depending on bank slope (modeled as 150 ft [46 m]):

- Inner band width is 25 ft (8 m).
- Middle band width is 25 ft (8 m) for slopes 0–30%, 50 ft (15 m) for slopes 30–50%, or 75 ft (23 m) for slopes > 50%. For slopes > 50%, width of middle band may be reduced by 20–25 ft (6–8 m) for cable or helicopter yarding.
- Outer band width is 50 ft (15 m) for slopes 0–30%, 55 ft (17 m) for slopes 30–50%, or 50 ft (15 m) for slopes > 50%. For slopes > 50%, width of outer band may be reduced by 20–25 ft (6–8 m) for cable or helicopter yarding.

Width of Small Class II Aquatic Management Zone is 50–100 ft (15–30 m), depending on bank slope (modeled as 75 ft [23 m]):

- If bank slope < 30%, Aquatic Management Zone width is 50 ft (15 m).

- If bank slope is 30–50%, Aquatic Management Zone width is 75 ft (23 m).
- If bank slope is > 50%, Aquatic Management Zone width is 100 ft (30 m) (subtract 25 ft [8 m] for cable or helicopter yarding).
- No harvest within 10 ft (3 m) of bankfull channel, except for limited selection of redwood clumps (50% of redwood stems > 8 in [20 cm] diameter at breast height can be removed per entry).

Aquatic Management Zone equipment use

Equipment is generally excluded from Class II Aquatic Management Zones, with exceptions as noted for Class I Aquatic Management Zones. In Small Class II Aquatic Management Zones, additional equipment restrictions apply where there is evidence of exposed soil pipes or soil pipes transitioning into stream channels.

Canopy retention

Large Class II: same as Class I.

Small Class II: 50% overstory canopy retained in Aquatic Management Zone.

Basal area retention

Large Class II: same as Class I.

Small Class II: no basal area retention standards.

Large tree retention

Large Class II: same as Class I.

Small Class II: no large tree retention standards.

Large woody debris

Large Class II: same as Class I.

Small Class II: same as Class I.

Silviculture

Large Class II: same as Class I.

Small Class II: high retention selection not required; otherwise same as Class I.

Exposed soil

Large and Small Class II: same as Class I.

Bank stability

Large Class II and Small Class II: same as Class I.

2.3.13.3 Class III Streams

Stream buffer widths

For Class III streams, Aquatic Management Zone width is based on bank slope, as follows:

- If bank slope < 30%, Aquatic Management Zone width is 25 ft (8 m).
- If bank slope is > 30%, Aquatic Management Zone width is 50 ft (15 m).

Aquatic Management Zone equipment use

Equipment is generally excluded from Class III Aquatic Management Zones, with limited exceptions as described above for Class I streams. Additional equipment restrictions apply where there is evidence of exposed soil pipes or soil pipes transitioning into stream channels.

Canopy retention

Same as for Small Class II streams.

Basal area retention

No basal area retention standards.

Large tree retention

No large tree retention standards.

Large woody debris

Same as for Class I streams.

Silviculture

Same as for Small Class II streams.

Exposed soil

Same as for Class I and II streams.

Bank stability

Class III bank stability measures same as Class I and II, with additional measures for soil pipes (when there is evidence of exposed soil pipes or soil pipes transitioning into stream channels):

- Fell trees so that they do not collapse a soil pipe, thereby prohibiting ground yarding across the collapsed soil pipe.
- Avoid soil pipes when operating heavy equipment.
- Cross soil pipes only at existing crossings when operating equipment.
- Remove all transported fill upon completion of the operation.

2.3.13.4 Wetlands, wet meadows, and wet areas

MRC would protect wetlands, wet meadows, and wet areas by designating an Equipment Exclusion Zone or Equipment Limitation Zone, the width of which would be based on the surface area of the resource:

- Maintain a 25 ft (8 m) Equipment Exclusion Zone buffer around wetlands, wet meadows, and wet areas < 50 ft^2 (4.6 m^2) in surface area.
- Maintain a 50 ft (15 m) Equipment Exclusion Zone buffer around wetlands, wet meadows, and wet areas > 50 ft^2 (4.6 m^2) in surface area.
- Limited equipment use allowed in buffer (i.e., buffer is considered an Equipment Limitation Zone) following consultation and approval by MRC biologist.
- Within Equipment Exclusion Zone or Equipment Limitation Zone, the following measures apply:
    - No sanitation or salvage harvest.
    - Retain all downed large woody debris.

- Retain 50 ft^2 (4.6 m^2) basal area or 50% of pre-harvest basal area, whichever is greater.
- Retain all old-growth trees.
- Fell trees away from area.
- Leave trees that were felled for safety reasons.

2.3.13.5 Seeps and springs

Under the Proposed Action, MRC would protect seeps and springs within Class I and II Aquatic Management Zones per the measures described above for these stream classes.

- Extend the Aquatic Management Zone boundary to include a seep or spring, if the seep or spring is on, near, or draining into the Aquatic Management Zone boundary.

For seeps and springs not within a Class I or II Aquatic Management Zone, the following measures apply:

- Maintain a 50-ft (15-m) Equipment Exclusion Zone buffer with a 50% canopy retention requirement.
- Limited equipment use allowed in buffer (i.e., buffer is considered an Equipment Limitation Zone) following consultation and approval by MRC biologist.
- Only partial harvest (uneven-aged silviculture) allowed within Equipment Exclusion Zone or Equipment Limitation Zone buffer.
- No sanitation or salvage harvest.
- Retain all downed large woody debris.
- Retain all old-growth trees.

2.3.13.6 Stream habitat improvement

Under the Proposed Action, MRC would continue to conduct its ongoing and planned stream habitat improvement activities (described under the No Action alternative), with additional measures contained in the proposed HCP/NCCP. HCP/NCCP measures include a relatively large amount of large woody debris placement in Class I streams, with an initial focus in coho core watersheds, which include over 30% of the primary assessment area (see HCP/NCCP Section 8.2.3 [MRC 2012]). MRC would notify the wildlife agencies of large woody debris placement activities by preparing site-specific plans if placing density exceeds one added piece of large woody debris per 100 ft (30 m) of channel length. Locations for large woody debris placement would be determined by watershed analysis, and streams with high large woody debris demand and channel responsiveness would be given the highest priority. Large woody debris placement projects would be monitored and data used to improve future projects through adaptive management.

To improve riparian function, MRC would use limited restoration treatments in Class I and II Aquatic Management Zones to (1) restore stands that are currently hardwood-dominated to conifer dominance and (2) treat conifer stands that are over-stocked and stagnating. A restoration harvest, in this context, generally allows for less than 50% canopy over the Aquatic Management Zone. The intent of the restoration treatment is to increase Aquatic Management Zone function over time. MRC would use restoration treatments in select Aquatic Management Zones where hardwood dominance has superseded conifer dominance.

2.3.14 Terrestrial habitat management

Measures in MRC's proposed HCP/NCCP would apply. Under the Proposed Action, MRC would implement the terrestrial habitat management measures as described under the No Action alternative, with additional measures contained in the proposed HCP/NCCP.

2.3.14.1 Snag and wildlife tree retention and recruitment

Management objectives for snag retention or recruitment in Class I and Large Class II Aquatic Management Zones would be:

- 1 hard snag or recruitment tree on average per acre that is ≥ 16 in (41 cm) diameter at breast height and ≥ 30 ft (9 m) tall.
- 2 hard snags or recruitment trees on average per acre that are ≥ 24 in (61 cm) diameter at breast height and ≥ 40 ft (12 m) tall.
- 1 wildlife tree or recruitment tree on average per acre that is ≥ 16 in (41 cm) diameter at breast height and ≥ 30 ft (9 m) tall.

Management objectives for snag retention and recruitment in general forest areas would be:

- 1 hard snag or recruitment tree on average per acre that is ≥ 16 in (41 cm) diameter at breast height and ≥ 30 ft (9 m) tall.
- 1 hard snag or recruitment tree on average per acre that is ≥ 24 in (61 cm) diameter at breast height and ≥ 40 ft (12 m) tall.
- 1 wildlife tree or recruitment tree on average per acre that is ≥ 16 in (41 cm) diameter at breast height and ≥ 30 ft (9 m) tall.
- Tally old-growth trees, wildlife trees, and recruitment trees in all silvicultural units and provide annual report and map to agencies.
- Ensure that no more than 50% of snags and snag recruitment trees are hardwoods.
- Retain all wildlife trees.
- Retain green trees to recruit into wildlife trees when deficient.
- Retain all hollow logs and hollow standing trees for future recruitment as downed wood.

2.3.14.2 Downed large woody debris

MRC's proposed HCP/NCCP includes the following downed large woody debris retention measures:

- Retain unmerchantable logs ≥ 16 in (41 cm) diameter and ≥ 6 ft (2 m) long;
- In Aquatic Management Zones and other special emphasis areas: retain 6 hard logs per acre (≥ 16 in [41 cm] diameter at breast height by 6 ft [2 m] long, and derived from ≥ 3 trees), averaged over each silvicultural unit.
- In other areas: retain 5 hard logs per acre (≥ 16 in (41 cm) diameter at breast height by 6 ft [2 m] long, and derived from ≥ 3 trees), averaged over each silvicultural unit.

2.3.14.3 Old growth

MRC's HCP/NCCP defines a Type I old-growth stand as an unharvested stand with at least 3 contiguous ac (1 ha) of old growth (FSC-US 2010). The conservation measures in the proposed HCP/NCCP for Type I old-growth stands include:

- Retain current acreage of Type I stands, as well as any new Type-I old-growth stands later discovered in the plan area.
- No harvest in previously unharvested Type I old-growth stands.
- Protect a 150-ft (46-m) buffer that retains ≥ 75% of the conifer basal area around Type I old-growth stands.
- Pursue conservation easements to permanently protect old-growth stands.

MRC's HCP/NCCP defines a Type II old-growth stand as a previously harvested stand of at least 3 contiguous ac (1 ha) with ≥ 6 old-growth trees per acre. The HCP/NCCP Type II old-growth standards include:

- Retain current acreage of Type II stands, as well as any new Type-II old-growth stands later discovered in the plan area.
- Harvest in Type II stands using single-tree selection to maintain and increase mean stand diameter at breast height.
- Maintain screen trees for old-growth trees to provide protection from wind and other disturbance.
- Preserve all individual old-growth trees.

As defined in MRC's HCP/NCCP, an individual old-growth tree is:

- ≥ 48 in (122 cm) diameter at breast height if coastal redwood, or ≥ 36 in (91 cm) diameter at breast height if Douglas-fir, and > 200 years old; or
- Any tree > 200 years old and with a preponderance of old-growth characteristics specific to that species of tree regardless of its diameter at breast height; or
- Any tree > 200 years old that cannot be replaced in size or ecological function within 80–130 years, regardless of diameter at breast height or presence of old-growth characteristics.

The conservation measures in the proposed HCP/NCCP for individual old-growth trees include:

- Protect and preserve all individual old-growth trees.
- Retain all screen trees around individual old-growth trees.

2.3.14.4 Hardwood retention

MRC's HCP/NCCP defines three types of hardwood stands:

- Class I hardwood stands are dominated by native hardwoods (e.g., tanoak, madrone, and true oaks) and have never been managed for conifer timber production.
- Class II hardwood stands are dominated by native hardwoods and may have had some conifer harvest, although their suitability for conifer restoration is unknown.
- Class III hardwood stands are dominated by native hardwoods only because of past management and are clearly suitable for conifer restoration.

Class I, II, and III hardwood stands would be managed as follows:

- Class I hardwood stands: no harvest.
- Class II hardwood stands: harvest is allowed if stand is re-classified as Class III following on-the-ground assessment.
- Class III hardwood stands: harvest is allowed to restore to conifer dominance.

- Do not manage hardwoods in riparian buffers (Aquatic Management Zones) unless management enhances riparian or in-stream habitats; establishes cable corridors for harvesting operations; or creates safer working conditions.
- Retain the boles of felled hardwoods to provide in-stream and terrestrial woody debris.
- Maintain all true oak (*Quercus* spp.) stands.
- Retain all true oak (*Quercus* spp.) and madrone trees > 18 in (46 cm) diameter at breast height, except as necessary for safety, road right-of-way, or yarding corridors.
- Retain at least 15 ft^2 (1.4 m^2) basal area per acre of hardwoods > 6 in (15 cm) diameter at breast height, provided that hardwoods comprised at least that amount prior to harvest.
- Retain all hardwoods > 6 in (15 cm) diameter at breast height when < 15 ft^2 (1.4 m^2) basal area of hardwoods is present before harvest.
- Retain all hardwoods ≥ 24 in (61 cm) diameter at breast height if this size class comprises less than 20% of pre-harvest area.
- Retain clusters of mast-producing hardwoods.
- Maintain hardwood clumps in rehabilitation stands.
- Retain hardwoods, when possible, in clumps that include a variety of size classes and that surround large individual trees or those with significant wildlife value.
- Retain aggregate hardwood areas within variable retention units.
- Maintain 1,487 ac (602 ha) as representative sample areas for early successional hardwood stands.

2.3.14.5 Unique habitats

Closed-cone pine forest

Under the proposed HCP/NCCP, MRC would protect closed-cone pine forest with the following measures:

- No harvest in pygmy forest or Bishop pine forest.
- Management in pygmy forest limited to existing infrastructure (i.e., roads); new road construction limited to 5% of the total MRC pygmy forest ownership.
- Decommission, close, and revegetate historical roads in closed-cone pine forest whenever possible.
- Reintroduce and manage ecological processes or surrogates after obtaining approval of the wildlife agencies.

Oak woodlands

Under the proposed HCP/NCCP, MRC would protect oak woodlands with the following measures:

- In oak woodlands, MRC may maintain use of existing infrastructure (i.e., roads).
- No harvest in oak woodlands except to remove invading conifers.
- In oak woodlands, new road construction requires a rare plant survey.
- Decommission, close, and revegetate historical roads in oak woodlands whenever possible.
- Reintroduce and manage ecological processes or surrogates after obtaining approval of the wildlife agencies.

Rocky outcrops and other unique habitats

Under the proposed HCP/NCCP, rocky outcrops are defined as:

- At least 1 ac (0.4 ha) in size with ground cover entirely of rock; or
- Near-vertical rock faces ≥ 50 ft (15 m) high and ≥ 100 ft (30 m) long that have not been affected by humans.

MRC would protect rocky outcrops with the following measures:

- Maintain and preserve 3 rocky outcrops comprising 63 ac (26 ha) across 3 planning watersheds.
- Survey for sensitive species if there are plans to convert rocky outcrops to quarries. If sensitive species are present, obtain approval of wildlife agencies prior to any conversion.
- Survey for peregrine falcons when timber operations are proposed within 0.5 mi (0.8 km) of a rocky outcrop or within 1 mi (1.6 km) for helicopter yarding.
- Coordinate with adjacent landowners to determine status of adjacent peregrine falcon eyries.
- As specified by 2012 CFPRs, consult with the wildlife agencies prior to operations within 0.25 mi (0.4 km) of a peregrine falcon nest to determine site-specific conservation measures, including applicable CFPRs, to prevent disturbance of active peregrine falcon nests.

2.3.14.6 Habitat connectivity

Harvest planning under the Proposed Action would incorporate measures from MRC's proposed HCP/NCCP and TMP (Appendix A) to maintain and enhance terrestrial habitat connectivity for different species at appropriate spatial scales. As described under the No Action alternative, the general objectives in the 2012 CFPRs (14 CCR §897) relating to habitat connectivity would apply, including retention/recruitment of late and diverse successional stage habitat components for wildlife concentrated in Watercourse and Lake Protection Zones and, as appropriate, to provide for functional connectivity between habitats. Habitat connectivity measures would be refined through adaptive management as species-specific measures are developed, implemented, and monitored.

2.3.15 Listed and sensitive species management

Under the Proposed Action, take of listed species covered under the HCP/NCCP would be permitted provided that the take is incidental to a covered activity, such as timber harvesting. MRC would remain subject to the take prohibition for other listed species that are not covered by incidental take authorization. For listed species not covered by the HCP/NCCP and incidental take authorization, MRC would continue to implement measures designed to avoid take of these species, including continuing to adhere to measures contained in its most recent Management Plan and the CFPRs (e.g., for certain listed bird species, the CFPRs include nest protection and other measures designed to avoid take), as well as those identified during the PTHP preparation and review process.

2.3.15.1 Species covered under the HCP/NCCP

Species that would be covered by incidental take authorization and under the proposed HCP/NCCP are described in Section 2.3.1 (above) and listed below, along with a summary of or reference to conservation and management measures in the HCP/NCCP.

Coho salmon, Chinook salmon, and steelhead

Under the Proposed Action, incidental take of these species would be authorized subject to the terms of the NMFS incidental take permit and CDFG take permit. MRC would implement habitat-based HCP/NCCP conservation measures intended to minimize and mitigate the effects of incidental take of these fish species, including the following:

- Harvest not allowed in inner gorges without field review by a California Professional Geologist and an aquatic resource expert, to minimize sediment delivery to watercourses.
- Restrictions on timber harvest and equipment use on steep streamside slopes and steep dissected topography to minimize sediment delivery to watercourses.
- Implementation of a comprehensive road inventory and system-wide Road Management Plan to identify and treat road-related sediment sources to minimize sediment delivery to watercourses.
- Restrictions on equipment use in Aquatic Management Zones to minimize sediment delivery to watercourses.
- Retention standards for riparian canopy, basal area, large trees, old-growth trees, and large woody debris in Aquatic Management Zones to maintain and enhance riparian function.
- Silvicultural restrictions in Aquatic Management Zones to minimize disturbance and maintain and enhance riparian function.
- Measures to treat exposed soil and maintain stream bank stability in Aquatic Management Zones to minimize sediment delivery to watercourses.
- Stream habitat improvement activities.

A more detailed description of these measures can be found above under Mass wasting and sediment management (Section 2.3.10), Road management (Section 2.3.11), and Aquatic and riparian habitat management (Section 2.3.13), and in Chapter 8 and Chapter 10 of MRC's HCP/NCCP. Stream habitat improvement, focused in coho core watersheds, accelerated road repairs and upgrades, and fish salvage during instream construction activities are included in these measures.

California red-legged frog and northern red-legged frog

Under the Proposed Action, incidental take of California red-legged frog, a federally threatened species, would be authorized subject to the terms of the USFWS incidental take permit. The USFWS designated 1.6 million ac (647,500 ha) in California as critical habitat for the California red-legged frog (75FR51:12815–12864), which includes Mendocino County and part of the HCP/NCCP plan area. California and northern red-legged frogs are not listed under the CESA, but both species are considered California Species of Special Concern.

MRC would implement species-specific HCP/NCCP conservation measures intended to minimize and mitigate adverse effects on California and northern red-legged frogs, including the following:

- Maintenance standards for documented red-legged frog breeding sites (both natural and man-made):
    - Maintain and manage vegetation after 1 July.
    - Do not conduct vegetation management more than once every 3 years.
    - Limit vegetation management to 50% of the breeding site's perimeter.
- Maintain a 25- to 50-ft (8- to 15-m) equipment limitation or exclusion zone around wetlands, wet areas, wet meadows, seeps, and springs, excluding existing roads.

- Maintain a 50-ft (15-m) equipment exclusion or limitation zone (Equipment Exclusion Zone or Equipment Limitation Zone) around all potential and documented red-legged frog breeding sites, excluding existing roads.
- Limit water drafting at documented red-legged frog breeding sites (both natural and man-made):
  - Do not draft more than 50% of pond volume before 1 July.
  - Do not draft more than 80% of pond volume after 1 July.
  - Do not draft when egg masses are present.
  - Use a screen with a mesh size less than 0.12 in (0.3 cm) and an approach velocity of 0.33 ft per second (10 cm per second) or less.

The HCP/NCCP also specifies pond construction and maintenance standards, bullfrog control measures, herbicide use limitations, and surveys and salvage prior to equipment entering into an Equipment Exclusion Zone or Equipment Limitation Zone of any wet feature (watercourses, wet areas, seeps, springs, wet meadows, and wetlands), including potential and documented red-legged frog breeding sites.

In addition, MRC would implement habitat-based HCP/NCCP conservation measures, many of which would also minimize and mitigate adverse effects on California and northern red-legged frog, including the following:

- Harvest not allowed in inner gorges without field review by a California Professional Geologist and an aquatic resource expert, to minimize sediment delivery to watercourses.
- Restrictions on timber harvest and equipment use on steep streamside slopes and steep dissected topography to minimize sediment delivery to watercourses.
- Implementation of a comprehensive road inventory and system-wide Road Management Plan to identify and treat road-related sediment sources to minimize sediment delivery to watercourses.
- Restrictions on equipment use in Aquatic Management Zones to minimize sediment delivery to watercourses.
- Retention standards for riparian canopy, basal area, large trees, old-growth trees, and large woody debris in Aquatic Management Zones to maintain and enhance riparian function.
- Silvicultural restrictions in Aquatic Management Zones to minimize disturbance and maintain and enhance riparian function.
- Silvicultural restrictions in areas adjacent to wetlands, wet meadows, wet areas, seeps, and springs to minimize disturbance and maintain ecosystem function.
- Retention standards for basal area, old-growth trees, snags and wildlife trees, and downed large woody debris in areas adjacent to wetlands, wet meadows, wet areas, seeps, and springs to maintain ecosystem function.

A more detailed description of these habitat-based measures can be found above under Mass wasting and sediment management (Section 2.3.10), Road management (Section 2.3.11), Aquatic and riparian habitat management (Section 2.3.13), and Terrestrial habitat management (Section 2.3.14), and in Chapter 8 and Chapter 10 of MRC's HCP/NCCP (MRC 2012).

Coastal tailed frog

The coastal tailed frog is not listed under the ESA or CESA, but is considered a California Species of Special Concern. MRC would implement species-specific HCP/NCCP conservation measures intended to minimize and mitigate adverse effects on coastal tailed frogs, including the following:

- Maintain a 25- to 50-ft (8- to 15-m) equipment limitation or exclusion zone around wetlands, wet areas, wet meadows, seeps, and springs, excluding existing roads.
- Conduct pre-project surveys to determine the presence of covered aquatic species when proposing that heavy equipment enter into the Equipment Limitation Zone or Equipment Exclusion Zone of any wet feature (wet areas, seeps, springs, wet meadows, and wetlands).
- Designate and manage all basins or sub-basins with breeding coastal tailed frogs present as Large Class II regardless of their drainage area size.
- Prohibit herbicide use within an Aquatic Management Zone of a Class I or Class II stream unless the wildlife agencies concur.

In addition, MRC would implement habitat-based HCP/NCCP conservation measures, many of which would also minimize and mitigate adverse effects on tailed frogs, including the following:

- Harvest not allowed in inner gorges without field review by a California Professional Geologist and an aquatic resource expert, to minimize sediment delivery to watercourses.
- Restrictions on timber harvest and equipment use on steep streamside slopes and steep dissected topography to minimize sediment delivery to watercourses.
- Implementation of a comprehensive road inventory and system-wide Road Management Plan to identify and treat road-related sediment sources to minimize sediment delivery to watercourses.
- Restrictions on equipment use in Aquatic Management Zones to minimize sediment delivery to watercourses.
- Retention standards for riparian canopy, basal area, large trees, old-growth trees, and large woody debris in Aquatic Management Zones to maintain and enhance riparian function.
- Silvicultural restrictions in Aquatic Management Zones to minimize disturbance and maintain and enhance riparian function.
- Measures to treat exposed soil and maintain stream bank stability in Aquatic Management Zones to minimize sediment delivery to watercourses.
- Stream habitat improvement activities.

A more detailed description of these measures can be found above under Mass wasting and sediment management (Section 2.3.10), Road management (Section 2.3.11), and Aquatic and riparian habitat management (Section 2.3.13), and in Chapter 8 and Chapter 10 of MRC's HCP/NCCP (MRC 2012). The HCP/NCCP also specifies surveys and salvage activities prior to equipment entering into a watercourse. Any Class II watercourse where breeding coastal tailed frogs are documented, regardless of drainage area, would be classified and managed as a Large Class II stream.

Northern spotted owl

Under the Proposed Action, incidental take of northern spotted owls would be authorized subject to the terms of the USFWS incidental take permit and CDFG take permit. MRC would continue to comply with the CFPRs (14 CCR §919.9[d]), with additional HCP/NCCP conservation measures (Chapter 10.3.1 of the HCP/NCCP, MRC 2012) intended to minimize and mitigate the effects of incidental take of this species. The proposed HCP/NCCP includes specific objectives for maintaining and increasing productive owl territories and increasing the area of Nesting/Roosting[19] habitat. It also provides for minimization of disturbance of nesting spotted owls, management of invasive barred owls, and intensive long-term monitoring/surveying of the northern spotted owl population. Population objectives include maintaining at least 28 Level-1 and 67 Level-2 northern spotted owl territories during the first 60 years of the HCP/NCCP and increasing the population to 34 Level-1 and 80 Level-2 northern spotted owl territories by year 75 of the HCP/NCCP. Surveys to identify northern spotted owl territories and assess how well population objectives are being met would be conducted following the *Northern Spotted Owl Data and Protocol* in Appendix K of the proposed HCP/NCCP (MRC 2012). MRC would monitor, as part of HCP/NCCP implementation, all productive owl territories in the plan area on a 5-year rotating basis. In addition, MRC would inventory potentially suitable habitat for northern spotted owls in a harvest impact area using current habitat typing (MRC 2010). Surveys would be conducted in suitable habitat unless northern spotted owl territories have been located within 0.5 mi (0.8 km) or survey work has adequately covered the area in the current year (MRC 2010).

The HCP/NCCP conservation measures for northern spotted owl include:

- High protection sites:
  - ≥ 80 ac (32 ha) no-harvest Nesting/Roosting core area with a minimum distance of 1,000 ft (305 m) from initial activity center.
  - Retain suitable Nesting/Roosting/Foraging habitat within the extended protection area (i.e., 267 ft [81 m] beyond the periphery of the core area).
  - ≥ 500 ac (202 ha) of Nesting/Roosting/Foraging within 0.7 mi (1.1 km) of activity center.
- Moderate protection sites:
  - ≥ 18 ac (7 ha) no-harvest Nesting/Roosting core area with a minimum distance of 500 ft (152 m) from initial activity center.
  - Retain suitable Nesting/Roosting/Foraging habitat within the extended protection area (i.e., 500 ft [152 m] beyond the periphery of the core area).
  - ≥ 500 ac (202 ha) of Nesting/Roosting/Foraging within 0.7 mi (1.1 km) of activity center.
  - Limited operation activity within 1,000 ft (305 m) of a current activity center.
- Limited protection sites:
  - Retain nest trees and screen trees.
  - Protect a 500-ft (152-m) no-harvest buffer during the breeding season.
  - Permit helicopter operations that are at least 1,320 ft (400 m) from an activity center.
  - Survey for spotted owls when operations could result in disturbance.

The timber model results indicate that well over 50% of all covered lands would continuously average > 11 in (28 cm) diameter at breast height and 40% canopy closure and thus should provide for northern spotted owl dispersal.

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[19] Northern spotted owl habitat is described in Section 3.6, Terrestrial Habitat and Wildlife Species of Concern. Nesting and roosting habitat have been combined since distinguishing between nesting and roosting habitat is difficult; however, there may be some Nesting/Roosting stands that provide more structures and requirements for nesting than others.

Management for northern spotted owls would include control measures for the invasive barred owl unless it is determined that attempts to control barred owls will be ineffective. Potential management of barred owls may include habitat manipulation, capture and sterilization, capture and relocation, and lethal removal; however, no habitat management techniques have currently been identified. Any direct control (e.g., lethal removal) would be conducted under necessary Migratory Bird Treaty Act and State of California authorizations. Any barred owl management would be conducted under a research or adaptive management framework.

Marbled murrelet

Under the Proposed Action, incidental take of marbled murrelets would be authorized subject to the terms of the USFWS incidental take permit and CDFG take permit. MRC would implement habitat-based and species-specific HCP/NCCP conservation measures intended to minimize and mitigate the effects of incidental take of this species. MRC would establish the Lower Alder Creek Management Area and implement special murrelet conservation measures within this 1,237 acre area. Surveys for murrelets and potential habitat would be conducted within and outside the Lower Alder Creek Management Area, and potential habitat trees for marbled murrelets would be protected within the Lower Alder Creek Management Area and throughout the primary assessment area, according to measures specified in the HCP/NCCP. MRC would cooperate with the wildlife agencies in setting aside mature stands outside of the Lower Alder Creek Management Area to be managed to promote murrelet habitat. Habitat-based conservation measures for the marbled murrelet are described above under Terrestrial habitat management (Section 2.3.14), and in Chapter 10.3.2 of MRC's HCP/NCCP (MRC 2012).

Species-specific HCP/NCCP conservation measures for marbled murrelet within the Lower Alder Creek Management Area include:

- Core Areas:
  - No forest management operations or public entry.
- Habitat Areas:
  - Timber management with agency technical assistance only to enhance marbled murrelet habitat.
  - Restrictions to helicopter operations, blasting, and vehicular traffic.
  - Breeding season: timber operations allowed only if murrelets are (1) not occupying any area within 0.25 mi (0.4 km) of proposed project and operations are: (2) at least 0.25 mi (0.4 km) beyond a core area periphery; (3) at least 100 ft (30 m) away from potential habitat trees; and (4) occur within 2 hours after sunrise to 2 hours before sunset.
  - Non-breeding season: timber operations only if murrelets are (1) not occupying any area within 300 ft (91 m) of a proposed project and operations are: (2) at least 300 ft (91 m) beyond a core area periphery; (3) at least 100 ft (30 m) away from potential habitat trees; and (4) occur within two hours after sunrise to two hours before sunset, with exceptions.
- Buffer areas:
  - Timber harvest with agency technical assistance only to provide buffering and protection for core and habitat areas.
  - Breeding season: same as for habitat areas.
  - Non-breeding season: same as for habitat areas.

In response to monitoring and adaptive management, corvid management in the Lower Alder Creek Management Area may occur if marbled murrelet populations decline. Control measures for corvids would include non-lethal (if possible) and lethal methods conducted under necessary Migratory Bird Treaty Act and State of California authorizations.

HCP/NCCP conservation measures for marbled murrelet outside the Lower Alder Creek Management Area include:

- Provide opportunities for the wildlife agencies to analyze and purchase MRC-designated potential murrelet recruitment habitat in 22 stands in six areas.
- Manage stands to:
    - Retain all primary murrelet trees[20] and screen trees.
    - Permit harvest of secondary murrelet trees if a ground survey and required watershed-wide radar surveys determine that it is unlikely murrelets are occupying the surrounding area.
- Occupied sites:
    - Breeding season: limit approaches to at least 0.25 mi (0.4 km) from identified habitat tree(s) with exceptions. Restrict helicopter operations, blasting, and hauling.
    - Non-breeding season: restrict operations within 300 ft (91 m) of a habitat tree. Restrictions to helicopter operations, blasting, and hauling.
- High protection sites (areas that most likely have murrelets):
    - Breeding season: Conduct operations at least 500–1,320 ft (150–400 m) from habitat trees, based on decibel level, with exceptions. Restrict helicopters and blasting.
    - Non-breeding season: Conduct harvesting within 100–200 ft (30–61 m) from habitat trees in accordance with specific silvicultural prescriptions.
    - Retain all primary murrelet trees and screen trees.
    - Permit harvest of secondary murrelet trees if a ground and radar survey determines that it is unlikely murrelets are occupying the surrounding area.
- Moderate protection sites (areas with some liklelihood of murrelet presence):
    - Breeding season: same as High sites.
    - Non-breeding season: Conduct harvests at least 75 ft (23 m) away from habitat trees unless tree felling is necessary for a cable corridor.
    - Non-breeding season: same as High sites, except harvesting within 75–200 ft (23–61 m) from habitat trees in accordance with specific silvicultural prescriptions.
- Limited sites (areas least likely to have murrelets):
    - Retain all primary murrelet trees and screen trees.
    - Permit harvest of secondary murrelet trees if a ground and radar survey determines that it is unlikely murrelets are occupying the surrounding area.

[20] The HCP/NCCP defines primary murrelet trees as having a diameter at breast height that must equal or exceed: 48 in (122 cm) for redwood; 36 in (91 cm) for Douglas-fir, grand fir, or Sitka spruce; or 30 in (76 cm) for western hemlock or all other conifers. In addition, primary murrelet trees must have one platform (e.g., a broken top, an elevated burl, a debris accumulation, or a branch) at least 9 in [22 cm] in diameter with specific characteristics that can support and retain an egg. Secondary murrelet trees, typically second-growth conifers, are those with the same diameter at breast height requirements, but with 6–9–in (15–22 cm) platforms.

Point Arena mountain beaver

Under the Proposed Action, incidental take of Point Arena mountain beavers would be authorized subject to the terms of the USFWS incidental take permit and CDFG take permit. MRC would implement species-specific HCP/NCCP conservation measures intended to minimize effects and maintain and enhance habitat for this species. Under the Proposed Action, MRC would conduct pre-harvest surveys of any potential Point Arena mountain beaver habitat within its Point Arena mountain beaver assessment area and implement conservation measures according to survey results. In addition, the Proposed Action provides for habitat improvement efforts that would not be possible without incidental take authorization.

Species-specific HCP/NCCP conservation measures for Point Arena mountain beavers are as follows:

- 200-ft (61-m) no-harvest buffer around active burrows or suitable Point Area mountain beaver habitat.
- No road construction in any contiguous habitat area that is within 400 ft (122 m) of active Point Area mountain beaver burrows or un-surveyed suitable Point Area mountain beaver habitat.
- No foot traffic that might cause burrow collapse within 25 ft (8 m) of active Point Area mountain beaver burrow systems[21] or un-surveyed potential Point Area mountain beaver habitat.
- No salvage operations within 100 ft (30 m) of known burrow systems.
- Fell trees away from un-surveyed potential Point Area mountain beaver habitat or active Point Area mountain beaver burrow systems, unless the wildlife agencies approve an alternative within adaptive management.
- Construct or reconstruct roads to maintain or enhance hydrologic conditions in the vicinity of Point Area mountain beaver burrow systems.
- No construction of permanent barriers, including fences and permanent openings greater than 50 ft (15 m), that might disrupt dispersal or movement between occupied Point Area mountain beaver colonies.
- Restrict rodent control, including trapping, to at least 500 ft (152 m) away from active Point Arena mountain beaver burrows or un-surveyed potential Point Area mountain beaver habitat.
- Restrict prescribed burning to at least 100 ft (30 m) away from an active Point Arena mountain beaver burrow or un-surveyed potential Point Area mountain beaver habitat.
- Specific restrictions to ground disturbance during breeding and non-breeding seasons.
- Create habitat (as part of adaptive management efforts).

[21] A "burrow system" is the HCP/NCCP's unit of conservation and the basis of the monitoring program. A burrow system is an interconnected group of tunnels, chambers, and openings; i.e., a mountain beaver would never have to exit the burrow system and cross the ground surface to access any location in it. Because the extent of underground burrows may not be apparent to ground surveyors, as a working definition the HCP/NCCP distinguishes as separate burrow systems areas with surface evidence (e.g., collapsed burrows) that are separated by at least 32 ft (10 m) without surface evidence. The number of mountain beavers per active burrow system may be greater than one. Thus, while the number of active burrow systems is likely correlated with population size, monitoring active burrow systems is best considered a population index.

Plant species of concern

Plants for which MRC is seeking coverage under the proposed HCP/NCCP are:

- Humboldt milk-vetch
- small groundcone
- pygmy cypress
- swamp harebell
- California sedge
- bristly sedge
- deceiving sedge
- green yellow sedge
- Oregon goldthread
- streamside daisy
- coast fawn lily
- Roderick's fritillary
- Pacific gilia
- glandular western flax
- thin-lobed horkelia
- hair-leaved rush
- Coast lily
- Baker's meadowfoam
- Mendocino bush mallow
- seacoast ragwort
- Bolander's beach pine
- white-flowered rein orchid
- North Coast semaphore grass
- great burnet
- maple-leaved checkerbloom
- Siskiyou checkerbloom
- beaked tracyina
- Santa Cruz clover
- oval-leaved viburnum
- running-pine
- long-beard lichen

Scientific names and listing status for each plant species can be found in Section 2.3.1 (ESA and CESA compliance for covered species; Table 2.3-1).

Take of plants on private lands is generally not prohibited under the ESA. Nevertheless, plants are included in the proposed HCP/NCCP to encourage their conservation and to provide assurances to the applicant. Although take of plants would not be authorized under the USFWS incidental take permit, any taking of federally listed plants must not jeopardize their continued existence. MRC would implement HCP/NCCP conservation measures intended to minimize and mitigate the effects of incidental take of covered plant species of concern.

Under the Proposed Action, MRC would implement community-based, category-based, and species-specific conservation measures. MRC would implement community-based conservation measures as the primary means of conservation for covered plants in the following habitats: closed-cone forest (including pygmy and Bishop pine forests); some permanent wetlands (marshes, bogs, fens); rocky outcrops, including serpentine; and oak woodlands. Applicable conservation measures for these habitats include the following:

- A prohibition on harvest and restrictions on management, including roadbuilding and road use, in closed-cone pine forest and oak woodlands.
- Measures to maintain and preserve rocky outcrops, including requirements for botanical consultation or survey (if no consultation) in serpentine areas.
- Designation of an Equipment Exclusion Zone or equipment Limitation Zone, with restrictions on equipment use, adjacent to wetlands, wet meadows, wet areas, seeps, and springs to minimize disturbance and maintain ecosystem function.
- Silvicultural restrictions in areas adjacent to wetlands, wet meadows, wet areas, seeps, and springs to minimize disturbance and maintain ecosystem function.
- Retention standards for basal area, old-growth trees, snags and wildlife trees, and downed large woody debris in areas adjacent to wetlands, wet meadows, wet areas, seeps, and springs to maintain ecosystem function.

A more detailed description of the measures for these habitats can be found above under Aquatic and riparian habitat management (Section 2.3.13) and Terrestrial habitat management (Section 2.3.14), and in Chapter 9 and Chapter 11 of MRC's HCP/NCCP (MRC 2012).

MRC would implement category-based conservation measures for covered plants known or expected in areas where covered activities would take place on a regular basis. The order of implementation of a category-based conservation strategy for covered plants would be as follows:

- Survey for covered species.
- Assign located covered species to management categories, if not already assigned.
- Implement conservation measures.
- Monitor and evaluate status of covered plants on MRC land.
- Determine trend for covered plant species (decreasing, stable, or increasing).
- Loop back to monitor and evaluate status of covered plants on MRC land.
- Re-evaluate management category and/or re-evaluate conservation measures.
- Loop back to implement conservation measures.

Species-specific conservation measures apply to species with substantial supporting information and unique growth needs. As more information is developed for some species, their management may shift from categorical to species-specific. At present, only two species—Humboldt milk vetch and long-beard lichen—have species specific measures developed for them.

Plant surveys

MRC would conduct a floristic survey for these species at least twice during the term of HCP/NCCP, the first survey being within a three-year window prior to any covered management activities. The surveys would be conducted at a seasonally appropriate time of year, when covered plants can be detected and are in identifiable condition (usually the flowering season).

An additional survey would be conducted in a PTHP area if the location has experienced a change in canopy closure of > 40% since the previous survey, or the status of a species recorded in an earlier survey is upgraded.

Covered plant management categories

MRC would assign each covered plant species found during surveys to a management category (1−4) based primarily on its statewide rarity and threat status, as denoted by its S rank (a measure of statewide abundance and, inversely, of rarity) and associated California Natural Diversity Database threat code. Additional factors that may modify this status are:

- Likelihood of effects on the covered species or its habitat from covered activities.
- Species sensitivity to disturbance.
- Viability of the species, as expressed by size and area of its occurrences throughout its California range.
- Whether occurrences in the plan area represent range limits or are disjunct from the central or main geographic distribution of the species.
- Distribution in the plan area, including overall range and number of occurrences.
- Documented population trend in the plan area.

Management Category 1 plants require the highest level of concern and conservation efforts. Management Category 2 plants require an intermediate level of concern and conservation efforts. Management Category 3 plants require a lower level of concern and conservation efforts. Management Category 4 plants require a minimal level of concern and conservation efforts. Two covered plants (Humboldt milk-vetch and long-beard lichen) have species-specific protections measures, as described in the HCP/NCCP. Nine species have already been assigned management categories, and the remainder will be assigned management categories once they have been confirmed on covered lands (i.e., in the primary assessment area).

Other plant species of concern

For those species that may potentially occur within the assessment area that are not covered under the HCP/NCCP, MRC would operate in a manner consistent with the 2012 CFPRs (14 CCR §919.4) and CEQA guidelines (14 CCR §15380). Specifically, a floristic survey would be conducted at least twice during the term of HCP/NCCP and if one of these species is documented, CAL FIRE would consult with CDFG in a project-specific review to ensure that operations covered by the PTHP are conducted to comply with the CEQA and CFPR requirements.

2.3.15.2 Other listed and sensitive wildlife species

Statutory take prohibitions would continue to protect species that are listed under the ESA or CESA and are not covered under the federal or state incidental take authorizations and proposed HCP/NCCP. Take prohibitions would continue to apply to California Fully Protected Species. For these species, MRC would request technical assistance from the appropriate wildlife agencies whenever proposed operations have the potential to cause disturbance or habitat modifications that may affect listed species not covered under the proposed HCP/NCCP. For non-covered species listed under ESA or CESA after issuance of the incidental take authorizations and formal approval of the HCP/NCCP, MRC would either manage each such species on a case-by-case, take-avoidance basis with technical assistance from the wildlife agencies, or amend the HCP/NCCP to include them. Under the Proposed Action, for these species and others of concern, MRC would evaluate potential effects and propose mitigation on a site-specific or PTHP-basis and describe these in the PTHP. Such proposals would be subject to standard review and comment by the resource agencies (see Section 2.3.5 for a description of the PTHP review process).

2.3.16 Monitoring and adaptive management

Under the Proposed Action, MRC would implement a monitoring program including three specific types of monitoring: compliance monitoring, effectiveness monitoring, and validation monitoring. Monitoring data would be used to ensure compliance with the regulatory provisions of the HCP/NCCP, test whether MRC's conservation measures meet the goals and objectives of the HCP/NCCP, and evaluate the validity of the assumptions upon which the conservation measures are based. For example, monitoring for covered species, including distribution and abundance surveys, would be used to test the effectiveness of habitat conservation and enhancement measures implemented as part of the HCP/NCCP. Monitoring data would be used to revise (i.e., adapt) conservation measures in the HCP/NCCP.

In addition to the research and monitoring activities described under the No Action alternative, MRC would also conduct the following types of monitoring activities:

- Aquatic habitat monitoring.
- Long-term stream channel monitoring.
- Mass wasting monitoring.
- Surface erosion monitoring.
- Terrestrial habitat monitoring.
- Monitoring of covered wildlife species.
- Rare plant monitoring.
- Natural community monitoring.

To ensure that PTHPs conform to stipulations in the incidental take authorizations and HCP/NCCP conservation measures, and to assist the wildlife agencies in verifying compliance, MRC would provide the wildlife agencies with notices of operation start and completion, copies of PTHPs, and compliance reports. For those years in which monitoring occurs, MRC would submit year-end reports to the wildlife agencies for aquatic habitat and species; long-term channel monitoring; large woody debris recruitment and placement; sediment control; northern spotted owls; marbled murrelets; Point Arena mountain beavers; snags, wildlife trees, and downed wood; hardwoods; and rare plants. MRC would submit monitoring reports on natural communities, old growth and, rocky outcrops every 10 years.

MRC's HCP/NCCP includes a monitoring and adaptive management program for covered species which, in addition to requiring staff and their equipment to physically be present and thus potentially affecting habitat or disturbing the animals, occasionally includes the capture, handling and limited relocation of covered salmonid and amphibian species and the capture, handling, and banding of northern spotted owls. Chapter 13 of the HCP/NCCP (MRC 2012), *Monitoring and Adaptive Management*, details MRC's monitoring strategies. Chapter 12 of the HCP/NCCP (MRC 2012), *Potential Impacts and Assessment of Take*, estimates the number of plants and animals that may be impacted under the Proposed Action. Impacts include injury or mortality to listed animals or plants during capture and release as well as disturbances that significantly affect animal or plant life functions (feeding, resting, breeding/spawning, hiding, etc.), including substantial adverse habitat modification.

2.4 Alternative A (Take Authorization and Enhanced HCP/NCCP)

Under Alternative A, the lead agencies would authorize the incidental take of federally listed and state-listed species on MRC's covered lands. Take would be authorized for activities associated with conducting timber harvesting and related operations in accordance with existing federal and state regulations. Take of federally listed species would be authorized pursuant to two federal incidental take permits, one from NMFS and one from USFWS. Take of state-listed species would be authorized pursuant to a CDFG take permit. The incidental take authorizations would have 80-year terms. The covered species would be the same as those covered under the Proposed Action (Table 2.4-1).

If approved, MRC would implement an enhanced HCP/NCCP on its forestlands within the primary assessment area (Section 1.2 [Proposed Action/Project Description], Figure 1.2-1). Operations within the primary assessment area would be subject to the provisions of the federal incidental take permits and state take permit. The enhanced HCP/NCCP would be similar to the HCP/NCCP implemented under the Proposed Action, with additional measures primarily to enhance conservation of aquatic and riparian habitats. Key provisions of this alternative would include accelerated implementation of a system-wide Road Management Plan, a 150-ft (46-m) no-cut buffer adjacent to Class I and large Class II streams, exclusion of heavy equipment in the Aquatic Management Zone of small Class II streams and Class III streams, increased recruitment and retention of wildlife trees and hardwoods, and increased habitat connectivity in riparian buffer zones.

Table 2.4-1. Species covered by incidental take authorization and included in the HCP/NCCP under Alternative A.

Common name	Scientific name	Listing status[a]		CRPR status[b]	Take authorization		
		Federal (ESA)	State (CESA)		NMFS[c]	USFWS[c]	CDFG[d]
Fish and wildlife							
Coho salmon, Central California Coast Evolutionarily Significant Unit	*Oncorhynchus kisutch*	E	E	NA	yes	–	yes
Coho salmon, Southern Oregon /Northern California Coast Evolutionarily Significant Unit	*Oncorhynchus kisutch*	T	T	NA	yes	–	yes
Chinook salmon, California Coastal Evolutionarily Significant Unit	*Oncorhynchus tshawytscha*	T	–	NA	yes	–	yes
Steelhead, Central California Coast Distinct Population Segment	*Oncorhynchus mykiss*	T	–	NA	yes	–	yes
Steelhead, Northern California Distinct Population Segment	*Oncorhynchus mykiss*	T	–	NA	yes	–	yes
California red-legged frog	*Rana draytonii*	T	–	NA	–	yes	yes

Common name	Scientific name	Listing status[a]		CRPR status[b]	Take authorization		
		Federal (ESA)	State (CESA)		NMFS[c]	USFWS[c]	CDFG[d]
Northern red-legged frog[e]	*Rana aurora*	–	–	NA	–	–	yes
Coastal tailed frog[e]	*Ascaphus truei*	–	–	NA	–	–	yes
Marbled murrelet	*Brachyramphus marmoratus*	T	E	NA	–	yes	yes
Northern spotted owl	*Strix occidentalis caurina*	T	–	NA	–	yes	yes
Point Arena mountain beaver	*Aplodontia rufa nigra*	E	–	NA	–	yes	yes
Plants							
Humboldt milk-vetch	*Astragalus agnicidus*	–	E	1B.1	–	–	yes
Small groundcone	*Boschniakia hookeri*	–	–	2.3	–	–	yes
Pygmy cypress	*Callitropsis pygmaea*	–	–	1B.2	–	–	yes
Swamp harebell	*Campanula californica*	–	–	1B.2	–	–	yes
California sedge	*Carex californica*	–	–	2.3	–	–	yes
Bristly sedge	*Carex comosa*	–	–	2.1	–	–	yes
Deceiving sedge	*Carex saliniformis*	–	–	1B.2	–	–	yes
Green yellow sedge	*Carex viridula* var. *viridula*	–	–	2.3	–	–	yes
Oregon goldthread	*Coptis laciniata*	–	–	2.2	–	–	yes
Streamside daisy	*Erigeron biolettii*	–	–	3	–	–	yes
Coast fawn lily	*Erythronium revolutum*	–	–	2.2	–	–	yes
Roderick's fritillary	*Fritillaria roderickii*	–	E	1B.1	–	–	yes
Pacific gilia	*Gilia capitata* ssp. *pacifica*	–	–	1B.2	–	–	yes
Glandular western flax	*Hesperolinon adenophyllum*	–	–	1B.2	–	–	yes
Thin-lobed horkelia	*Horkelia tenuiloba*	–	–	1B.2	–	–	yes
Hair-leaved rush	*Juncus supiniformis*	–	–	2.2	–	–	yes
Coast lily	*Lilium maritimum*	–	–	1B.1	–	–	yes
Baker's meadowfoam	*Limnanthes bakeri*	–	R	1B.1	–	–	yes
Mendocino bush mallow	*Malacothamnus mendocinensis*	–	–	1A	–	–	yes

Common name	Scientific name	Listing status[a]		CRPR status[b]	Take authorization		
		Federal (ESA)	State (CESA)		NMFS[c]	USFWS[c]	CDFG[d]
Seacoast ragwort	*Packera bolanderi* var. *bolanderi*	–	–	2.2	–	–	yes
Bolander's beach pine	*Pinus contorta* ssp. *bolanderi*	–	–	1B.2	–	–	yes
White-flowered rein orchid	*Piperia candida*	–	–	1B.2	–	–	yes
North Coast semaphore grass	*Pleuropogon hooverianus*	–	T	1B.1	–	–	yes
Great burnet	*Sanguisorba officinalis*	–	–	2.2	–	–	yes
Maple-leaved checkerbloom	*Sidalcea malachroides*	–	–	4.2	–	–	yes
Siskiyou checkerbloom	*Sidalcea malviflora* ssp. *patula*	–	–	1B.2	–	–	yes
Beaked tracyina	*Tracyina rostrata*	–	–	1B.2	–	–	yes
Santa Cruz clover	*Trifolium buckwestiorum*	–	–	1B.1	–	–	yes
Oval-leaved viburnum	*Viburnum ellipticum*	–	–	2.3	–	–	yes
Running-pine	*Lycopodium clavatum*	–	–	2.3	–	–	yes
Long-beard lichen	*Usnea longissima*	–	–	–	–	–	yes

NA = not applicable
[a] Listing status under ESA and CESA:
E: endangered
T: threatened
R: rare
[b] CRPR: California Rare Plant Rank; for explanation of number ranking system, see Section 3.5, Vegetation and Plant Species of Concern.
[c] Federal incidental take permit
[d] CDFG take permit under Fish & Game Code Section 2835 *et seq*.
[e] For covered species that are not federally listed, a federal incidental take permit would only take effect if and when the species becomes federally listed.

2.4.1 ESA and CESA compliance for covered species

Same as the Proposed Action.

2.4.2 Covered activities

Same as the Proposed Action.

2.4.3 Timber harvesting and forest management activities

Timber harvesting and forest management activities conducted under Alternative A would be the same as those conducted under the Proposed Action, with the following additional measures:

- Uneven-aged silviculture would be used landscape-wide, with a minimum re-entry period of 20 years.
- Even-aged silviculture would be used on stands adjacent to riparian stands only for the purpose of rehabilitation (hardwood to conifer).
- Stocking retention standards would be increased (no harvest in size class until minimum retentions are met) for conifers > 32 in (81 cm) diameter at breast height at the rate of 5% per 5-year period from an initial 10% retention to a maximum of 40% retention.
- Yarding would be conducted by helicopter on any ground that would otherwise require construction of new roads greater than 1 mi (1.6 km) over the life of the plan (not cumulative).

2.4.4 Maximum sustained production of high-quality timber products

As under the Proposed Action, maximum sustained production would be governed by the standards and guidelines set forth in MRC's TMP (Appendix A), with additional measures contained in the proposed HCP/NCCP. Harvest levels would be balanced with growth and inventory to ensure long-term sustained yield and maximum sustained production over the covered period.

Maximum sustained production would be achieved under Alternative A (as discussed in further detail in Section 3.9, Timber Resources). Table 2.4-2 shows the modeled harvest, in acres, using each silvicultural method by decade over the 100-year planning horizon. This modeled harvest serves as the basis for the long-term sustained yield calculation under Alternative A. Timber modeling assumptions are described in Section 2.1.2 (Development of Alternatives, Modeling forest conditions under each alternative). A detailed description of the timber model is provided in Appendix E.

2.4.4.1 Monitoring thresholds and maximum sustained production compliance

Monitoring thresholds and maximum sustained production compliance under Alternative A would be the same as under the Proposed Action.

Table 2.4-2. Acres harvested by silvicultural method by decade—Alternative A.

Silvicultural method	Decade									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Clearcut	0	0	0	0	0	0	0	0	0	0
Coastal Zone Selection	382	49	382	49	382	49	382	49	382	49
Commercial Thinning	0	0	0	0	0	0	0	0	0	0
Flood Plain Selection	16	3	16	11	16	11	22	21	22	21
High Retention Selection	20	65	301	719	1,310	1,635	2,042	2,212	2,236	2,294
High Retention Selection (Carbon)	0	178	0	254	0	254	0	254	0	254
Medium Retention Selection	0	4	0	183	0	210	0	210	0	210
Rehabilitation	8,359	3,826	0	0	0	0	0	0	0	0
Seed Tree Removal	91	44	126	45	89	0	0	0	0	0
Selection	23,593	35,115	72,544	73,518	78,866	76,809	82,203	78,018	82,352	77,428
Selection (Stepped Approach)	0	0	0	0	0	0	0	0	0	0
Selection (Old Growth II)	0	0	0	0	0	0	0	0	0	0
Small Class II Selection	0	0	0	0	0	0	0	0	0	0
Transition	19,911	15,117	492	0	0	0	0	0	0	0
Variable Retention	12,412	10,141	499	278	207	36	262	128	18	0
Total	**64,784**	**64,541**	**74,360**	**75,057**	**80,870**	**79,004**	**84,911**	**80,893**	**85,011**	**80,255**

2.4.5 Program Timber Harvesting Plans

Same as the Proposed Action.

2.4.6 Alternate standards to the CFPRs

Same as the Proposed Action.

2.4.7 Management of hazardous substances

Same as the No Action alternative.

2.4.8 Management of fire hazards

Same as the No Action alternative.

2.4.9 Post-fire timber salvage

Same as the Proposed Action.

2.4.10 Mass wasting and sediment management

Mass wasting and sediment management activities conducted under Alternative A would be the same as those conducted under the Proposed Action, with the following additional measures:

- Harvest would be prohibited in inner gorge terrain.
- Harvest on steep streamside slopes would be limited to high retention selection.

2.4.11 Road management

Under Alternative A, MRC would accelerate the development and implementation of a system-wide Road Management Plan, with the objective of reducing the delivery of sediment to aquatic habitats. Compared with the Proposed Action, the frequency of road inspections and critical maintenance would be increased. Under Alternative A, the following road management measures would supplement or supersede those described for the Proposed Action:

- A Road Management Plan would be developed within 10 years to minimize roads needed in each watershed/ownership block.
- MRC would focus on decommissioning unused roads and limiting road miles within certain sensitive watersheds.
- With approval of the federal and state agencies, certain road alignments could be removed in exchange for new roads.
- Unneeded roads would be decommissioned coincident with timber operations in the area within 10 years, or within first 20 years of the plan if no operations are conducted within 10 years.
- Road inspection frequency would be < 10 years.
- All temporary and seasonal roads would be inspected at least once during each winter period.
- Blocked culverts and other imminent problems would be fixed before the beginning of the next winter season.

- No road construction would occur during winter period or in April–May.
- No new road construction greater than continuous 1 mi (1.6 km) on any PTHP would occur over the life of the permit.
- No new roads, road crossings, or landings would be constructed in inner gorges.
- No roads would be constructed across the toe of historically active deep-seated landslides.
- Bridges would be required on permanent road crossings of Class I and large Class II streams.
- No winter timber hauling would be permitted after 15 October once rainfall total is 4 in (10 cm).
- No hauling would be permitted in April or May for 72 hours after 0.5 in (1.3 cm) of rain.
- Mainline haul roads would be treated (after 15 June) by 2020 using feasible methods for dust abatement to minimize the need for water drafting (with the exception of portions of roads where tractors cannot be trailered).

2.4.12 Site preparation

Same as the Proposed Action.

2.4.13 Aquatic and riparian habitat management

Aquatic and riparian habitat management under Alternative A would include increased protections relative to the Proposed Action. Under this alternative, the following measures would supplement or supersede those described for the Proposed Action.

2.4.13.1 Class I streams

- Class I Aquatic Management Zone width would be equal to the height of one site potential tree (modeled as 150 ft [46 m]).
- No harvest allowed within Aquatic Management Zone (≥ 150 ft [46 m] no harvest buffer), except for hardwood rehabilitation.
- In channel migration zone and flood prone zone, harvest limited to high-retention selection.
- When flood prone zone and channel migration zone extend beyond width of one site potential tree, management would be the same as management in the inner and middle bands under the Proposed Action.

2.4.13.2 Class II streams

As under the Proposed Action, Class II streams under Alternative A would be divided into Large Class II and Small Class II streams at the drainage area threshold of 100 ac (40 ha). In addition to the conservation measures described under the Proposed Action, the following measures for Class II streams would apply under Alternative A.

Large Class II streams

- Aquatic Management Zone width would be equal to the height of one site potential tree (modeled as 150 ft [46 m]).
- No harvest allowed within Aquatic Management Zone (≥ 150 ft [46 m] no harvest buffer).
- Retain all large woody debris within Aquatic Management Zone.

- No ground disturbance allowed within Aquatic Management Zone.

Small Class II streams

- Aquatic Management Zone width would be 50–150 ft (15–46 m), depending on bank slope (modeled as 75 ft [23 m]).
- Equipment excluded from Aquatic Management Zone (Aquatic Management Zone = Equipment Exclusion Zone).
- Silviculture: only high-retention selection harvest allowed in Aquatic Management Zone.
- Canopy retention: retain 85% overstory canopy in Aquatic Management Zone.
- Basal area retention: retain 200–300 ft^2 (19–28 m^2) basal area per acre or 75% of pre-harvest conifer basal area, whichever is greater, based on site class of Aquatic Management Zone.
- Treat all areas of exposed soils that are ≥ 100 ft^2 (9 m^2).
- 25-ft (8-m) no-cut buffer to maintain bank stability.

2.4.13.3 Class III streams

The width of Class III Aquatic Management Zones would be the same as under the Proposed Action. In addition to the conservation measures described under the Proposed Action, the following measures for Class III streams would apply under Alternative A:

- Equipment excluded from Aquatic Management Zone (Aquatic Management Zone = Equipment Exclusion Zone).
- Basal area retention: no reduction in proportion of conifer basal area.

2.4.13.4 Wetlands, wet meadows, and wet areas

In addition to the conservation measures described under the Proposed Action, the following measures for wetlands, wet meadows, and wet areas would apply under Alternative A.

- A 50-ft (15-m) Equipment Exclusion Zone buffer would be established around wetlands and wet meadows. Within the Equipment Exclusion Zone buffer:
    - Only partial harvest allowed.
    - No sanitation or salvage.
    - Retain downed large woody debris.

2.4.13.5 Seeps and springs

Conservation measures for seeps and springs would be the same as under the Proposed Action.

2.4.13.6 Stream habitat improvement

Stream habitat improvement activities would be the same as under the Proposed Action.

2.4.14 Terrestrial habitat management

Terrestrial habitat management under Alternative A would be similar to the Proposed Action, with additional measures designed to increase the emphasis on development of larger trees and improved terrestrial species habitat across the landscape. These additional measures would include the following.

2.4.14.1 Snag and wildlife tree retention and recruitment

- Retain and recruit trees as wildlife trees as wildlife trees from largest 5% of stand diameter distribution.
- Increase objectives for number of wildlife trees per acre by one (e.g., from 2 per acre to 3 per acre), in each tree class.
- Wildlife trees count only when ranked as "hard snags," and diameter at breast height is greater than 24 in (61 cm) for white woods, 32 in (81 cm) for redwoods, 18 in (46 cm) for hardwoods, and greater than half of the site-potential tree height on the site.

2.4.14.2 Downed large woody debris

- Redistribute culls >16 in (41 cm) from landings to forest floor.
- Logs only count when considered "hard logs" and are greater than 2/3 the diameter and length of site-potential trees.

2.4.14.3 Old growth

- Type I old growth:
  - 300-ft (91-m) no-cut buffer, regardless of marbled murrelet survey results.
  - 1,000-ft (305-m) seasonal activity restriction.
- Type II old growth:
  - No harvest within type II stands.
  - 300-ft (91-m) silviculture-limited zone around stands.
  - 1,000-ft (305-m) seasonal activity restriction.
- Residual old growth:
  - Retain largest tree per acre and sheltering trees to recruit into 'old-growth' character over the life of the plan (where the largest tree per acre is not residual and would otherwise be removed).

2.4.14.4 Hardwood retention

Where hardwood or hardwood-conifer stands make up < 15% of a planning watershed, retain these stands as hardwood-dominated stands.

2.4.14.5 Unique habitats

Closed-cone pine forest

- No new road construction.
- Decommission and revegetate unused roads (except mainline roads).

Oak woodlands

Implement ecological burn programs under adaptive management oversight, especially where Douglas-fir appears to be encroaching on annual grasslands, oak woodlands, or oak savannahs.

Rocky outcrops

- No harvest within a 20-ac (8-ha) buffer.
- Seasonal closure if needed from 1 January to 15 August.

2.4.14.6 Habitat connectivity

Same as the Proposed Action.

2.4.15 Listed and sensitive species management

Management of listed and sensitive species under Alternative A would be similar to the Proposed Action, with added measures to enhance conservation of aquatic, riparian, and terrestrial habitats. Take of listed species authorized under the federal state take authorizations would be permitted provided that the take is incidental to a covered activity, such as timber harvesting.

Under Alternative A, MRC would remain subject to take prohibition for other listed species that are not covered under the federal incidental take permits and state take permit but that may occur within the primary assessment area (Section 1.2 [Proposed Action/Project Description], Figure 1.2-1). For listed species not covered under the incidental take authorizations, MRC would implement measures designed to avoid take of these species, including continuing to adhere to measures in the CFPRs (e.g., for certain listed bird species, the CFPRs include nest protection and other measures designed to avoid take), and measures identified during the PTHP preparation and review process). For species listed after the incidental take authorizations have been issued and the HCP/NCCP has been approved, MRC would either manage each such species on a case-by-case, take-avoidance basis with technical assistance from the wildlife agencies or amend the incidental take authorizations to include them.

As described under the Proposed Action (Section 2.3.15) management for northern spotted owls would include control measures for the invasive barred owl unless it is determined that attempts to control barred owls will be ineffective. Potential barred owl management measures would be the same as those under the Proposed Action.

2.4.16 Monitoring and adaptive management

Same as the Proposed Action.

2.5 Alternative B (Take Authorization and Terrestrial Reserves)

Under Alternative B, USFWS would issue an incidental take permit for the take of marbled murrelet and northern spotted owl on MRC's covered lands; CDFG would issue a take permit for marbled murrelet only. Take would be authorized for activities associated with conducting timber harvesting and related operations in accordance with existing federal and state regulations. The permit would have an 80-year term. If approved, MRC would also implement an HCP for marbled murrelet and northern spotted owl on its forestlands within the primary assessment area (Section 1.2 [Proposed Action/Project Description], Figure 1.2-1). Operations within the primary assessment area would be subject to the provisions of the federal and state incidental take authorizations.

Reserves would be established on portions of MRC's land to provide increased protections for the northern spotted owl and marbled murrelet (Figure 2.5-1). The total area of the reserves would be approximately 48,800 ac, or 21% of MRC's forestland. Reserves would include corridors, in many cases following headwater streams and ridgetops, connecting larger blocks of land within the reserve system. Additional detail on the reserves that would be established for these two species is provided in Section 2.5.13 (Listed and sensitive species management).

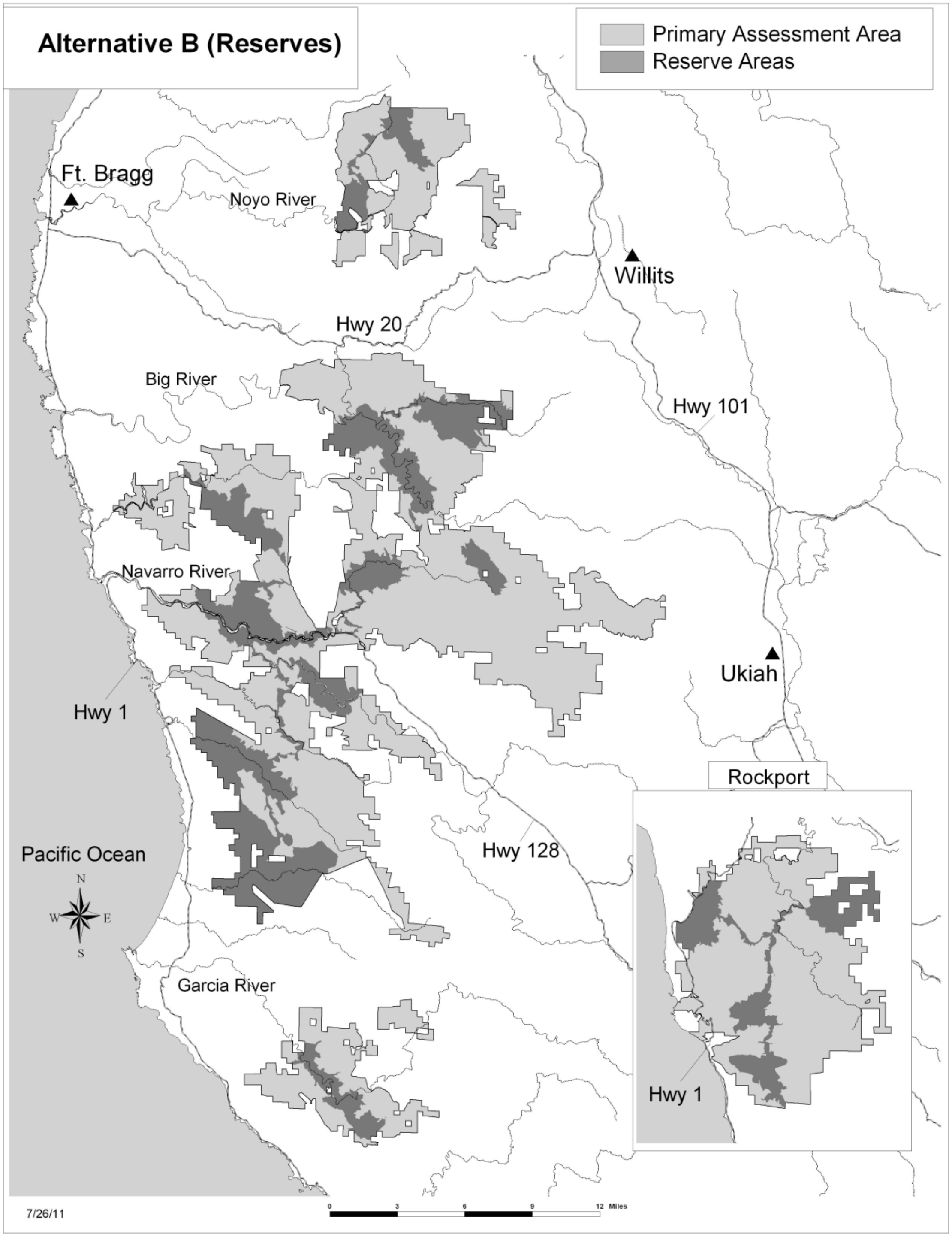

Figure 2.5-1. Terrestrial reserves (Alternative B).

Alternative B would provide expanded benefits focused specifically on the two covered species. To minimize disturbance and promote late-successional habitat conditions, no commercial timber harvest would be allowed in the reserves. Management in reserves would be limited to controlled burning, control of exotic vegetation, and limited silvicultural treatments and stream habitat improvement activities to meet ecological objectives approved by the agencies. In areas outside of the reserves, MRC would generally continue operating under its current practices and policies, as described under the No Action alternative, except that management outside of reserve areas would be subject to more intensive timber management practices (e.g., clearcut) than proposed under the No Action alternative or the Proposed Action. Under this alternative, reserves could be purchased and managed by another party (e.g., the reserves could be purchased by federal and state governments and held in public ownership), according to the general management practices described below.

2.5.1 ESA and CESA compliance for covered species

Under Alternative B, USFWS would issue a federal incidental take permit for the northern spotted owl and marbled murrelet for a term of 80 years (Table 2.5-1). NMFS would not issue a federal incidental take permit. Take prohibitions would apply for other federally listed species.

Under Alternative B, CDFG would issue a take permit for only marbled murrelet for 80 years under CESA (Table 2.5-1). Take prohibitions would apply for other state-listed species.

Species for which a federal incidental take permit and state take permit would be granted (and would be included in an HCP) are listed in Table 2.5-1.

Table 2.5-1. Species covered by incidental take authorization and included in an HCP under Alternative B.

Common name	Scientific name	Listing status[a]		Take authorization		
		Federal (ESA	State (CESA)	NMFS[b]	USFWS[b]	CDFG[c]
Marbled murrelet	*Brachyramphus marmoratus*	T	E	–	yes	yes
Northern spotted owl	*Strix occidentalis caurina*	T	–	–	yes	–

[a] Listing status under ESA and CESA:
E: endangered
T: threatened
[b] Federal incidental take permit.
[c] CDFG take permit under Fish & Game Code Section 2835 *et seq*.

2.5.2 Covered activities

Activities covered under the federal and state incidental take authorizations would include the following:

- Silviculture and stand improvement.
- Vegetation management, including planting, manual brush and tree removal, and burning for site preparation.
- Commercial timber operations, which entail felling, limbing, bucking, yarding, loading, and hauling of timber, as well as maintenance and refueling of heavy equipment.
- Road and landing construction, use, maintenance, and decommissioning.
- Drafting of water in support of timber operations and road and landings programs.
- Operation of non-commercial rock pits and quarries.

- Data collection for research and monitoring associated with the HCP conservation measures.
- Previously approved (grandfathered) THPs.

Other activities may occur in the primary assessment area that are not covered by the proposed HCP and for which incidental take would not be authorized. Examples of activities not covered by the proposed HCP include herbicide use, removal of trees that are utility hazards, recreation (including hunting and fishing), grazing, harvest of minor forest products (firewood, greenery, and mushrooms), unauthorized use of MRC roads, and emergency fire suppression by CAL FIRE or other firefighting agencies.

2.5.3 Timber harvesting and forest management activities

Under Alternative B, commercial timber harvesting would continue on a THP-by-THP basis. Such harvesting would be prohibited in the reserves. Limited management would be permitted within the reserves to meet ecological objectives. Ecological objectives would be determined in coordination with the federal and state agencies and approved by them on a case-by-case basis.

Outside the reserves, timber harvesting and forest management would be similar to the No Action alternative, with the following exceptions:

- Even-aged management (e.g., clearcut and commercial thinning) would be the primary silvicultural objective[22], as allowable under the CFPRs.
- Clearcut and commercial thinning would be the dominant silvicultural methods, except in Class I & II Watercourse and Lake Protection Zones and other special concern areas (see below).
- Uneven-aged management would be practiced in Watercourse and Lake Protection Zones and other special concern areas, as described under the No Action alternative.
- Following harvest, at least 50% of each inventory block would be composed of trees at least 11 in (28 cm) diameter at breast height and with at least 40% canopy closure in order to provide for northern spotted owl dispersal.
- No yarding would occur in reserves, with limited exceptions for cable tail holds if approved by the agencies.
- Burning for fuel load reduction and ecological management would be permitted in reserves, subject to approval by the agencies.
- Measures to control exotic vegetation would be permitted in reserves, subject to approval by the agencies.

2.5.4 Maximum sustained production of high-quality timber products

Under Alternative B, MRC would ensure long-term sustained yield and maximum sustained production over a 100-year period using the same standards and guidelines described under the No Action alternative (Section 2.2.4, Maximum sustained production of high-quality timber products).

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[22] The timber modeling prescription for Alternative B assumes that even-aged management would be the primary silvicultural treatment outside reserves. The modeled acreage of even-aged management is likely an overestimate because of other constraints that would be implemented but could not be modeled.

Maximum sustained production would be achieved under Alternative B (as discussed in further detail in Section 3.9, Timber Resources). Table 2.5-2 shows the modeled harvest, in acres, using each silvicultural method by decade over the 100-year planning horizon. This modeled harvest serves as the basis for the long-term sustained yield calculation under Alternative B. Timber modeling assumptions are described in Section 2.1.2 (Development of Alternatives, Modeling forest conditions under each alternative). A detailed description of the timber model is provided in Appendix E.

2.5.4.1 Monitoring thresholds and maximum sustained production compliance

Monitoring thresholds and maximum sustained production compliance under Alternative B would be the same as under the No Action alternative.

Table 2.5-2. Acres harvested by silvicultural method by decade—Alternative B.

Silvicultural method	Decade									
	1	2	3	4	5	6	7	8	9	10
Clearcut	1,066	3,676	22,837	14,304	20,909	9,187	22,287	18,367	31,520	15,026
Coastal Zone Selection	171	268	205	274	205	274	211	268	211	274
Commercial Thinning	12,406	22,672	8,653	21,837	18,124	31,758	15,044	21,321	9,625	22,347
Flood Plain Selection	0	20	0	0	0	0	0	0	0	0
High Retention Selection	1,433	2,296	3,067	2,839	3,457	4,111	3,458	3,844	3,939	3,313
High Retention Selection (Carbon)	0	0	34	0	0	35	0	0	35	0
Medium Retention Selection	0	0	0	0	0	0	0	0	0	0
Rehabilitation	8,558	1,895	1,230	341	153	192	73	0	0	0
Seed Tree Removal	24,360	14,916	9,422	623	295	55	0	10	0	0
Selection	1,341	1,558	1,649	1,114	1,098	1,689	1,414	1,669	1,538	1,069
Selection (Stepped Approach)	0	0	0	0	0	0	0	0	0	0
Selection (Old Growth II)	0	0	0	0	0	0	0	0	0	0
Small Class II Selection	0	0	0	0	0	0	0	0	0	0
Transition	0	0	0	0	0	0	0	0	0	0
Variable Retention	0	0	0	0	0	0	0	0	0	0
Total	**49,334**	**47,301**	**47,097**	**41,331**	**44,241**	**47,300**	**42,488**	**45,480**	**46,868**	**42,029**

2.5.5 Management of hazardous substances

Same as the No Action alternative.

2.5.6 Management of fire hazards

Same as the No Action alternative.

2.5.7 Post-fire timber salvage

Under Alternative B, MRC would not salvage burned timber inside reserves. Outside the reserves, post-fire salvage of burned timber could occur and would be subject to the same requirements and guidelines as under the No Action alternative (Section 2.2.7).

2.5.8 Mass wasting and sediment management

Under Alternative B, mass wasting and sediment management activities, which are typically associated with timber harvesting, would not occur in the reserves.

Outside the reserves, mass wasting and sediment management would be the same as under the No Action alternative.

2.5.9 Road management

Under Alternative B, road use and management within the reserves would occur on a restricted basis:

- Existing roads within the reserves would be given high priority for survey and decommissioning (same schedule as under the Proposed Action).
- MRC would assess the possibility of relocating roads outside of reserves to minimize ongoing sediment hazards and disturbance associated with maintenance and decommissioning.
- Existing roads would be decommissioned or relocated whenever possible.
- Road and crossing maintenance, including limited heavy equipment use, would be allowed within reserves, but construction of new roads would be prohibited.
- Timber loading would be prohibited in reserves.
- Timber hauling would be allowed on existing mainline roads in reserves only if no suitable alternative route exists.
- If timber hauling occurs within reserves, seasonal restrictions would apply, as described for the Proposed Action.
- Winter hauling would be subject to CFPR restrictions.
- Development of water drafting sites for road dust abatement would be prohibited in reserves. MRC would attempt to move existing water drafting sites out of reserves.

Road management outside the reserves would be the same as under the No Action alternative.

2.5.10 Site preparation

Site preparation would not occur in the reserves. Management in the reserves may include controlled burning and control of exotic vegetation.

Outside reserves, site preparation activities would be the same as under the No Action alternative.

2.5.11 Aquatic and riparian habitat management

Under Alternative B, no timber harvesting would occur in or adjacent to aquatic and riparian buffer zones within reserves and therefore no aquatic and riparian habitat management would be practiced in the reserves. Aquatic, riparian, and wetland habitat improvement, restoration, and monitoring activities would be permitted in reserves, subject to approval by the agencies.

Outside the reserves, aquatic and riparian habitat management would be the same as under the No Action alternative.

2.5.12 Terrestrial habitat management

Under Alternative B, only limited terrestrial habitat management would be permitted within the reserves to meet ecological objectives. Ecological objectives would be determined in coordination with the federal and state agencies and approved by them on a case-by-case basis.

Outside the reserves, terrestrial habitat management would be the same as under the No Action alternative.

2.5.13 Listed and sensitive species management

Under Alternative B, reserves would be established for northern spotted owl and marbled murrelet. The reserve system would include corridors, in many cases following headwater streams and ridgetops, connecting larger blocks of land within the reserve system. The corridors are designed to provide habitat connectivity for these and other terrestrial/avian species. Management of listed and sensitive species within the reserves would be limited to habitat improvement, research, and monitoring activities targeting these two species. Reserves for each species are described below. The reserves would overlap a large portion of the known range of the Point Arena mountain beaver in the primary assessment area, and would thus provide benefits to this species as well.

Outside the reserves, listed and sensitive species would be managed as described under the No Action alternative, except that activities covered under the federal and state incidental take authorizations, and any resulting take of northern spotted owl and marbled murrelet, would be permitted. MRC would continue to follow its existing management policies and practices to avoid the take of other species listed as threatened or endangered under the ESA or CESA as described under the No Action alternative. As under the No Action alternative, outside the reserves MRC would continue to operate in a manner consistent with the 2012 CFPRs (14 CCR §898.2(e) and §919.4) and CEQA (14 CCR §15380) standards for plant species of concern, including take-avoidance and minimization measures. The CFPRs and CEQA guidelines require seasonally-appropriate floristic surveys for federally listed and/or state-listed plant species if necessary to avoid a significant impact (see Section 2.2.13.6, Listed and sensitive species management, Plant species of concern). For any listed species documented, management strategies would be determined on a THP-by-THP basis to ensure that impacts of activities covered under THPs are not significant and that take is avoided where necessary. MRC would use these survey protocols, if necessary to avoid a significant impact, and mitigation standards to support impact determinations in THPs for all plant species of concern, including those designated as California Rare Plant Rank species.

2.5.13.1 Northern spotted owl reserves

Approximately 167 spotted owl territories are located either in or within 1,000 ft (305 m) of the primary assessment area (MRC 2012). Under Alternative B, 15 separate Northern Spotted Owl Reserves, totaling 40,341 ac (16,319 ha), would be established in the primary assessment area for the duration of the requested 80-year incidental take authorization period. The Northern Spotted Owl Reserves would be established on large blocks of land that contain the greatest number of the most active or productive activity centers, as determined in conjunction with the agencies. The Northern Spotted Owl Reserves would differ in size and encompass a total of at least 100 selected owl activity centers. With the exception of the limited activities described above, no timber operations, road building, potentially disturbing activities, or other operations would be permitted within the Northern Spotted Owl Reserves.

Outside the reserves, measures for northern spotted owls would be the same as for Limited protection sites under the Proposed Action (Section 2.3.15, Listed and sensitive species management). Control measures for barred owl may or may not be implemented outside the reserves under Alternative B, but there would be no economic incentive to implement barred owl control under Alternative B.

2.5.13.2 Marbled murrelet reserves

In the primary assessment area, marbled murrelets are only known to occur in the Alder Creek drainage (see Section 3.6.1, Terrestrial Habitat and Wildlife Species of Concern, Affected environment/Environmental setting). Other areas of potential habitat exist in the primary assessment area, but despite murrelet detections at various locations, no behavior indicative of breeding has been observed. Most of these areas consist of one or a few residual old-growth trees. Under Alternative B, the portion of the Alder Creek drainage owned by MRC would be established as a Marbled Murrelet Reserve for the duration of the requested 80-year permit period. The Marbled Murrelet Reserve would include all lands in the drainage from ridgetop to ridgetop, for a total of 6,039 ac (2,443 ha). With the exception of the limited activities described above, no timber harvest, road building, or other forestry operations would be allowed in the Marbled Murrelet Reserve. There would be no control measures for corvids inside the Marbled Murrelet Reserve under Alternative B.

Outside the reserves, MRC would:

- Retain all primary murrelet trees and screen trees.
- Permit harvest of secondary murrelet trees if a ground survey determines that it is unlikely murrelets are occupying the surrounding area.

Outside the reserves, there would be explicit restrictions on activities during marbled murrelet breeding and non-breeding seasons within occupied sites as well as sites identified as High, Moderate, and Limited protection areas. These would include limits to approaches, and restrictions on prescribed burning, fire control lines, helicopters, blasting, maintenance, and hauling. Timber operations would be constrained at prescribed distances from habitat trees if habitat trees are not surveyed for occupancy.

2.5.14 Monitoring and adaptive management

Under Alternative B, MRC may continue its current research and monitoring activities. Research and monitoring in reserves would include watershed analysis and surveys for northern spotted owl and marbled murrelet. The agencies and MRC would develop additional research and monitoring guidelines for northern spotted owl and marbled murrelet inside and outside of the reserves.

Outside the reserves, MRC would continue to conduct the research and monitoring activities described under the No Action alternative, with the exception that such activities would be covered by the incidental take permit from USFWS for marbled murrelet and northern spotted owl, and take permit from CDFG for marbled murrelet.

2.6 Alternative C (HCP Only, Fewer Covered Species, Shorter Take Authorization Term)

Under Alternative C, the lead agencies would authorize the incidental take of federally listed and state-listed species on MRC's covered lands. Take would be authorized for activities associated with conducting timber harvesting and related operations in accordance with existing federal and state regulations. Take of federally listed species would be authorized pursuant to two federal incidental take permits, one from NMFS and one from USFWS. Take of state-listed species would be authorized pursuant to a CDFG take permit. The incidental take authorizations would have a 40-year term.

If approved, MRC would prepare an HCP with a term of 40 years. Operations within the primary assessment area would be subject to the provisions of the federal and state incidental take authorizations. After 40 years, management would either revert back to current practices (i.e., No Action) or MRC could seek an extension of the incidental take authorization term. The HCP prepared under this alternative would be similar to the HCP prepared under the Proposed Action, but would cover fewer species. No NCCP would be prepared under this alternative. Under Alternative C, MRC would not seek coverage for the northern red-legged frog, coastal tailed frog, Point Arena mountain beaver, or plants other than those listed by the State of California as threatened, endangered, or rare[23]. MRC would be subject to take prohibition standards for these and other listed species not covered under the HCP, as described under the No Action alternative. The agencies chose to propose a shorter permit term and coverage of fewer species under this alternative in response to requests received during public scoping.

2.6.1 ESA and CESA compliance for covered species

Under Alternative C, NMFS and USFWS would each issue MRC an incidental take permit covering federally listed species for a term of 40 years.

Under Alternative C, CDFG would issue MRC a take permit covering state-listed species for a term of 40 years under California Fish and Game Code Section 2080.1 or 2081.

Species for which federal incidental take permits and a state take permit would be granted (and would be included in an HCP) are listed in Table 2.6-1.

[23] The CDFG rare designation applies to plants only.

Table 2.6-1. Species covered by incidental take authorization and included in an HCP under Alternative C.

Common name	Scientific name	Listing status[a]		CRPR status[b]	Take authorization?		
		Federal (ESA)	State (CESA)		NMFS[c]	USFWS[c]	CDFG[d]
Fish and wildlife							
Coho salmon, Central California Coast Evolutionarily Significant Unit	*Oncorhynchus kisutch*	E	E	NA	yes	–	yes
Coho salmon, Southern Oregon/ Northern California Coast Evolutionarily Significant Unit	*Oncorhynchus kisutch*	T	T	NA	yes	–	yes
Chinook salmon, California Coastal Evolutionarily Significant Unit	*Oncorhynchus tshawytscha*	T	–	NA	yes	–	–
Steelhead, Central and Northern California Coast Distinct Population Segment	*Oncorhynchus mykiss*	T	–	NA	yes	–	–
California red-legged Frog	*Rana draytonii*	T	–	NA	–	yes	–
Marbled murrelet	*Brachyramphus marmoratus*	T	E	NA	–	yes	–
Northern spotted owl	*Strix occidentalis caurina*	T	–	NA	–	yes	–
Plants							
Humboldt milk-vetch	*Astragalus agnicidus*	–	E	1B.1	–	–	yes
Roderick's fritillary	*Fritillaria roderickii*	–	E	1B.1	–	–	yes
Baker's meadowfoam	*Limnanthes bakeri*	–	R	1B.1	–	–	yes
North Coast semaphore grass	*Pleuropogon hooverianus*	–	T	1B.1	–	–	yes

[a] Listing status under ESA and CESA:
E: endangered
T: threatened
R: rare
[b] CRPR: California Rare Plant Rank; for explanation of number ranking system, see Section 3.5, Vegetation and Plant Species of Concern.
[c] Federal incidental take permit.
[d] CDFG take permit under Fish & Game Code Section 2080.1 or 2081.

2.6.2 Covered activities

Activities covered under the federal and state incidental take authorizations would be the same as those listed under the Proposed Action (Section 2.3.2, Covered activities). However, the duration of the covered activities, including long-term programs such as research, monitoring, and habitat improvement, would be limited to 40 years.

2.6.3 Timber harvesting and forest management activities

Same as the Proposed Action.

2.6.4 Maximum sustained production of high-quality timber products

Under Alternative C, maximum sustained production would be governed by the standards and guidelines set forth in an Option A or Sustained Yield Plan that would be prepared by MRC, with additional measures contained in the proposed HCP. Harvest levels would be balanced with growth and inventory to ensure long-term sustained yield and maximum sustained production over the covered period.

Maximum sustained production would be achieved under Alternative C (as discussed in further detail in Section 3.9, Timber Resources). Table 2.6-2 shows the modeled harvest in acres, using each silvicultural method over a shorter 40-year planning horizon. This modeled distribution serves as the basis for the long-term sustained yield calculation under Alternative C. Timber modeling assumptions are described in Section 2.1.2 (Development of Alternatives, Modeling forest conditions under each alternative). A detailed description of the timber model is provided in Appendix E.

2.6.4.1 Monitoring thresholds and maximum sustained production compliance

Monitoring thresholds and maximum sustained production compliance under Alternative C would be the same as under the Proposed Action.

Table 2.6-2. Acres harvested by silvicultural method by decade—Alternative C.

Silvicultural method	Decade			
	1	2	3	4
Clearcut	0	0	0	0
Coastal Zone Selection	332	36	398	51
Commercial Thinning	0	0	0	0
Flood Plain Selection	44	53	65	179
High Retention Selection	89	264	1,714	3,096
High Retention Selection (Carbon)	0	189	0	261
Medium Retention Selection	52	0	82	0
Rehabilitation	8,035	3,743	0	0
Seed Tree Removal	50	44	114	10
Selection	26,025	39,058	75,426	78,032
Selection (Stepped Approach)	0	0	0	0
Selection (Old Growth II)	33	68	66	78
Small Class II Selection	1,150	1,563	1,943	2,294
Transition	20,435	15,473	600	0
Variable Retention	12,245	10,209	499	278
Total	**68,491**	**70,700**	**80,908**	**84,280**

2.6.5 Alternate standards to the CFPRs.

Same as the Proposed Action.

2.6.6 Management of hazardous substances

Same as the Proposed Action.

2.6.7 Management of fire hazards

Same as the Proposed Action.

2.6.8 Post-fire timber salvage

Same as the Proposed Action.

2.6.9 Mass wasting and sediment management

Same as the Proposed Action.

2.6.10 Road management

Same as the Proposed Action.

2.6.11 Site preparation

Same as the Proposed Action.

2.6.12 Aquatic and riparian habitat management

Same as the Proposed Action.

2.6.13 Terrestrial habitat management

Terrestrial habitat management under Alternative C would be similar to the Proposed Action, with several exceptions related to management of habitat for Point Arena mountain beaver and rare plants. Because no NCCP would be prepared under this alternative, terrestrial habitat management would not be focused on natural communities. Terrestrial habitat management under Alternative C would differ from the Proposed Action in the following ways:

- The Lower Alder Creek Management Area would not be established.
- Management of terrestrial habitat (e.g., snag and wildlife tree retention and recruitment) in the lower Alder Creek drainage would be the same as in other portions of MRC land.
- Surveys for plant species of concern, if necessary to avoid a significant impact (see Section 2.2.13, No Action alternative, Listed and sensitive species management, Plant species of concern), and protection of rare plants on MRC land would occur on a PTHP-by-PTHP basis, with protection measures subject to approval by the wildlife agencies.
- Protection measures for plants would focus on avoiding or minimizing disturbance of individual plants, rather than on communities and habitats.

2.6.14 Listed and sensitive species management

Management of listed and sensitive species under Alternative C would be similar to the Proposed Action, with the exception of conservation measures specifically designed to protect the Point Arena mountain beaver, or plants other than those listed under CESA. Because of the shorter term of the HCP compared with the Proposed Action, the species protections would be more short-lived, and some or all of the habitat improvements anticipated over the second half of the term of the Proposed Action would not be realized under Alternative C. For listed species not covered under the proposed HCP and incidental take authorizations, MRC would implement measures designed to avoid take of these listed species, including continuing to adhere to measures contained in an Option A or Sustained Yield Plan and the 2012 CFPRs, as well as measures identified during the PTHP preparation and review process. Long-term management programs would be implemented only for the covered species.

For species listed after formal approval of the HCP, MRC would either manage each such species on a case-by-case, take-avoidance basis with technical assistance from the wildlife agencies or amend the HCP to include them.

As described under the Proposed Action (Section 2.3.15, Proposed Action/Proposed Project, Listed and sensitive species management) management for northern spotted owls would include control measures for the invasive barred owl unless it is determined that attempts to control barred owls will be ineffective. Potential barred owl management measures would be the same as those under the Proposed Action.

2.6.15 Monitoring and adaptive management

Under Alternative C, MRC's monitoring and adaptive management program would be similar to the Proposed Action, with several notable exceptions:

- The duration of monitoring programs would be limited to 40 years to correspond with the requested incidental take authorization term.
- Natural community monitoring would not occur.
- There would be no comprehensive, long-term monitoring or adaptive management program for Point Area mountain beaver or non-listed plants.
- Surveys for Point Area mountain beaver would be conducted on a PTHP-by-PTHP basis, with protection measures subject to approval by the wildlife agencies. Surveys for plant species of concern would be conducted on a PTHP-by-PTHP basis, as necessary to avoid a significant impact, with protection measures subject to approval by the agencies.

As described for the Proposed Action, data from MRC's monitoring programs under Alternative C would be used to ensure compliance with the regulatory provisions of the incidental take authorizations, test whether MRC's conservation measures meet the goals and objectives of the HCP, and evaluate the validity of the assumptions upon which the conservation measures are based. Under Alternative C, MRC would continue to conduct the following types of monitoring activities:

- Aquatic habitat monitoring.
- Long-term stream channel monitoring.
- Mass wasting monitoring.
- Surface erosion monitoring.
- Terrestrial habitat monitoring.

- Monitoring of covered wildlife species.

However, because of the shorter HCP and incidental take authorization term under this alternative, monitoring periods and the effectiveness of the adaptive management program would be limited to 40 years. Similar to the Proposed Action, monitoring data would be used to revise (i.e., adapt) the conservation measures in the HCP, within the shorter period of the HCP.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

3.1 Introduction and Approach to the Analysis

For each environmental resource area, this section provides: (1) a description of the affected environment, and (2) the environmental effects analysis, including mitigation. The affected environment (also referred to as environmental setting) subsection provides an overview of the existing conditions in the assessment area that implementation of the alternatives could affect. The environmental effects and mitigation subsection provides a discussion of the environmental consequences associated with implementation of the alternatives, and mitigation measures that would avoid or eliminate potentially significant effects or reduce them to a less-than-significant level, where feasible.

3.1.1 Spatial organization of the analysis

A description of the assessment area is provided in Section 1.2 (Proposed Action/Project Description). The definitions of the primary and secondary assessment areas are unique for Hydrology, Beneficial Uses of Water, and Water Quality (Section 3.3) and Aquatic and Riparian Resources (Section 3.4) because the analysis for these resource areas is organized primarily around drainage basins. For these sections, analyses often refer to the primary assessment area using MRC's watershed analysis units[24] (Appendix F, Figure F-1). For terrestrial resource sections, analyses sometimes refer to the primary assessment area using MRC's inventory blocks (Section 1.2 [Proposed Action/Project Description], Figure 1.2-1). For some resources, the assessment area has its own unique boundary (e.g., visual resources, traffic and noise) to correspond with a meaningful geographic area for assessment of effects.

3.1.2 Environmental baseline

The environmental baseline is the existing physical conditions in the primary and secondary assessment areas that would serve as the basis for evaluating and comparing effect levels. For the EIS/PTEIR, the environmental baseline is equivalent to the 2008 (post-fire) starting conditions used for MRC's current timber modeling (Appendix E). Information provided in the Affected Environment/Environmental Setting sections for each resource is used primarily to describe the baseline conditions for the effects analyses. However, some of the information in these sections is not used directly in the analysis. This supplemental information is provided to meet the requirements of the PTEIR, which will serve as a CEQA tiering document for future PTHPs. Future PTHPs will use baseline information in the EIS/PTEIR to inform project-specific resource analyses and ensure program-level CEQA compliance.

Although CEQA generally requires that the environmental baseline represent existing conditions in the project area at the time of publication of the Notice of Preparation (10 March 2006), environmental conditions in the EIS/PTEIR assessment area in 2006 are not representative of baseline conditions for two reasons. First, wildfires in June 2008 burned approximately 55,000 ac (22,260 ha) in Mendocino County, including about 23,200 ac (9,390 ha) of the primary

[24] A watershed analysis unit is an area of land, typically covering multiple planning watersheds, which MRC defines for watershed analysis.

assessment area. Second, MRC reclassified fire-affected portions of its timberlands shortly after the June 2008 fires and used the reclassified timber stand conditions as the "starting condition" for timber modeling purposes. Data from the timber model are used in this EIS/PTEIR as the basis for many of the effects analyses for the 80-year analysis period. The timber model is described in detail in Appendix E. For these reasons, the lead agencies have agreed that 2008 post-fire environmental conditions, rather than 2006 conditions, provide a more appropriate environmental baseline for the effects analysis in this EIS/PTEIR.

3.1.3 Timber modeling

As described in Section 2.1.2 (Alternatives, Modeling forest conditions under each alternative), the effects analyses in the following sections rely in large part on the results of timber modeling, which provide simulated forest conditions for management strategies under each alternative. For the purposes of this EIS/PTEIR, the lead agencies used output data from the timber model to describe predicted forest conditions under each alternative. Per the Council on Environmental Quality Regulations for Implementing the Provisions of NEPA (40 CFR §1506.5 [c]) in some instances the lead agencies requested information from MRC, including timber model results, to help with the development of this EIS/PTEIR. All information provided by MRC was independently reviewed by the lead agencies prior to inclusion in this EIS/PTEIR.

The timber modeling results are relative, i.e., they are used to compare and contrast the alternatives analyzed in the EIS/PTEIR. The model results are used strictly for relative comparisons because it is not possible to model all of the specific conservation and management measures in each alternative. Simplifying assumptions were made in the model regarding the effect of conservation measures on timber harvest under each alternative. Therefore, model results do not necessarily reflect actual future conditions. Modeling assumptions are described in Section 2.1.2 (Alternatives, Modeling forest conditions under each alternative) and in Appendix E.

3.1.4 Significance criteria

Significance criteria are stated in the beginning of the subsection for each resource area. A brief explanation is provided for significance criteria that do not apply and are not used for determinations of significance.

3.1.5 Significance levels

The EIS/PTEIR uses the following terminology, based on CEQA guidelines, to describe the significance of environmental effects:

- **No effect** indicates that the implementation of the Proposed Action or alternatives would not have any direct or indirect effects on the environment, and there would be no change from existing conditions as a result. Mitigation is not required for this effect level.
- A **beneficial** effect is one that would result in a beneficial change in the environmental resource. Mitigation is not required for this effect level.
- A **less than significant** effect is one that would not result in a substantial or potentially substantial adverse change in the environmental resource. Mitigation is not required for this effect level.
- A **potentially significant** effect is one that may cause a substantial, or potentially substantial, adverse change in the environmental resource. Under CEQA, mitigation measures must be provided, where feasible, to avoid or reduce the magnitude of significant

or potentially significant effects[25]. In this EIS/PTEIR, where an effect determination of potentially significant is made, a mitigation measure is recommended, with the exception of the No Action alternative.

3.2 Geology, Soils, and Geomorphology

This section describes the geology, soils, and geomorphology within the primary assessment area, as well as the potential effects of implementing the alternatives on these conditions. The primary assessment area for geology, soils, and geomorphology includes the 213,000 ac (86,200 ha) area covered by the proposed HCP/NCCP (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1) (Appendix F, Figure F-1). The HCP/NCCP plan area is encompassed entirely within portions of 12 of MRC's watershed analysis units. All relevant and available data from MRC's watershed analyses were utilized by the agencies in describing the affected environment and in analyzing potential effects of the alternatives.

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is of a similar geology, topography, and climate as the primary assessment area, has been subject to similar management (i.e., commercial timber harvest), and has similar erosion processes and rates. The affected environment and potential effects would therefore be similar to those in the primary assessment area.

3.2.1 Affected environment/Environmental setting

3.2.1.1 Geology

The assessment area is located within the Coast Range physiographic province of northern California, which is underlain predominantly by rocks of the Franciscan complex. The Franciscan complex includes three terranes (Coastal Belt, Central Belt, and Eastern Belt) separated by east-dipping thrust faults (Table 3.2-1, Appendix G). Younger marine sedimentary rocks occur in the vicinity of Point Arena.

Table 3.2-1. Descriptions of major geologic units in the assessment area.

Geologic unit	Location	Description
Coastal Belt Terrane	Western portions of the assessment area.	Highly sheared and deformed graywacke sandstone and shale interbedded with small amounts of limestone, pebble conglomerate, and volcanic rocks. Bedrock is locally folded, has a northwest strike, and dips to the northeast.
Central Belt Terrane	Between the Coastal Belt terrane and the Eastern Belt terrane.	Predominantly mélange (matrix of sheared shale containing discontinuous blocks of sandstone, chert, high-grade blueschist, serpentinitic rocks, eclogite, greenstone, basaltic pillow basalt, diabase, and minor pyroclastic rocks).

[25] NEPA does not require a lead agency to adopt mitigation measures for significant effects.

Geologic unit	Location	Description
Eastern Belt Terrane	Eastern portions of the assessment area.	Sheared and folded metagreywacke, blueschist, metaquartzite and eclogite. Low-angle faults and thrust belts characterized by presence of serpentinized ultramafic rocks.
Tertiary marine deposits	Present coastline west of the San Andreas fault.	Folded sandstone and mudstone with interbedded shale, siltstone, breccia and pebble (and cobble) conglomerate. Thin flows of basalts, andesites and rhyolites are present in some areas.
Quaternary surficial deposits	Throughout the assessment area.	Marine terraces, dune deposits, stream terraces, and colluvial and alluvial deposits.

Marine terraces and dune deposits, stream terraces, and colluvial and alluvial deposits of Holocene and Quaternary age occur throughout the assessment area. Pleistocene marine terraces are composed of quartz sand and gravel deposits. Dune deposits composed of partially consolidated, fine- to medium-grained sand commonly overlay marine terraces. Colluvial deposits composed of poorly consolidated sediment occur in unchanneled valleys (hollows) and along toeslopes. Landslide deposits composed of a heterogeneous mixture of rock, soil, and organic debris are common throughout the assessment area.

3.2.1.2 Geomorphology and surface processes

The assessment area is mountainous, with elevations up to 4,233 ft (1,290 m) and relief up to 2,295 ft [700 m]). Regional topography and drainage patterns are strongly controlled by the northwest-trending structural grain. Hillslope gradients, averaging 20 to 50% on earthflows and up to 70% or greater in terrain underlain by more competent bedrock, are within the range in which mass movement (e.g., debris slides and debris flows) governs long-term evolution of slope morphology. Many of the watersheds encompassed by the primary assessment area are currently listed as sediment impaired under Section 303(d) of the Clean Water Act due to accelerated erosion and sedment delivery to watercourses caused by historical and existing land uses and associated roads.

Hillslope processes and landforms

Much of the primary assessment area is prone to mass soil movement due to weak bedrock, unconsolidated surficial deposits, steep topography, and high mean annual precipitation. Landslides in the assessment area vary in size from small streamside failures, shallow debris slides, and rotational slumps to large and complex deep-seated failures involving slopes from ridge top to valley bottom. Landslides in the assessment area can be up to tens of thousands of years in age and include both active features and inactive features that are not likely to experience movement in the near future. Hillslope erosion processes may also include sheetwash, rilling, and gullying; soil creep; rockfall; and bank failure.

Inner gorges are landforms characterized by steep slopes that terminate in a slope break several hundred feet or more above the valley bottom and are among the most sensitive to mass movement within the assessment area (Farrington and Savina 1977, Wolfe 1982, Kelsey 1988, Furbish and Rice 1983). Inner gorges typically develop in third- and fourth-order stream reaches where valley side slopes are underlain by competent sandstone or other resistant lithologies. Inner gorges typically do not form in earthflow materials with weak mechanical properties (Kelsey 1988). Colluvial-filled hollows are common hillslope landforms also prone to mass wasting in the assessment area (Reneau et al. 1986, Kelsey 1988, Haible 1980). Shallow landslides periodically evacuate colluvial debris from hollows, often transitioning to debris flows in downslope areas. River terraces of Holocene and Quaternary age occur in many of the larger valley bottoms in the assessment area. Terrace deposits comprised of weakly consolidated alluvium can be destabilized by fluvial erosion or road construction across the riser.

Terrain Stability Units, as defined in MRC's watershed analyses and used by the lead agenices in this EIS/PTEIR, are landscape units with similar geomorphic characteristics that influence landsliding and other hillslope erosion processes. Terrain Stability Units are used by MRC to help minimize management-related sediment delivery by identifying areas with higher potential for shallow landsliding and other erosion processes, and that are susceptible to increased erosion resulting from land management practices. The Terrain Stability Unit approach to terrain classification is adopted herein to analyze the potential effects of the alternatives because (1) Terrain Stability Units are defined using accepted geologic and geomorphic criteria that reflect the primary controls on hillslope instability and sediment delivery (e.g., slope steepness and morphology, degree of dissection and associated convergent flow patterns, and proximity to stream channels), (2) MRC has demonstrated that Terrain Stability Units correlate with the incidence of landslides and associated sediment delivery (MRC 2000c, 2003a–e, 2004a–d, 2005), and (3) many of MRC's management activities and conservation measures are designed and prescribed based on delineation of Terrain Stability Units. Additional details regarding the methods and results of Terrain Stability Unit delineation are available in MRC's watershed analyses (MRC 2000c, 2003a–e, 2004a–d, 2005). Seven different Terrain Stability Units are mapped in watershed anaysis units within the primary assessment area (Table 3.2-2).

Table 3.2-2. Terrain Stability Units in watershed anaysis units within the primary assessment area.

Terrain Stability Unit	Description
1	Inner gorge or steep streamside slopes along low-gradient watercourses
2	Inner gorge or steep streamside slopes adjacent to high gradient intermittent watercourses
3	Dissected and convergent topography
4	Non-dissected topography (e.g., planar slopes)
5	Low-relief topography (e.g., ridge-top areas)
6	Earth flow complexes
7	Accelerated creep terrain

Shallow landslides

Shallow landslides involve the soil mantling bedrock and may occur anywhere on hillslopes, but are most commonly found on steep slopes near stream channels (e.g., inner gorges) and in areas where steep surface topography forces convergent subsurface flow (e.g., swales or hollows). Other major factors influencing the distribution of shallow landsliding include soil thickness, presence of near surface bedrock, soil strength, soil cohesion, and apparent cohesion provided by roots. Shallow landslides are typically triggered by high pore pressures resulting from intense or prolonged precipitation. Roads and timber harvest may increase the incidence of shallow landsliding where these practices change slope steepness, mass balance, subsurface hydrology, and root strength.

Seismic ground shaking can also trigger movement of existing landslides, create new landslides, or predispose hillslopes to future landsliding (e.g., Lawson 1908, Keefer 1984, McPherson and Dengler 1992). Three major sub-parallel strike-slip faults in the San Andreas fault system bisect the assessment area: the San Andreas fault, the Maacama fault, and the Bartlett Springs fault. Since 1853, hundreds of earthquakes ranging from 4.5 to 8.3 in magnitude have occurred in the Coast Ranges of northern California and adjacent offshore areas, some of which have triggered landslides (Stover and Coffman 1993, Toppozada and Parke 1982, Dengler et al. 1992, California Geology 1992, Dengler 1995).

The fraction of sediment delivered from a landslide to a channel (i.e., sediment delivery ratio) is the portion of landslide sediment production that can adversely affect aquatic habitat. The sediment delivery ratio for shallow landslides typically ranges from 0.50 to 0.75, with higher values occurring in inner gorge areas (Euphrat et al. 1998, Coyle and Stillwater Sciences 1999). Average annual background sediment delivery rates from shallow landsliding estimated for portions of the assessment area during sediment source analyses conducted for Total Maximum Daily Loads range from 91 tons mi^{-2} yr^{-1} (short tons per square mile per year) in the Noyo River watershed to 180 tons mi^{-2} yr^{-1} in the Navarro watershed (EPA 1998,1999a-b, 2000, 2001a-c)[26]. The average annual background delivery rate across all of the Total Maximum Daily Loads in the assessment area was 152 tons mi^{-2} yr^{-1}. These estimates are based on aerial photographic interpretation and field inventories in areas that may have historically undergone various types of forest management, including timber harvest.

The most complete evaluations of the long-term (approximately the last 50 years) occurrence and sediment delivery from management-related shallow landsliding in the primary assessment area were conducted as part of MRC's watershed analyses and used by the lead agencies in this EIS/PTEIR (MRC 2000c, 2003a–e, 2004a–d, 2005). The watershed analyses estimated sediment delivery from shallow landslides based on inventory of mass wasting features collected through the use of aerial photographs and field observations. Parameters inventoried for each landslide observed in the field and in aerial photographs included, among other characteristics, land use association (e.g., road, landing, or skid trail) from which to separate road-related landslides from other landslides. A detailed description of the methods used to determine sediment delivery rates from shallow landsliding is given in MRC's watershed analyses (MRC 2000c, 2003a–e, 2004a–d, 2005). The lead agencies relied extensively on information presented in MRC's watershed analyses to describe existing conditions and to evaluate the potential effects of the alternatives in this EIS/PTEIR.

The percentage of shallow landslides delivering sediment to the drainage network in MRC watershed anaysis units varied from 32% (Upper Russian River) to 92% (Cottoneva Creek and Garcia River). The fraction of sediment delivered by road-related shallow landslides varied from 21% in the Garcia River watershed anaysis unit to 71% in the Nararro River watershed anaysis unit, with an average of 54% for all watershed anaysis units. Sediment delivery from shallow landslides in the 11 watershed anaysis units ranged from 228 tons mi^{-2} yr^{-1} in the Noyo River watershed anaysis unit to 795 tons mi^{-2} yr^{-1} in the Navarro River watershed anaysis unit, with an average across all the watershed anaysis units of 491 tons mi^{-2} yr^{-1} (266 tons mi^{-2} $yr^{-1}$for road-related slides and 269 tons mi^{-2} yr^{-1} for landslides unrelated to roads) (Table 3.2-3) (MRC 2000c, 2003a–e, 2004a–d, 2005). The average total sediment delivery rate from shallow landsliding estimated from data in watershed analyses (491 tons mi^{-2} yr^{-1}) (MRC 2000c, 2003a–e, 2004a–d,

[26] A soil bulk density of 1.48 tons yd^{-3} was used by the EPA to convert landslide sediment volume to mass.

2005) is within 6% of the average total shallow landslide rate estimated from Total Maximum Daily Loads in the assessment area (463 tons mi^{-2} yr^{-1}) (EPA 1998,1999a-b, 2000, 2001a-c).

Table 3.2-3. Summary of long-term average sediment delivery rates from shallow landsliding in watershed analysis units within the primary assessment area (MRC 2000c, 2003a-e, 2004a-d, 2005).

Watershed analysis unit[a]	Terrain Stability Unit	Sediment delivery rate[b] (tons mi^{-2} yr^{-1})		
		Road	Non-road	Total
Albion River	1	207	112	320
	2	231	323	554
	3	726	666	1,392
	4	114	100	214
	5	36	0	36
	1–5	154	140	294
Big River	1	1,492	1,150	2,643
	2	486	463	950
	3	578	347	925
	4	112	52	163
	5	0	0	0
	1–5	288	190	478
Cottaneva Creek	1	930	3,792	4,722
	2	425	187	612
	3	510	279	789
	4	73	17	90
	5	0	0	0
	1-5	156	170	327
Garcia River	1	810	4,857	5,667
	2	109	621	730
	3	322	615	937
	4	72	72	144
	5	0	0	0
	1–5	155	570	726
Greenwood Creek	1	663	766	1,429
	2	632	223	855
	3	524	394	917
	4	166	40	206
	5	0	0	0
	1–5	248	113	362
Gualala River[c]	1	NA	NA	4,622
	2	NA	NA	192
	3	NA	NA	529
	4	NA	NA	155
	5	NA	NA	0
	1–5	NA	NA	495
Hollow Tree Creek	1	3,575	8,499	12,074
	2	84	387	471
	3	277	1,060	1,337
	4	246	115	362
	5	9	3	11
	1–5	299	464	763

Watershed analysis unit[a]	Terrain Stability Unit	Sediment delivery rate[b] (tons mi^{-2} yr^{-1})		
		Road	Non-road	Total
Navarro River	1	2,779	1,454	4,233
	2	555	546	1,101
	3	334	489	823
	4	501	79	580
	5	121	0	121
	1–5	563	232	795
Noyo River	1	NA	NA	1,545
	2	NA	NA	518
	3	NA	NA	248
	4	NA	NA	69
	5	NA	NA	13
	1–5	NA	NA	228
Upper Russian River	1	NA	NA	3,885
	2	NA	NA	757
	3	NA	NA	189
	4	NA	NA	501
	5	NA	NA	11
	1–5	NA	NA	485
Average[d]	1	1,494	2,947	3,853
	2	360	393	655
	3	467	550	798
	4	183	68	260
	5	24	0	16
	1–5	266	269	491

[a] Stream delivery data are not available for the Alder Creek/Schooner Gulch, Elk Creek, and Rockport Coastal Streams watershed anaysis units.
[b] The term “NA” (not applicable) indicates that road and non-road sediment delivery rates were not reported separately in watershed analyses.
[c] The primary assessment area includes approximately 1,000 ac of the upper Gualala watershed that are part ot the Garcia River watershed analysis unit (MRC 2012).
[d] Averages include data from the Willow Freezeout and Gualala watershed anaysis units, which are outside of the primary assessment area but include useful empirical data from detailed landslide inventories on MRC lands.

The majority of sediment delivered from shallow landslides in watershed anaysis units originated from inner gorges and steep streamside slopes along low-gradient watercourses (Terrain Stability Unit 1) (Table 3.2-4). Inner gorges and steep streamside slopes adjacent to high-gradient intermittent streams (Terrain Stability Unit 2) and convergent dissected topography (Terrain Stability Unit 3) were also found to have high sediment delivery rates. Other studies corroborate the lead agencies’ and MRC’s findings that inner gorge slopes are among the most sensitive of all landforms to mass soil movement processes (Farrington and Savina 1977, Wolfe 1982, Kelsey 1988, Furbish and Rice 1983). Debris slides on inner gorge slopes in Jackson Demonstration State Forest, for example, accounted for about 39% of the landslide occurrences unrelated to roads and delivered a large proportion of sediment relative to their limited frequency and aerial extent (Spittler and McKittrick 1995, Coyle and Stillwater Sciences 1999).

Table 3.2-4. Summary of long-term average sediment delivery rates from shallow landsliding in Terrain Stability Units within the primary assessment area.

Location	Average sediment delivery rate, tons mi^{-2} yr^{-1}						
	Terrain Stability Unit 1	Terrain Stability Unit 2	Terrain Stability Unit 3	Terrain Stability Unit 4	Terrain Stability Unit 5	Terrain Stability Units 1–5	Total Maximum Daily Load[a]
Road	1,494	360	467	183	24	266	169
Non-road	2,947	393	550	68	0.4	269	293
Total	**3,853**	**655**	**798**	**260**	**16**	**491**	**463**

[a] Average landslide sediment delivery rates reported for sediment Total Maximum Daily Loads within the assessment area (EPA 1998,1999a-b, 2000, 2001a-c) shown for comparison with Terrain Stability Units 1–5 derived from shallow landslide inventories in watershed anaysis units (MRC 2000c, 2003a–e, 2004a–d, 2005). Total area used to calculate area-normalized sediment delivery rates differs between the primary assessment area and the Total Maximum Daily Load assessments areas.

The long-term average[27] road-related shallow landslide rate in the watershed analysis units where MRC conducted landslide inventories was approximately 51 tons m^{-1} yr^{-1} (Table 3.2-5) (MRC 2000c, 2003a–e, 2004a–d, 2005). Based on analysis of landslide data provided by MRC and used by the lead agencies, the average delivery rate for the period following the 1973 Forest Practice Act is about 35 tons mi^{-1} yr^{-1}.

Table 3.2-5. Summary of long-term average sediment delivery rates from road-related shallow landsliding in Terrain Stability Units within the primary assessment area.[a]

Terrain Stability Unit	Sediment delivery (ton yr^{-1})	Road length (mi)	Linear sediment delivery rate (tons mi^{-1} yr^{-1})
1	22,618	114	199
2	5,828	76	77
3	11,395	124	92
4	44,815	1,204	37
5	481	142	3
Total 1–5	**85,138**	**1,659**	**51**

[a] Includes data from basins where sediment delivery from road-related landsliding is reported in watershed anaysis units (Albion, Big, Cottaneva, Garcia, Greenwood, Hollow Tree, and Navarro)(MRC 2000c, 2003a–e, 2004a–d, 2005). The long-term average rate is calculated over an approximately 50-year period, the beginning and ending of which varies by watershed analysis unit.

Shallow landslide inventories in the Jackson Demonstration State Forest show trends similar to those observed by MRC in the primary assessment area. In the Caspar Creek and James Creek watersheds, 413 shallow landslides occurred between 1958 and 1996: 56% were road-related, 17% were located in inner gorges, and 28% were located on other landforms (Coyle and Stillwater Sciences 1999). The number of road-related landslides in the Caspar Creek and James Creek planning watersheds (115 and 117, respectively) decreased by an order of magnitude between 1978 and 1996 due to either improved road management practices or preferential failure

[27] The long-term average rate is calculated over an approximately 50-year period during the late 20th century, the beginning and ending of which varies by watershed analysis unit.

of unstable portions of the road network prior to 1978. The number of slides unrelated to roads was similar between 1978 and 1996. In the South Fork Caspar Creek sub-basin, Cafferata and Spittler (1998) mapped 66 recently active slides on 1975 aerial photographs (the period of road construction and timber harvesting in the South Fork) and found 35 road-related, 12 landing-related, 16 skid trail-related, and 3 natural landslides.

Deep-seated landslides

Deep-seated landslides in the assessment area typically fail as earthflows or large-scale translational-rotational slides (referred to as rockslides). Deep-seated landslides can encompass large areas (e.g., ridge top to valley bottom) and constitute a major source of sediment input to stream channels in a watershed (Kelsey 1988, Mackey and Roering 2011). Because climatic conditions during the Holocene epoch (last 10,000 years) have been dryer than climate during the late Pleistocene stage (126,000 to 10,000 years), deep-seated landslides are thought to be less active now than they were in the geologically recent past. Active deep-seated landslides typically move in wet years or after multiple years of average rainfall. Some earthflows may move annually at relatively slow rates. Movement may range from centimeters to meters, with most of the displaced mass typically remaining on the hillslope. Sediment delivery to stream channels typically occurs by surface erosion (sheet wash, rill, and gully erosion) and by shallow mass wasting at the toe.

Deep-seated landslides were mapped in the assessment area during watershed analyses through aerial photographic interpretation and limited field validation (Spittler and McKittrick 1995; MRC 2000c, 2003a–e, 2004a–d, 2005). Four morphologic features of deep seated landslides were mapped (toe, internal morphology, lateral flanks, and main scarp), and the activity level on a scale from 1 (most active) to 5 (least active) was described for each morphologic feature (McCalpin 1984, Keaton and DeGraff 1996). Most of the mapped deep-seated landslides are either translational-rotational failures in competent sandstone located in the Coastal Belt Franciscan terrane or earthflows in mélange located in the Central Belt Franciscan terrane (Spittler and McKittrick 1995). The number of deep-seated landslides mapped in the primary assessment area varies by watershed anaysis unit, from one per mi^2 (Hollow Tree Creek) to nearly six per mi^2 (Big River) (Table 3.2-6) (MRC 2000c, 2003a–e, 2004a–d, 2005). Many deep-seated landslides in the assessment area are disconnected from channels by alluvial valley fills that reduce the potential for sediment delivery (Spittler and McKittrick 1995). Because the activity level, rate of movement, and thickness of deep seated landslides is difficult to determine, the volume of material moved and the amount of sediment delivered to stream channels was not estimated during watershed analyses. Few of the deep-seated landslides in the assessment area are considered active, but active deep-seated slides have locally overwhelmed channels with sediment (e.g., the Floodgate slide in the Navarro River during March 1995 [Sowma-Bawcom 1996, Sutherland et al. 2002]). Data were not available to assess the area harvested on deep-seated landslides under existing conditions.

Table 3.2-6. Deep-seated landslides mapped within the primary assessment area watershed anaysis units.

Watershed analysis unit[a]	Number of slides	Area (mi^2)	Number of slides per mi^2
Albion River	136	24.0	5.7
Big River	311	55.2	5.6
Cottaneva Creek	26	12.4	2.1
Garcia River[b]	25	17.7	1.4
Greenwood Creek	69	15.4	4.5
Hollow Tree Creek	32	32.8	1.0

Watershed analysis unit[a]	Number of slides	Area (mi^2)	Number of slides per mi^2
Navarro River	270	86.0	3.1
Noyo River	155	31.0	5.0
Upper Russian River	35	8.9	3.9

[a] Deep-seated landslide mapping data were not available for the Alder Creek/Schooner Gulch, Elk Creek, and Rockport Coastal Streams watershed anaysis units.
[b] Includes portions of the Gualala River basin.

Surface erosion

Under natural conditions, chronic surface erosion processes in the northern California Coast Range include sheetwash, rilling, and gullying commonly associated with bare debris slide scars and earthflows (Lehre 1982). Total Maximum Daily Loads for sediment in the assessment area report long-term average background surface erosion rates of approximately 75 tons mi^{-2} yr^{-1} (EPA 2001a, 2001b, 2001c). The background surface erosion rate used in these studies was estimated using regional data described by CAL FIRE for Jackson Demonstration State Forest (P. Caferrata, pers. comm., A. Mangelsdorf, as cited in EPA 1999a). Surface erosion rates can dramatically increase following wildfires that remove protective cover from the ground surface, exposing soil to erosion and increasing the potential for overland flow (Tiedemann et al. 1979, Swanson 1981, Wondzell and King 2003, Roering and Gerber 2005).

Aquatic habitat in all watershed analysis units is impacted by fine sediment due in part to management-related surface erosion and mass wasting (MRC 2000c, 2003a–e, 2004a–d, 2005). Forest management practices that reduce ground cover and increase compaction and overland flow can increase surface erosion rates from sheetwash, rilling, and gullying. These management-related surface erosion processes can affect aquatic habitat by increasing chronic fine sediment delivery to stream channels, elevating and prolonging turbidity, and increasing the concentration of fine sediment in spawning gravels (Reid and Dunne 1984, Everest et al. 1987, Furniss et al. 1991, Hicks et al. 1991, Spence et al. 1996).

Gully erosion has been documented as a relatively important source of erosion and sediment delivery in response to forest management practices that reduce vegetation cover and increase surface runoff (Reid et al. 2010). In investigating the relative importance of gully erosion across different forest management treatment types in Caspar Creek, Reid et al. (2010) found that sediment production from gully headcut erosion increased by 79% in clearcut areas and 32% in selectively logged areas relative to control areas. Increases in sediment production in clearcut areas may reflect either increased runoff associated with timber harvest or direct disturbance of low-order channels during yarding operations (Reid et al. 2010). Estimated sediment production from gully erosion during the period of study was less than that estimated for road and hillslope erosion, but exceeded that of treethrows and landslides. Sediment yields during the period were largely controlled by chronic sediment sources rather than by discrete, sediment-producing events such as landslides. Estimates of sediment production and yield from gully erosion required critical assumptions about the distribution, geometry, and erodibility of the unmapped headward portions of the channel network.

Road surface erosion and road point-source erosion

Sediment budget work in north coastal California watersheds has shown that approximately two thirds of management-related sediment delivery originates from forest roads, most of which is related to inadequate road and crossing design, construction, and maintenance (Cafferata et al. 2007). The average rates of road surface erosion and road point-source erosion in watershed analysis units within the assessment area were 240 tons mi^{-2} yr^{-1} (33 tons mi^{-1}) and 283 tons mi^{-2} yr^{-1} (40 tons mi^{-1}), respectively (Table 3.2-7) (MRC 2000c, 2003a–e, 2004a–d, 2005).

Table 3.2-7. Long-term average annual surface and point-source erosion rates in the primary assessment area watershed anaysis units.

Watershed analysis unit[a]	Road density ($mi\ mi^{-2}$)	Skid trail surface erosion[b] (tons $mi^{-2}\ yr^{-1}$)	Road surface erosion[c]		Road point-source erosion[c]	
			tons $mi^{-2}\ yr^{-1}$	tons $mi^{-1}\ yr^{-1}$	tons $mi^{-2}\ yr^{-1}$	tons $mi^{-1}\ yr^{-1}$
Albion River	6.9	43.0	NA	NA	NA	NA
Big River	7.3	4.1	190	26.0	130	17.8
Cottaneva Creek	8.5	45.0	341	40.1	546	64.2
Garcia River	5.9	156	178	30.2	NA	NA
Greenwood Creek	7.5	20.0	380	50.7	370	49.3
Gualala River[d]	8.0	0.8	200	25.0	200	25.0
Hollow Tree Creek	5.4	20.0	180	33.3	240	44.4
Navarro River	7.3	14.5	195	26.7	338	46.3
Noyo River	8.0	49.2	NA	NA	NA	NA
Upper Russian River	6.9	10.0	253	36.7	159	23.0
Average	**7.2**	**34.6**	**240**	**33.4**	**283**	**37.1**

[a] Data were not available for the Alder Creek/Schooner Gulch, Elk Creek, and Rockport Coastal Streams watershed anaysis units.
[b] Skid trail erosion rates are for the period after the 1990s.
[c] Linear rates (tons $mi^{-1}\ yr^{-1}$) for road surface and point source erosion are calculated by dividing the unit-area erosion rate by the road density in the watershed anaysis unit. “NA” (not applicable) indicates that data were not reported in watershed analyses.
[d] The primary assessment area includes approximately 1,000 ac of the upper Gualala River watershed that are part ot the Garcia River watershed analysis unit (MRC 2012).

Road segments within 200 ft (61 m) of a stream channel are typically more hydrologically connected to stream channels, and sediment delivery from road surfaces located greater than 200 ft (61 m) is comparatively small (Rice et al. 1979, Lewis 1998, Stillwater Sciences 1999). Roads located greater than 200 ft (61 m) from a watercourse, however, can deliver relatively large quantities of sediment to stream channels where road surface runoff leads to gully erosion. Table 3.2-8 summarizes the length of existing roads in the primary assessment area that are within 200 ft (61 m) of a stream channel and within Aquatic Management Zones, including road approaches to crossings and roads running parallel to stream channels.

Table 3.2-8. Length of road within 200 ft of a channel and within Aquatic Management Zones in the primary assessment area watershed anaysis units.

Watershed analysis unit[a]	Length ≤ 200 ft from a channel[b] (mi)				Length in Aquatic Management Zones[b] (mi)	
	Paved	Rocked	Native[c]	Total	Active	Unused
Albion River	3.6	18.4	36.4	58.4	16.8	0.0
Big River	2.4	32.9	127.0	162.4	61.5	1.7
Cottaneva Creek	2.0	13.0	25.2	40.1	12.5	0.0
Garcia River[d]	0.3	7.7	35.2	43.2	8.9	0.4
Greenwood Creek[e]	0.9	5.6	106.3	112.8	27.5	11.2
Hollow Tree Creek	0.5	4.9	52.6	58.0	23.9	0.0
Navarro River	12.6	30.5	214.2	257.4	85.3	0.2
Noyo River	0.0	4.3	92.8	97.1	19.6	0.6
Rockport Small Coastal Streams	1.1	10.4	19.6	31.1	3.5	0.0
Upper Russian River	4.7	1.2	13.6	19.5	4.3	0.0
Total	**28.2**	**128.9**	**722.9**	**880.0**	**263.8**	**14.2**

[a] Data were not available for the Alder Creek/Schooner Gulch and Elk Creek watershed anaysis units.
[b] Lengths exclude roads decommissioned after 2008.
[c] "Native" includes other road surfaces identified in MRC's road database as historical, jeep trail, and undetermined.
[d] Includes portions of the Gualala River basin.
[e] Road lengths for Greenwood Creek include Elk Creek, Alder Creek, and Schooner Gulch.

Sediment production and delivery rates from roads located within 200 ft (61 m) of a watercourse in the Jackson Demonstration State Forest were 534 tons mi^{-2} yr^{-1} and 428 tons mi^{-2} yr^{-1}, respectively (Stillwater Sciences 1999). Many of these riparian roads were constructed adjacent to stream channels before passage of the 1973 Forest Practice Act. Studies in North Fork Caspar Creek found little evidence of sediment delivery from roads located in upslope areas where construction occurred after the Forest Practice Act (Lewis 1998). These results are comparable to those found in MRC watershed analyses (MRC 2000c, 2003a–e, 2004a–d, 2005). Barrett and Tomberlin (2007) more recently evaluated sediment production from road surface erosion on Jackson Demonstration State Forest, reporting an average road surface erosion rate of 1.6 kg m^{-2} yr^{-1} for hydrologic years 2006 and 2007. Assuming an average road width of approximately 20 ft (6 m), this equates to an average sediment production rate from surface erosion of 17 tons mi^{-1} yr^{-1}. The Watershed Erosion Prediction Project model predicted surface erosion rates of roughly 43 tons mi^{-1} yr^{-1} (P. Cafferata, Forester/Hydrologist, CAL FIRE, Sacramento, California, pers. comm., 15 April 2010). These rates are lower than those estimated in MRC's watershed analyses and in prior studies of Jackson Demonstration State Forest roads. Road surface erosion rates reported in these sources may differ due to the actual or assumed road widths and cut bank heights.

MRC identified point-sources of erosion and sediment delivery associated with roads through detailed road inventories in each watershed analysis unit (MRC 2000c, 2003a–e, 2004a–d, 2005). Controllable erosion at point-source sites (> 40 yd^3 [31 m^3]) was characterized and classified by treatment immediacy (high, moderate, low) (Table 3.2-9). MRC used these data to establish targets for reducing the volume of potentially erodible sediment at controllable point-sources under various time periods. MRC controlled approximately 737,000 yd^3 (536,477 m^3) of sediment at point-source erosion sites in the assessment area between 1998 and 2007, averaging approximately 73,700 yd^3 (56,348 m^3) per year (MRC 2012).

Table 3.2-9. Estimated volume of controllable sediment delivery from point-source erosion in the primary assessment area watershed analysis units.

Watershed analysis unit[a]	Volume (yd^3)		
	High priority	**Moderate priority**	**Low priority**
Albion River	3,000	1,800	11,300
Big River	97,200	130,200	68,300
Rockport Small Coastal Streams	45,200	18,600	57,000
Elk Creek	2,200	900	13,800
Garcia River[b]	29,100	8,700	79,300
Greenwood Creek	5,800	6,300	28,400
Navarro River	299,500	101,800	249,400
Noyo River	12,100	8,600	20,100
Upper Russian River	31,400	80,000	54,400
Total	**525,500**	**356,900**	**582,000**

Source: MRC HCP/NCCP (2012).

[a] The MRC HCP/NCCP does not specify treatment priorities for controlling point source erosion in the Alder Creek/Schooner Gulch, Elk Creek, and Hollow Tree Creek watershed anaysis units.

[b] Includes portions of the Gualala River basin.

Skid trails

Between the 1940s and mid-1970s, skid trails in the assessment area were commonly cut on slopes greater than 70% and were commonly placed in ephemeral and intermittent stream channels. MRC analyzed erosion and sediment delivery from skid trails on its ownership as part of watershed analyses. In the eleven watershed analysis units analyzed, long-term average sediment production from skid trails ranged from 10 tons mi^{-2} yr^{-1} for the Upper Russian River watershed analysis unit to 223 tons mi^{-2} yr^{-1} for the Garcia River watershed analysis unit (Table 3.2-7) (MRC 2000c, 2003a–e, 2004a–d, 2005). The long-term average sediment production rate from skid trails throughout the primary assessment area was approximately 69 tons mi^{-2} yr^{-1}, although the amount of sediment production varied by decade as the extent of tractor yarding and forest practices changed. Sediment produced from skid trails decreased during the most recent period (after 1990) for nine watershed anaysis units, but increased slightly for the Albion River and Garcia River watershed analysis units. The long-term average sediment production rate from skid trails after 1990 was approximately 35 tons mi^{-2} yr^{-1}.

Comparable surveys of skid trails were conducted in the Hare Creek and Kass Creek planning watersheds within Jackson Demonstration State Forest in 1997, where skid trail density ranged from 49.1 mi mi^{-2} (30.5 km km^{-2}) to 59.5 mi mi^{-2} (37 km km^{-2}) (Stillwater Sciences 1999). The degree of vegetative cover (including forest litter) and the time since construction were the primary factors influencing sediment production from skid trails in these areas. A separate study in the Juan Creek planning watershed (in MRC's Rockport Coastal inventory block) indicated that skid trails from tractor-yarding can produce sediment at rates comparable to roads (Ramos 1995, unpublished data).

Fluvial processes and forms

Information about fluvial forms and processes in the primary assessment area provide a context for sediment delivery processes, channel responsiveness to changes in water and sediment delivery, and the effects of channel changes on aquatic habitat. Although not all of the information presentated here is directly used in subsequent analysis of effects on soils, geology, and geomorphology, the information is relevant to the analysis of environmental effects on other resources, such as hydrology, beneficial uses of water, and water quality (Section 3.3), and aquatic and riparian habitats and species of concern (Section 3.4). This information may also be used as background information to support evaluation of future PTHPs that tier off the PTEIR.

Approximately 2,054 mi (3,306 km) of Class I, II, and III stream channels drain the 12 watershed analysis units in the primary assessment area (Table 3.2-10).

Table 3.2-10. Length of Class I, II, and III channels in the primary assessment area watershed analysis units.

Watershed Analysis Unit	Class I streams (mi)	Large Class II streams (mi)[b]	Small Class II streams (mi)[b]	Class III streams (mi)	Total (mi)
Albion River	31.1	8.5	29.4	88	157
Alder Creek/Schooner Gulch	21.5	13.7	21.7	65	121.9
Big River	72.1	23.8	44.1	159	299
Cottaneva Creek	11.9	6.2	14	40.1	72.2
Elk Creek	20.3	19.9	32.1	72.9	145.2
Garcia River[a]	20.8	11.2	21.2	56.7	109.9
Greenwood Creek	19.9	6	19.5	60.4	105.8
Hollow Tree Creek	44.8	9.7	28.9	87.5	170.9
Navarro River	106.6	35.9	103.3	297.6	543.4
Noyo River	34.8	10.8	28.9	130.9	205.4
Rockport Small Coastal Streams	17.3	6.2	16.9	45.4	85.8
Upper Russian River	8.5	4.1	8.9	15.8	37.3
Totals	**410**	**156**	**369**	**1,119**	**2,054**

[a] Includes portions of the Gualala River basin.

[b] A large Class II stream has a watershed that is greater than 100 acres in size, provides aquatic habitat for nonfish aquatic species, and excludes Class III waters that are tributary to Class I waters. A small Class II stream has a watershed that is less than 100 acres in size, provides aquatic habitat for nonfish aquatic species, and excludes Class III waters that are tributary to Class I waters.

Channel morphology

The morphology of a stream channel is largely determined by bedrock and soils in the watershed, drainage area and discharge, topographic relief and channel gradient, and by interactions between water, wood, and sediment. Large storm and flood events play an important role in shaping stream channels in the California Coast Range by delivering and transporting large quantities of sediment and wood. Large woody debris is especially important in maintaining productive salmonid populations in streams of north coastal California, because it creates hydraulic conditions favorable for pool formation, stores sediment and organic material, and acts as velocity refuge and cover. Large boulders provide similar functions but are less common features in channels within the primary assessment area.

The proportion of source channel types in the channel network is one indicator of the potential for sediment delivery from steep, headwater areas. Within the nine watershed analysis units surveyed in the primary assessment area, the percentage of channels considered source reaches varied from 30 to 56% (Table 3.2-11) (MRC 2000c, 2003a–e, 2004a–d, 2005). Variation in the length of each channel reach type among watershed analysis units is due, in part, to the topography and terrain types specific to each watershed. Transport reach types are supply-limited channels that convey sediment to downstream reaches. Response reaches, in contrast, are transport-limited channels where sediment is typically stored (Montgomery and Buffington 1997).

Table 3.2-11. Channel reach types in the primary assessment area watershed analysis units.

Watershed analysis unit[a]	Total mi	Response reaches (0–3% gradient)		Transport reaches (3–20% gradient)		Source reaches (>20% gradient)	
		mi	%	mi	%	mi	%
Albion River	97.6	27.6	28	40.9	42	29.1	30
Big River	224.5	55.2	25	85.7	38	83.5	37
Cottaneva Creek	55.9	4.7	8	20.1	36	31.2	56
Garcia River[b]	85.6	9.6	11	33.9	40	42.2	49
Greenwood Creek	69.6	12.2	18	19.8	28	37.5	54
Navarro River	424.4	74.4	18	149.4	35	200.7	47
NoyoRiver	153.2	19.8	13	51.3	33	82.1	54
Upper Russian River	88.1	10.7	12	38.3	43	39.1	44

[a] Information on channel reach types was not available for the Alder Creek/Schooner Gulch, Elk Creek, Hollow Tree Creek, and Rockport Coastal Streams watershed anaysis units.
[b] Includes portions of the Gualala River basin.

Pool spacing and residual pool depth are a function of channel type. Data on pool spacing and residual pool depth were collected by MRC in nine watershed analysis units (Table 3.2-12) (MRC 2000c, 2003a–e, 2004a–d, 2005). Pool spacing was lowest in the Albion watershed analysis unit and highest in the Cottaneva Creek watershed analysis unit. Mean residual pool depth was greatest in the Greenwood Creek and Hollow Tree Creek watershed analysis units.

Table 3.2-12. Pool spacing and residual pool depths in the primary assessment area watershed analysis units (n = number of reaches sampled).

Watershed analysis unit[a]	Pool spacing (in bankfull channel widths)			Residual pool depth (ft)		
	n	Mean	Range	n	Mean	Range
Albion River	20	2.8	1.1–5.9	20	2.1	1.1–3.1
Big River	44	4.7	2.2–10.1	44	1.7	0.7–4.3
Cottaneva Creek	34	10.6	2.8–26.0	44	1.8	1.0–3.1
Garcia River[b]	23	3.6	1.8–8.2	10	0.5	6.8 (max)
Greenwood Creek	16	3.8	1.9–5.3	16	2.2	1.2–3.7
Hollow Tree Creek	25	3.2	0.8–8.1	25	2.2	1.2–5.9
Navarro River	49	3.8	0.9–12.5	40	1.7	0.9–3.1
Noyo	23	5.1	2.5–11.4	23	1.8	0.8–3.1
Upper Russian River	8	5.0	3.0–8.4	8	1.7	0.8–1.9

[a] Pool data were not available for the Alder Creek/Schooner Gulch, Elk Creek, and Rockport Coastal Streams watershed anaysis units.
[b] Includes portions of the Gualala River basin.

Table 3.2-13 shows the distribution of pool types for sites visited in the nine primary assessment area watershed analysis units surveyed by MRC (MRC 2000c, 2003a–e, 2004a–d, 2005). The majority of pools in the Albion River, Hollow Tree Creek, and Navarro River watershed analysis units were formed by large woody debris. In the Noyo River watershed analysis unit, bank-forced pools were the most common. Free pools (pools that are not forced because of large woody debris, boulders, or bedrock banks) were common in the Cottaneva Creek watershed analysis unit. Boulder-forced pools were the most common in the Greenwood Creek watershed analysis unit.

Table 3.2-13. Pool types in the primary assessment area watershed analysis units (n = number of pools).

Watershed analysis unit[a]	n	Free pools		Large woody debris-forced pools		Boulder-forced pools		Bank-forced pools	
		n	%	n	%	n	%	n	%
Albion River	214	70	33	105	49	8	4	31	14
Big River	231	27	12	60	26	18	8	126	55
Cottaneva Creek	370	249	67	33	9	74	20	14	4
Garcia River[b]	153	98	64	23	15	32	21	na	na
Greenwood Creek	138	29	21	22	16	49	36	38	28
Hollow Tree Crek	264	55	21	111	42	19	7	79	30
NavarroRiver	515	77	15	238	45	15	3	185	36
Noyo River	152	39	26	47	31	10	7	56	37
Upper Russian River	40	5	13	11	28	8	20	16	40

[a] Pool types in the Garcia River watershed anaysis unit were not analyzed. Pool data were not available for the Alder Creek/Schooner Gulch, Elk Creek, and Rockport Coastal Streams watershed anaysis units.
[b] Includes portions of the Gualala River basin.

Channel substrate

Stream channel substrates in the primary assessment area typically vary in size from fine gravel to cobble. The channel bed surface in low- and mid-order reaches typically consists of both mobile sediment and relatively immobile framework particles. Mobile sediment typically has a median diameter of about 1.5 in (40 mm), is loosely packed, and poorly sorted. Active sediment deposits (i.e., gravel bars mobilized every 2–5 years) are typically unvegetated and composed of loose, rounded material. Semi-active sediment deposits (e.g., gravel bars mobilized every 5–20 years) typically occur at higher elevations above the thalweg and support woody riparian vegetation (Madej 1995). Large immobile particles (e.g., boulders) create storage sites for deposition of finer sediment. Large woody debris also strongly influences reach-scale channel morphology, sediment storage, and bed surface texture.

3.2.1.3 Soils

Soils are highly variable throughout the assessment area. Soils within the assessment area are summarized in Appendix G. The productivity for tree growth on a given soil is expressed by a forestland site quality index determined from the height and age of a stand of a certain tree species (Soil Survey Division Staff 1993). Site Class 1 represents the most productive sites and Site Class 5 represents the least productive sites. Marginal timberlands consist of sites that have poor site quality and are not managed for timber production. MRC's lands in coastal Mendocino County are composed of 2% Site Class 2, 82% Site Class 3, and 15% Site Class 4, and 1% greater than Site Class 4.

3.2.2 Environmental effects and mitigation

Effects are considered significant if an alternative would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
    - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault (refer to Division of Mines and Geology Special Publication 42);
    - Strong seismic ground shaking;
    - Seismic-related ground failure, including liquefaction; or
    - Landslides.
- Be located on ground that is unstable or would become unstable as a result of the project, potentially resulting in mass wasting, surface erosion, and/or point-source erosion.
- Result in substantial sediment delivery to a watercourse.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.2.2.7.

3.2.2.1 Analysis approach and impact mechanisms

Effects of implementing each alternative are evaluated by the lead agencies using data on projected future conditions from the timber model (Appendix E), when applicable, and the likely response of geology, soils, and geomorphology to changes in environmental conditions projected to occur as a result of the management and conservation measures that would be implemented under each alternative. Effects were determined by comparing conditions that would occur under each alternative to the existing conditions, as described in Section 3.2.1. A comparative evaluation of effects among the alternatives is included at the end of this section. Analyses of climate change and cumulative effects are discussed separately in Section 3.8 (Climate and Climate Change) and Section 4 (Cumulative Effects), respectively.

Many of the watersheds within the assessment area are currently listed as sediment impaired, and the potential for the alternatives to increase sediment delivery to streams by accelerating mass wasting, surface erosion, and point-source erosion is the geological resource issue of greatest concern. This analysis therefore focused on the effects of each alternative on potential management-related erosion and sediment delivery from hillslope mass wasting, surface erosion from harvest areas, and road-related erosion in the primary assessment area. The potential for accelerated sediment delivery to adversely affect water quality and aquatic habitat is evaluated in Section 3.3 (Hydrology, Beneficial Uses of Water, and Water Quality) and Section 3.4 (Aquatic and Riparian Habitat and Species of Concern), respectively.

There would be little or no direct or indirect effects on several geological resource issues as a result of implementing the alternatives in the primary assessment area. These issues, which may be discussed but are not analyzed in detail in this EIS/PTEIR, include the following:

- The alternatives do not cover commercial extraction of rock. Extraction of in-stream gravel in the primary assessment area would be conducted in compliance with existing state and federal permitting and regulatory requirements. These activities would be the same under all the alternatives.
- The alternatives would not affect wildfire prevention and suppression activities that can increase erosion and sediment delivery following fire fighting. The effects of these activities on erosion and sediment delivery would be the same under each alternative.
- The likelihood or magnitude of earthquakes or volcanic eruptions would not be affected by implementation of the alternatives. The potential effects of seismic ground shaking on mass wasting in harvest areas is uncertain, difficult to quantify, and requires detailed analysis of site-specific hillslope geotechnical parameters that is beyond the scope of this EIS/PTEIR.

Analyses of the effects of the alternatives on geology, soils, and geomorphology rely primarily on detailed information provided to the lead agencies by MRC (e.g., geomorphic mapping, mapping of sediment sources, and timber modeling results). Detailed information provided by MRC is available only within the primary assessment area, which includes portions of 12 watershed anaysis units (Appendix F, Figure F-1).

Hillslope mass wasting

The assessment of the effects of the alternatives on sediment delivery from hillslope mass wasting considered shallow landslide and deep-seated landslide processes. Landforms in the assessment area that are most susceptible to mass wasting as a result of timber harvest activities include inner gorge slopes, steep and convergent topography, and headwall swales. These landforms are more susceptible to landsliding after timber harvest and road construction due the influence of steep hillslope gradients, shallow bedrock depths, and the potential for increased concentrated subsurface flow and reduced root cohesion. Failure of road fill slopes is typically a result of disruption of the natural drainage, increased water content, and changes in mass balance. Road cut failures, which occur primarily in response to the removal of downslope support, often deposit sediment on the inboard portion of the road, which may block inboard drainage and can lead to flow diversion, surface-erosion of the road prism, and mass wasting of the fill slope (Furniss et al. 1991). Road construction and timber harvest can influence localized movement within deep-seated landslides (particularly earthflows) by concentrating water onto the slide mass, locally increasing pore-water pressures, reducing root cohesion, and reducing load capacity by excavation or grading (Miller 1995, Swanson et al. 1987). The effects of forest management on movement of the larger deep-seated landslide mass are often difficult to discern, however, and remain inconclusive. Much of the sediment delivered to streams from deep-seated landslides may be accounted for by gully erosion and by shallow mass wasting at the toe.

Accelerated mass wasting may also occur following fire, due largely to alterations in soil and hydrologic characteristics (Booker et al. 1993, Spittler 1993). Under each of the alternatives, MRC's response to wildfire would follow its current (2011) Fire Suppression Plan or future updates to this plan (Section 3.10, Hazards and Hazardous Substances). Because the potential effects of wildfire on mass wasting, as well as surface erosion from harvest areas and roads, are varied and unpredictable due to the stochastic nature of wildfires, an analysis of the effects would be speculative in nature. Accordingly, effects of wildfire on mass wasting and surface erosion are not analyzed in this EIS/PTEIR. However, post-fire timber salvage may occur in burned areas to salvage trees that are likely to die or that are not viable for timber production. The effects of post-fire timber salvage on hillslope mass wasting may differ by alternative based on the conservation and management measures that would be implemented under each alternative. The EIS/PTEIR therefore includes a qualitative analysis of the effects of post-fire timber salvage on hillslope mass wasting and sediment delivery.

Anticipated sediment delivery from management-related shallow landslides (unrelated to roads) under each alternative was estimated by applying empirically derived sediment delivery rates to modeled timber harvest areas of a specific silviculture treatment type. Refer to Appendix E for detailed information on the timber model. Long-term average (approximately 50-year) sediment delivery rates were derived for five different Terrain Stability Units from shallow landslide inventories in watershed anaysis units (Table 3.2-3, Table 3.2-4). These rates are averaged over wet years when storm events triggered landslides and dry years that lacked substantial landsliding. Sediment delivery rates for each of the five Terrain Stability Units were modified to reflect the influence of forest management practices by assigning sediment delivery factors to different silvicultural treatments based on anticipated canopy and basal area retention (Table 3.2-14). The factors are derived from studies of the effects of canopy cover, basal area, and live root mass on root strength and slope instability (Sidle 1991, 1992, Robison et al. 1999, Krogstad 1995, Schmidt et al. 2001), and are consistent with previously accepted approaches to evaluating the effects of silvicultural treatments on landslide sediment delivery in similar forests of north coastal California that are managed for industrial timber production (Simpson Resource Company 2002). The highest factor value (1.0) indicates the lowest relative root strength and slope stability. Lower factors indicate comparatively greater root strength and slope stability. Of the factors used in this analysis (Table 3.2-14), a factor of 0.20 indicates the greatest root strength and slope stability. Estimated sediment delivery was calculated as the product of harvest area (by silvicultural treatment type), shallow landslide delivery rate (by Terrain Stability Unit), and sediment delivery factor. Total sediment delivery from shallow landslides (unrelated to roads) was summed by decade for each watershed anaysis unit and for the primary assessment area.

Table 3.2-14. Sediment delivery factors for silvicultural treatments.[a]

Variable	Low density overstory and understory	Low density overstory and 20–30% understory	Medium density overstory and understory	Medium density overstory/Medium to dense understory	Dense overstory/Medium to dense understory
Canopy cover (%)	0–20	20–30	30–40	40–60	> 60
Conifer basal area (ft^2)	0–30	20–30	50–60	75–90	> 200
Factor	1.0	0.90	0.65	0.40	0.20
Silvicultural treatment	Clearcut; Rehabilitation	Seed tree removal; Variable retention	Transition	Group selection Selection (1, 2); Small class II selection; Coastal zone selection; Commercial thin	High retention selection; Medium retention selection; Floodplain selection; Wildlife selection; Low site selection; Old growth selection

[a] Factors modified from Simpson Resource Company (2002).

Anticipated sediment delivery from management-related shallow landslides (unrelated to roads) under existing conditions (1998–2008) was estimated using similar methods, but because not all harvest areas from 1998 to 2008 can be associated with a specific Terrain Stability Unit, the long-term average rate of 269 tons mi^{-2} yr^{-1} for Terrain Stability Units 1–5 was used (Table 3.2-4).

Sediment delivery rates from shallow landsliding vary based on the occurrence of stochastic triggering mechanisms (e.g., intense rainfall events, earthquakes, and forest fires). Characterization of short term sediment production and delivery rates resulting from these triggers was beyond the resolution of the available data and scope of the EIS/PTEIR analysis, and therefore, average annual landslide rates for a given terrain type and silvicultural treatment were considered constant over the life of the permit and among alternatives. The resulting estimates of sediment delivery are most useful in comparing the relative sediment delivery under existing conditions and anticipated under the alternatives rather than the absolute sediment delivery. Where possible, the EIS/PTEIR analysis evaluates the likely effectiveness of conservation measures aimed at reducing the effects of management activities on sediment delivery from shallow landslides. Analyses in this EIS/PTEIR related to hillslope mass wasting and other geologic resources were conducted by and/or overseen and approved by a California Professional Geologist.

Conservation measures included in the proposed HCP/NCCP address the potential for accelerating erosion from deep-seated landslides (earthflows and rockslides) depending on the activity level of component morphological features (i.e., toe, internal morphology, lateral flanks, or main scarp). The EIS/PTEIR effects analysis evaluates the type and spatial extent of silvicultural treatments on deep-seated landslides classified with toe morphology of 1 or 2 and internal morphology of 1 or 2.[28] These classes include features that may be interpreted as potentially active or unstable as defined by common practice (Cruden and Varnes 1996) and by conservation measures included in the alternatives. Roads and timber harvest activities on these features have a greater potential to affect erosion and sediment delivery. Existing and background sediment delivery from mapped deep-seated landslides is unknown, and the potential effects of the alternatives on sediment delivery from these features were not quantified in the EIS/PTEIR analysis.

Surface erosion from harvest areas (unrelated to roads and skid trails)

Forest management practices that reduce forest cover and increase soil compaction and overland flow can increase sediment delivery from surface erosion, rilling, and gullying. In addition, fires tend to increase hillside erosion and sediment delivery to streams because they strip the ground of protective cover, exposing the soil to more erosional forces and increasing the potential for overland flow and surface erosion. Fire may also alter the hydrologic response of watersheds due to its effects on interception, infiltration, soil moisture storage, overland flow, and erosion (Wondzell and King 2003).

Post-fire timber salvage may occur in burned areas to salvage trees that are likely to die or that are not viable for timber production. The effects of post-fire timber salvage on surface erosion may differ by alternative based on the conservation and management measures that would be implemented under each alternative. The EIS/PTEIR therefore includes a qualitative analysis of the effects of post-fire timber salvage on erosion and sediment delivery.

Sediment budgets prepared for industrial timberlands in the northern California Coast Range, where similar topography and mass wasting processes occur, report surface erosion from timber harvest areas (unrelated to roads and skid trails) as 4–5 % of the total budget (USFWS and NMFS 2006). Although surface erosion from harvest areas is typically a small component of the sediment budget compared with landslides and point source erosion from roads, gully erosion in response to reduced vegetation cover and increased surface runoff in harvest areas can be a larger proportion of total sediment delivery during years with low landslide sediment input (Lisle et al. 2008, Lisle et al. 2009). These effects are most apparent in small headwater basins during the first several years following clearcut harvest (Reid et al. 2010).

Estimates of sediment delivery from gully erosion in the primary assessment area under past and existing conditions are not available. Quantitative predictions of anticipated sediment delivery from gully erosion resulting from future timber harvest under the alternatives were not possible at the time this EIS/PTEIR was prepared due to a lack of information describing hillslope and channel characteristics in small headwater valleys most susceptible to management-related gully erosion. The effects of the alternatives on surface erosion from harvest areas were qualitatively evaluated by assessing the total area of harvest with silvicultural treatments that result in 20% or less basal area retention. These silviculural treatments include variable retention (20% basal area retention), seed tree removal (15% basal area retention), rehabilitation (5% basal area retention), and clearcut (0% basal area retention) (Appendix E). These silvicultural treatments reduce canopy and ground cover more than other treatments and therefore have a higher potential to increase overland flow and surface erosion from sheetwash, rilling, and gullying.

[28] Toe morphologies of 1 or 2 are characterized by extensively unvegetated to few, sparsely vegetated debris slide scars on one or both toe slopes, coarser sediment in the channel toe region than in adjacent channel reaches, and channel deflected by the toe slope. Internal morphologies of 1 or 2 are characterized by well-defined or identifiable scarps and benches, hummocky topography with ground cracks, and poorly established drainage.

Road-related erosion

As discussed previously, the majority of sediment delivery from management-related surface erosion originates from roads and skid trails. Analysis of the effects of the alternatives on management-related sediment delivery from roads was divided into (1) road-related landslides, (2) surface erosion from roads and skid trails, and (3) point-source erosion associated with roads. The potential effects of the alternatives on road-related landslides were assessed by applying empirically derived sediment delivery rates to the anticipated length of road under each alternative. Sediment delivery rates from road-related landslides were estimated for Terrain Stability Units based on shallow landslide inventories conducted within watershed anaysis units in the primary assessment area (Table 3.2-5) (MRC 2000c, 2003a–e, 2004a–d, 2005). Insufficient information was available to estimate the anticipated length, density, and sediment delivery from skid trails within specific terrain stability units or watershed analysis units under future conditions. Conservation measures that address skid trail erosion and their potential effects are discussed under each alternative, where applicable, but estimated sediment delivery from skid trails under future conditions is not explicitly included in the effects analysis. Road construction and use may occur during post-fire timber salvage. The effects of post-fire timber salvage on road-related erosion may differ by alternative based on the conservation and management measures that would be implemented under each alternative. The EIS/PTEIR therefore includes a qualitative analysis of the effects of road-related erosion and sediment delivery from post-fire timber salvage.

Sediment delivery from road surface erosion was estimated by multiplying the long-term, average annual surface erosion rate in watershed anaysis units (Table 3.2-7) by the anticipated length of hydrologically connected road for each alternative. The anticipated length of hydrologically connected road under each alternative was estimated based on the extent to which proposed road management measures would change the existing length of road delivering water and sediment to a watercourse. Decommissioning and construction of new roads near stream channels are the primary measures that would change the length of hydrologically connected roads under each alternative. Road decommissioning and construction would vary in response to the amount of harvest that would occur and the type of yarding (e.g., tractor-truck vs. helicopter yarding) that would be used. Although inventories in some watershed anaysis units identified the existing length of road delivering to a watercourse, the length of road delivering to a watercourse was not identified in the field for all watersheds or for all roads within a watershed. Where road inventories lacked information on the road length delivering to a watercourse, watershed analyses assumed that road segments within 200 ft (61 m) of a stream channel were hydrologically connected. This assumption was consistent with the Standard Methodology for Conducting Watershed Analyses (Version 4.0 Washington Forest Practices Board). This effects analysis assumed that all road segments within 200 ft (61 m) of a stream channel (Table 3.2-8) were hydrologically connected and that all sediment produced by erosion of the road surface within the segment is delivered to the channel. In some cases, sediment produced from roads within 200 ft (61 m) may be deposited on hillslopes and floodplain surfaces before reaching the channel. It was assumed that roads located greater than 200 ft (61 m) from a channel do not deliver substantial quantities of sediment produced by erosion of the road surface. Where road surface runoff leads to gully erosion, however, roads located greater than 200 ft (61 m) from a watercourse can deliver substantial quantities of sediment to stream channels.

Controllable erosion sites (> 40 yd^3 [31 m^3]) associated with roads were characterized through detailed road inventories and classified by treatment immediacy (high, moderate, low) (Table 3.2-9) (MRC 2000c, 2003a–e, 2004a–d, 2005). The effects analysis in this EIS/PTEIR used targets established by MRC and reviewed by the agencies during HCP development for reducing the volume of controllable sediment sources specified under the proposed HCP/NCCP and reasonable assumptions about treatment of controllable sediment sources under the other alternatives to qualitatively compare the potential effects of road-related point-sources under each alternative. These assumptions are discussed, where applicable, in the effects analyses for each alternative.

3.2.2.2 No Action alternative

Hillslope mass wasting

Under the No Action alternative, MRC would avoid and minimize sediment delivery from shallow landsliding related to timber harvest by implementing measures included in its Management Plan (MRC 2000a) and the CFPRs. These measures would require identification of unstable slopes, restricted harvest and heavy equipment operation on unstable slopes (e.g., inner gorge of Class I streams) and in aquatic and riparian habitat protection zones, and review by a California Professional Geologist when operations are proposed on potentially unstable slopes (e.g., slopes > 65% and slopes > 50% where the erosion hazard rating is high). Post-fire timber salvage would be conducted in accordance with the CFPRs and the measures included in MRC's 2000 Management Plan (MRC 2000a). Because management measures for post-fire timber salvage would not differ substantially from current practices, there would be no effect on hillslope mass wasting compared with existing conditions.

The No Action alternative would deliver an estimated 31,000 tons of sediment from management-related shallow landsliding (unrelated to roads) in the primary assessment area during the first decade of implementation. Estimated delivery would increase to about 100,000 tons during decade 8 (Figure 3.2-1). Estimated sediment delivery under the no action alternative would exceed sediment delivery estimated under existing conditions after decade 5. Over eight decades of implementation, 31% of the total estimated sediment delivery would originate from Terrain Stability Unit 1 (inner gorge and steep slopes along low gradient watercourses), 9% from Terrain Stability Unit 2 (inner gorge and steep slopes adjacent to high-gradient watercourses), 34% from Terrain Stability Unit 3 (dissected and convergent topography), 25% from Terrain Stability Unit 4 (non-dissected topography), and < 0.05% from Terrain Stability Unit 5 (Figure 3.2-2). The estimated long-term increase in sediment delivery relative to existing conditions could increase sediment loads and turbidity during storm events and degrade aquatic habitat by filling pools, simplifying channel morphology, and reducing the quality of spawning gravel substrates by fining bed surface texture and reducing subsurface permeability. The environmental effects of sediment delivery on aquatic and riparian habitats and species of concern are discussed in more detail in Section 3.4 (Aquatic and Riparian Habitats and Species of Concern).

Impact 3.2-1: Increased sediment delivery to stream channels from management-related shallow landsliding. The No Action alternative would have **potentially significant effects** after decade 5 due to increased incidence of management-related shallow landsliding (unrelated to roads) and associated sediment delivery to stream channels relative to existing conditions. Landforms in the assessment area that are most susceptible to mass wasting as a result of timber harvest and post-fire salvage activities include inner gorge slopes (Terrain Stability Units 1 and 2), steep and convergent topography (Terrain Stability Unit 3), and headwall swales. The higher incidence of landsliding under the No Action alternative would result primarily from an increased rate of harvest (predominantly by selection and seed tree removal methods) in Terrain Stability Unit 3 (dissected and convergent topography) beginning in decade 4.

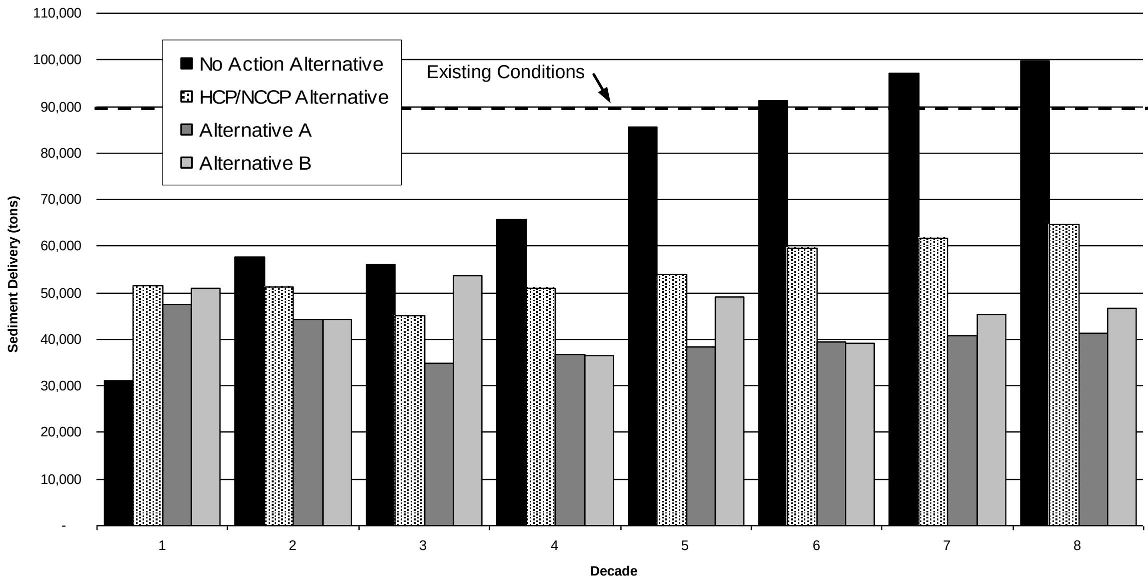


Figure 3.2-1. Estimated sediment delivery from management-related shallow landsliding (unrelated to roads) in the primary assessment area under the alternatives. (Alternative C is not shown on the figure because the effects of its implementation would be identical to the Proposed Action [HCP/NCCP Alternative] during the first four decades.)

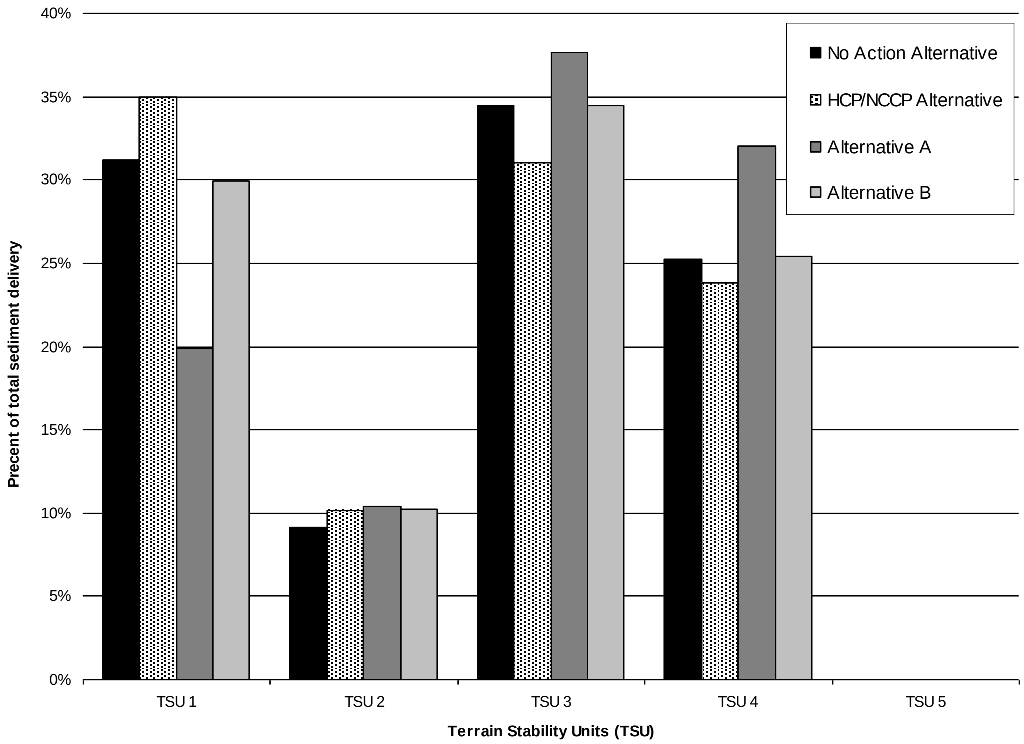


Figure 3.2-2. Percentage of total estimated sediment delivery from management-related shallow landsliding (unrelated to roads) in Terrain Stability Units 1–5 under the alternatives during eight decades of implementation. (Alternative C is not shown on the figure because the effects of its implementation would be identical to the Proposed Action [HCP/NCCP Alternative] during the first four decades.)

During the eight decades of implementing the No Action alternative, approximately 4,708 ac (1,905 ha) would be harvested on deep-seated landslides mapped as rockslides with toe and/or body morphology classes of 1 or 2 (Figure 3.2-3). This cumulative area estimate includes multiple cycles of harvest in the same landslide area. A range of silvicultural treatments would occur within these areas under the No Action alternative, including selection, rehabilitation, transition, and variable retention. Approximately 229 ac (93 ha) would be harvested on deep-seated landslides during the first decade of implementation, increasing to about 785 ac (318 ha) by decade 8 (Figure 3.2-3). An increase in harvest rates on deep-seated landslides may result in an increase in sediment production and delivery by gullying and reactivation of debris slides and rotational landslides during large storm events (De La Fuente et al. 2002). Harvest would not occur on earthflows having toe and/or internal morphology of 1 or 2, but approximately 3,200 ac (1,295 ha) would be harvested on earthflows with toe and/or internal morphology of 3, 4, or 5 (Figure 3.2-4).

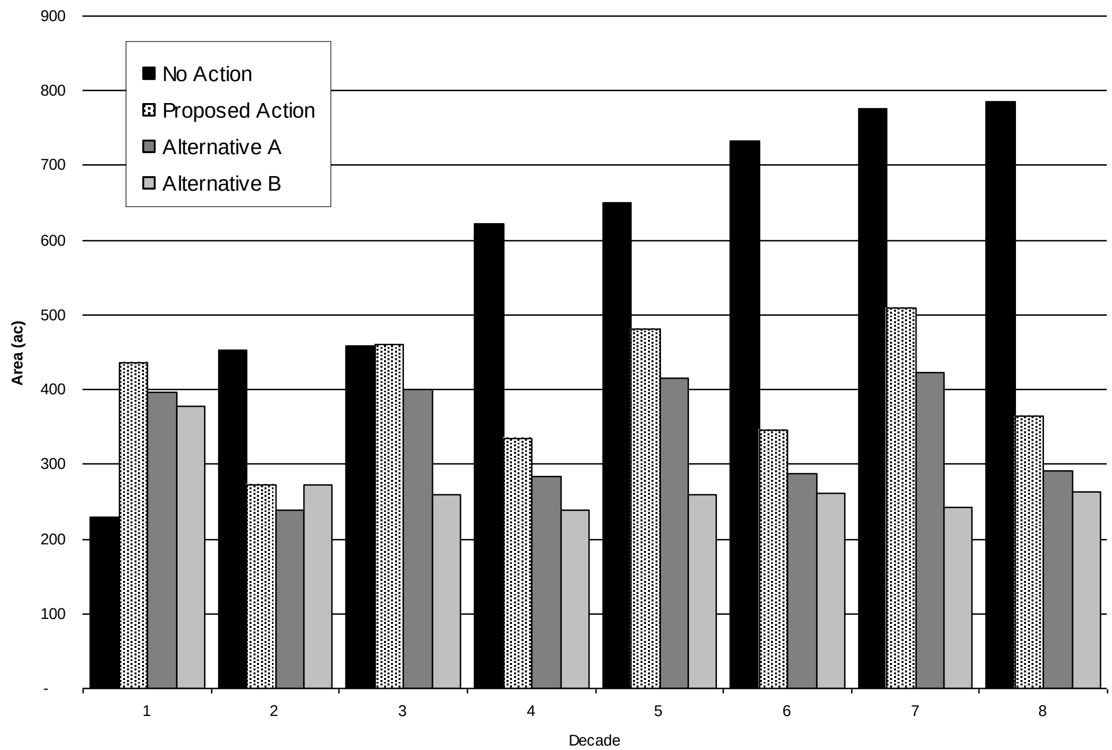


Figure 3.2-3. Predicted area of harvest on deep-seated landslides (harvest occurring on rockslides only) mapped as having toe activity or internal body classes 1–2 under the alternatives. (Alternative C is not shown on the figure because the effects of its implementation would be identical to the Proposed Action [HCP/NCCP Alternative] during the first four decades.)

Impact 3.2-2: Increased sediment delivery to stream channels from deep-seated landsliding. Based on the increase in area that would be harvested on deep-seated landslides mapped as rockslides with toe and/or body morphology classes of 1 or 2 and the associated potential increase in sediment delivery from those activities compared with existing conditions, the No Action alternative would have **potentially significant effects** by increasing sediment delivery to stream channels after decade 3. Timber harvest and post-fire salvage activities that increase concentrated subsurface flow and reduce tree root-strength can reduce resisting forces within portions of deep-seated landslides. Movement of all or portions of the slide mass can deliver sediment to stream channels, typically by gully erosion and by shallow mass wasting at the toe.

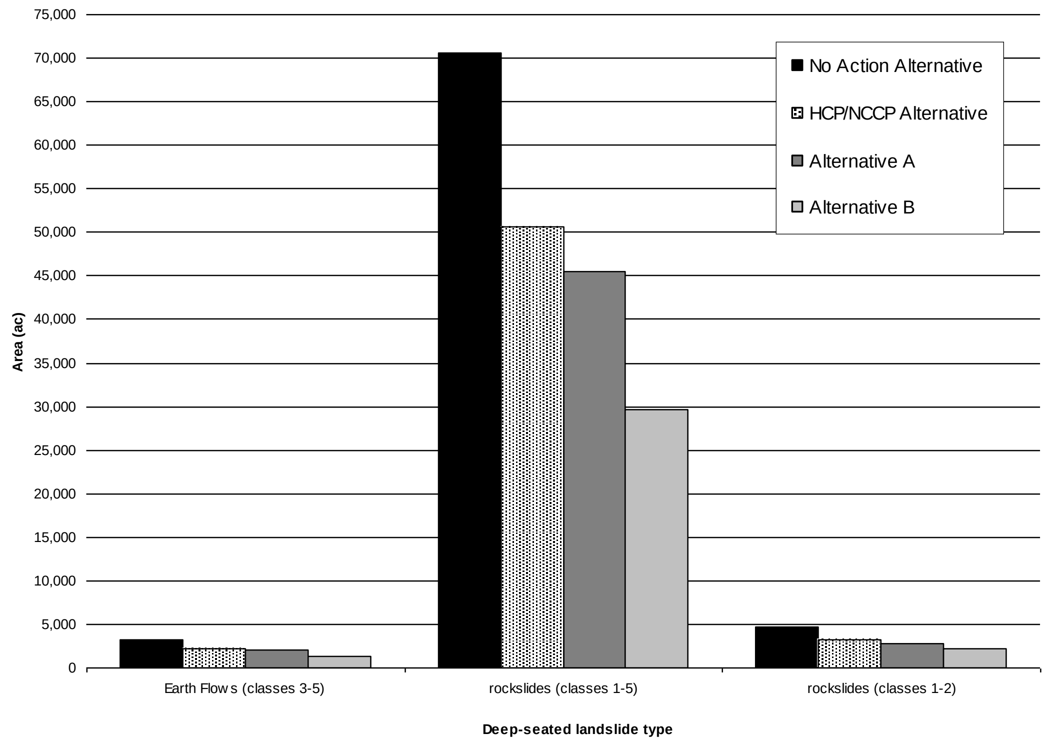


Figure 3.2-4. Cumulative area of harvest on deep-seated landslides (estimates include multiple cycles of harvest on the same landslide area) under the alternatives during eight decades of implementation. (Alternative C is not shown on the figure because the effects of its implementation would be identical to the Proposed Action [HCP/NCCP Alternative] during the first four decades.)

Surface erosion from harvest areas (unrelated to roads and skid trails)

Management-related surface erosion in harvest areas (unrelated to roads and skid trails) under the No Action alternative is not expected to be substantially different than under existing conditions. Timber harvest under the No Action alternative would result in about 12,700 ac (5,140 ha) with 20% or less basal area retention during the first decade of implementation, increasing to 18,200 ac (7,365 ha) during the second decade (Figure 3.2-5). These silvicultural treatments reduce canopy and ground cover more than other treatments and therefore have a higher potential to increase overland flow and surface erosion from sheetwash, rilling, and gullying. This area would substantially diminish in subsequent decades as silviculture shifts to treatments with more basal area retention. Overall, there would be **no effects** on management-related surface erosion from harvest areas (unrelated to roads and skid trails) under the No Action alternative.

Under the No Action alternative, post-fire timber salvage would be conducted in accordance with the CFPRs and the measures included in MRC's 2000 Management Plan (MRC 2000a). Per the 2012 CFPRs, timber salvage would continue to be prohibited in Watercourse and Lake Protection Zones in order to minimize sediment delivery to streams. Because management measures for post-fire timber salvage would not differ substantially from current practices, there would be no effect on surface erosion and sediment delivery compared with existing conditions.

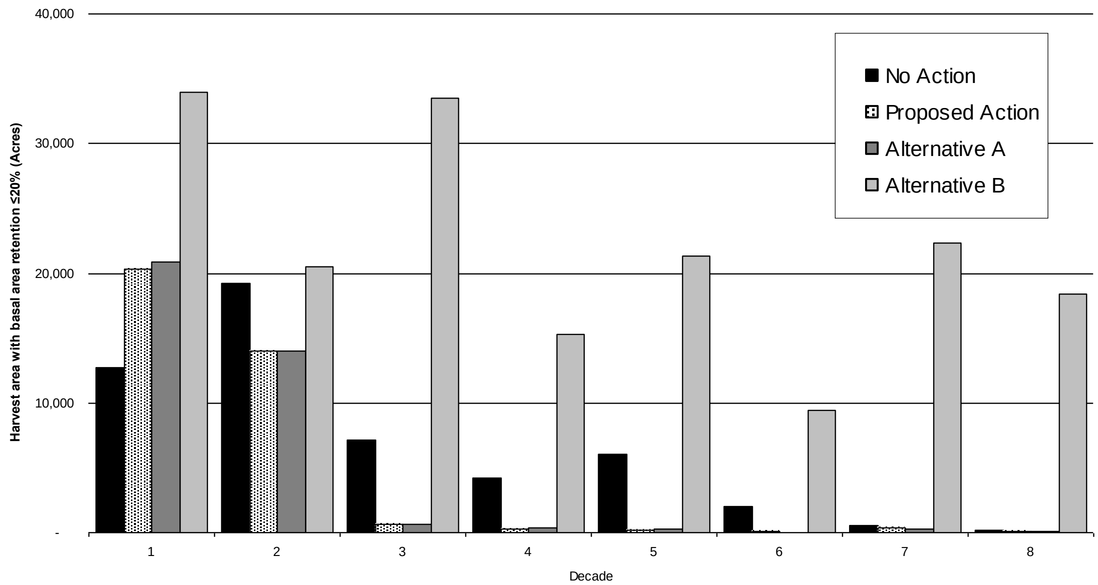


Figure 3.2-5. Harvest area with basal area retention of 20% or less under the alternatives. (Alternative C is not shown on the figure because the effects of its implementation would be identical to the Proposed Action [HCP/NCCP Alternative] during the first four decades.)

Road-related erosion

Commitments for treating road-related point-source erosion sites have not been established under the No Action alternative and would likely occur on a project (e.g., THP) basis at a slower and more variable rate than has occurred over the last decade. The No Action alternative would implement an uneven-aged management strategy that employs predominantly cable and helicopter yarding practices. Consequently, the length of the road network under the No Action alternative is not expected to change from existing conditions, and the conservation measures applied under the No Action alternative would be similar to existing conservation measures. Increased harvest levels after decade 4 would lead to increased road use and potentially greater surface erosion.

Under the No Action alternative, post-fire timber salvage would be conducted in accordance with the CFPRs and the measures included in MRC's 2000 Management Plan (MRC 2000a). Because road management measures associated with post-fire timber salvage would not differ substantially from current practices, there would be no effect on road-related erosion and sediment delivery compared with existing conditions.

No comprehensive road inventory or maintenance plan would be implemented under the No Action alternative. The construction, maintenance, and inventory of roads and landings would occur according to the 2012 CFPRs (14 CCR §923) and MRC's Management Plan (MRC 2000a). The condition of roads, landings, bridges, watercourse crossings, drainage structures, and erosion control features would be monitored annually and periodically during the storm season. CFPR (14 CCR §923) measures for road construction and maintenance include:

- Locating logging roads and landings to avoid unstable areas and Watercourse and Lake Protection Zones.

- Locating new roads to avoid routes near the bottoms of steep and narrow canyons, wetlands, unstable areas, and watercourses.
- Locating new roads on natural benches, flatter slopes, and areas of stable soils to minimize sediment delivery to streams.
- Constructing new roads and landings with an adequate number of drainage facilities and structures to minimize erosion on roadbeds, landing surfaces, sidecast, and fills.
- Prohibiting road construction under saturated soil conditions.
- Minimizing the number of watercourse crossings, maintaining watercourse crossings, and prohibiting construction of roads or landings in a watercourse or Watercourse and Lake Protection Zone (unless for approved crossings).
- Maintaining facilities and drainage structures open for unrestricted passage of water, maintaining permanent stream crossings to prevent stream diversion, and sizing watercourse crossings to pass the 100-year flood.
- Completion of all drainage improvements by 15 October.
- Treating road surfaces in logging areas to reduce erosion by shaping, rocking, oiling, asphalting, or other methods.
- Prohibiting use of heavy equipment for maintenance of roads or landings in a Watercourse and Lake Protection Zone during wet weather.
- Decommissioning temporary roads and associated landings after use.
- Treating Watercourse and Lake Protection Zone roads with a high potential for erosion and sediment delivery by mulching, covering with slash, and/or seeding.
- Maintaining mainline roads to ensure fire access.

Additional CFPR (14 CCR §916.9 and §923.9) measures would apply in watersheds with listed anadromous salmonids.

MRC's Management Plan (MRC 2000a) and the CFPRs (14 CCR §914.7) restrict winter operations, defined as 15 November to 15 April. MRC's Management Plan (MRC 2000a) would require trucks to retire for the day at first measurable rain, and winter loading or hauling would be prohibited during rain if road surfaces pond water or if water is flowing in roadside ditches. CFPR (14 CCR §914.7) measures prohibit mechanical site preparation or harvesting (except cable and helicopter yarding) without a winter-period operating plan or specific THP measures. Winter loading and hauling is limited to roads with stable operating surfaces. In watersheds with listed anadromous salmonids, the necessity for a winter period operating plan is expanded to cover 15 October to 1 May.

Impact 3.2-3: Increased sediment delivery to stream channels from road-related erosion. An increase in road use associated with higher harvest levels after decade 4 could increase road-related erosion and sediment delivery relative to existing conditions. Because the No Action alternative would not include a comprehensive road management approach, this would result in **potentially significant effects** associated with road-related sediment delivery. A comprehensive road management approach ensures that sediment delivery from the existing and future road network is minimized by (1) defining when and how road-related point sources of erosion and sediment delivery would be treated; (2) prioritizing removal of road segments that pose the greatest erosion hazards and risks to aquatic resources; (3) specifying best management practices for inventory, maintenance and upgrade of existing roads; (4) specifying when, where and how new roads would be constructed; and (5) regulating road use.

3.2.2.3 Proposed Action

The Proposed Action would likely reduce sediment delivery to watercourses within the primary assessment area below that anticipated under existing conditions and the No Action alternative. Reduction in sediment delivery would be achieved by implementing (1) a comprehensive road management approach (Appendix E of the HCP/NCCP, MRC 2012) that includes road inventory protocols and associated standards for design, construction, decommissioning, use, and maintenance of roads, landings, and skid trails; (2) a program for treating existing and future controllable point-sources of erosion; and (3) a mass wasting conservation strategy that includes standards for canopy retention and measures to identify and avoid unstable and potentially unstable slopes, minimize ground disturbance related to harvest activities, and avoid or minimize effects of management activities on erosion in Aquatic Management Zones.

The fundamental differences in conservation measures aimed at controlling and reducing sediment delivery to stream channels under the Proposed Action compared with those under existing conditions and the No Action alternative include the following:

- Under the Proposed Action, conservation measures would be implemented on both an individual project basis (e.g., PTHP) and an ownership-wide basis throughout the primary assessment area.
- Measures in the Proposed Action are designed to address existing erosion and minimize activities that may cause erosion rather than simply identify and avoid unstable areas and active erosion sites.
- Road improvement work would address point-sources of erosion with high and moderate risk of sediment delivery within the first 20 years of implementation in priority coho salmon watersheds and within the first 30 years in non-coho salmon watersheds. 70% of the high risk sites would be treated within the first 10 years.
- Restrictions, in addition to those imposed by the No Action alternative, would be placed on equipment use during wet weather and the winter season.

Hillslope mass wasting

The Proposed Action includes measures to reduce sediment delivery from mass wasting (unrelated to roads) by at least 10% of the existing rate by decade 4 and at least 20% by decade 8. These targets would be achieved through implementation of slope stability conservation measures that are part of the No Action alternative (i.e., MRC's 2000 Management Plan and the 2012 CFPRs), as well as additional measures developed for individual Terrain Stability Units (Section 2, Alternatives). Under the Proposed Action, post-fire timber salvage would follow the prescriptions in MRC's proposed HCP/NCCP, which include site-specific measures to reduce erosion and sediment delivery to streams from roads, stream crossings, and potentially unstable slopes. The HCP/NCCP measures would provide additional erosion control in burned areas and would reduce the potential for sediment delivery to streams and other aquatic habitats compared with existing conditions and the No Action alternative.

Total estimated sediment delivery from management-related shallow landsliding (unrelated to roads) in the primary assessment area under the Proposed Action is shown in Figure 3.2-1. The Proposed Action would initially deliver slightly more sediment during the first decade compared with existing conditions and the No Action alternative due to the higher rate and proportion of variable retention, rehabilitation, and transition silviculture. Estimated sediment delivery under the Proposed Action would drop below that estimated under existing conditions and the No Action alternative by decade 2 as practices shift to predominantly selection silviculture. Estimated sediment delivery would remain about 65 to 80% of the No Action alternative through decade 8. Management-related shallow landsliding (unrelated to roads) would deliver an estimated 438,000 tons of sediment through decade 8, 75% of that estimated under the No Action alternative. About 35% of the total sediment delivery from management-related shallow landsliding (unrelated to roads) would originate from Terrain Stability Unit 1 (inner gorge and steep slopes along low gradient watercourses), 10% from Terrain Stability Unit 2 (inner gorge and steep slopes adjacent to high-gradient watercourses), 31% from Terrain Stability Unit 3 (dissected and convergent topography), 24% from Terrain Stability Unit 4 (non-dissected topography), and < 0.05% from Terrain Stability Unit 5 (Figure 3.2-2). Based on these results, the potential for sediment delivery from hillslope mass wasting to watercourses is greatest in areas with steep streamside slopes (Terrain Stability Units 1 and 2) and in areas with dissected and convergent topography (Terrain Stability Unit 3). The analysis indicated that objectives set forth in the HCP/NCCP for reduction of sediment delivery from mass wasting unrelated to roads would be met in each watershed anaysis unit. The Proposed Action would have the **beneficial effects** of reducing the number of management-related shallow landslides (unrelated to roads) and associated sediment delivery relative to existing conditions in all eight decades of implementation. Fewer management-related shallow landslides would reduce sediment delivery to stream channels and improve aquatic habitat (see Section 3.4, Aquatic and Riparian Habitats and Species of Concern, for more detail). Reduction in management-related shallow landsliding would not substantially affect chronic fine sediment delivery associated with surface erosion processes (sheetwash, rilling, and gullying).

During the eight decades of implementing the Proposed Action, approximately 3,204 ac (1,297 ha) would be harvested on deep-seated landslides mapped as rockslides with toe and/or body morphology of classes 1 or 2 (Figure 3.2-3). This cumulative area estimate includes multiple cycles of harvest in the same landslide area. Harvest on deep-seated landslides under the Proposed Action would be cyclical, alternating from a high in one decade to a low in the next (Figure 3.2-3). The area harvested on deep-seated landslides under the Proposed Action would be substantially less than under the No Action alternative after decade 3 but more than under Alternatives A and B (Figure 3.2-3). Timber harvest modeled under the Proposed Action does not occur on earthflows having toe and/or internal morphology of 1 or 2. Over eight decades of implementation, approximately 2,221 ac (899 ha) would be harvested on earthflows with toe and/or internal morphology of 3 or 4 (Figure 3.2-4). The area harvested on deep-seated landslides under the Proposed Action would be less than under existing conditions, but the types of silvicultural treatments would not be substantially different. The Proposed Action would likely have a **beneficial effect** of reducing sediment delivery from deep-seated landsliding relative to existing conditions. The Proposed Action may have an additional **beneficial effect** of reducing sediment production from sheetwash, rilling, and gullying where these processes are active and influenced by management within deep-seated landslide areas.

Surface erosion from harvest areas (unrelated to roads and skid trails)

The Proposed Action would result in greater canopy and basal area retention (Figure 3.2-5), less ground disturbance from yarding practices, and less hydrologic change (e.g., increased runoff) than under existing conditions. These practices, in combination with specific conservation measures that minimize and/or avoid disruption of the ground and associated drainage by equipment operation, would have the **beneficial effects** of reducing soil compaction and fine sediment delivery from surface erosion (e.g., sheetwash, rilling, and gullying) in harvest areas relative to existing conditions. Surface erosion in harvest areas (unrelated to roads and skid trails), however, contributes a relatively small proportion of the overall sediment supply under existing conditions.

Under the Proposed Action, post-fire timber salvage would follow the prescriptions in MRC's proposed HCP/NCCP, which include site-specific measures to reduce erosion and sediment delivery to streams from roads, stream crossings, and general forested areas. Timber salvage would be prohibited in Aquatic Management Zones unless approved by the wildlife agencies. The HCP/NCCP measures would provide additional erosion control in burned areas and would reduce the potential for sediment delivery to streams and other aquatic habitats compared with existing conditions and the No Action alternative.

Road-related erosion

The Proposed Action includes a target of reducing sediment delivery from mass wasting related to roads by at least 30% of the rate (tons per mi^2 per year) determined in the initial watershed analyses or established in Total Maximum Daily Load allocation reductions by the end of decade 4 and at least 60% by the end of decade 8. A 30% reduction in the average rate of sediment delivery from mass wasting related to roads (as reported in watershed analyses) would be achieved through implementation of a comprehensive road management approach (Appendix E of the HCP/NCCP, MRC 2012) that includes conservation measures related to road and landing construction, reconstruction, and maintenance, as well as priorities for treating existing controllable point-sources of erosion. Key conservation measures in the plan include:

- Re-inventory of all roads with permanent structures at 10-year intervals, and annual inspection of permanent roads.
- Improving all roads to the standards specified in MRC's road management approach (Appendix E of the HCP/NCCP, MRC 2012) within 40 years.
  - "Coho Core Watersheds" (over 30% of the primary assessment area)—repairing all high and moderate erosion sites within 20 years, and all erosion sites within 40 years.
  - Non-"Coho Core Watersheds"—repairing all high and moderate erosion sites within 30 years, and all erosion sites within 40 years.
- Conducting five inspections of seasonal and temporary roads during each five-year period and more frequent inspections in response to large storm events (> 20-year return period).
- Surveying roads on new lands and completing road upgrades within five years of acquisition.
- Wet weather restrictions in addition to the CFPRs (14 CCR §914.7 and §916.9(l)).
- Baseline inventory of skid trails (aerial photographic analysis combined with limited field observation) within the first five years of HCP/NCCP implementation to identify and prioritize controllable erosion sites and schedule treatment.
- Terrain Stability Unit-related conservation measures.

Potential sediment delivery from road-related mass wasting under the Proposed Action was estimated throughout the primary assessment area by multiplying the information available on the anticipated length of road after decommissioning and new road construction (Table 3.2-15) by the average sediment delivery rate from road-related landslides in watershed anaysis units during the period 1988–2004 (35 tons mi^{-1} yr^{-1}). The anticipated change in the length of the road network during the first decade of HCP/NCCP implementation is shown in Table 3.2-15. MRC does not specify, however, where or at what rate those changes would be implemented. MRC anticipates completing most of the changes to its road network (including decommissioning and new road construction) during the first 20–40 years and does not specify in the HCP/NCCP how the road network would change after the first decade. The effects of any changes that may occur to the road network in subsequent decades were not evaluated.

Sediment delivery from road-related mass wasting in the primary assessment area is estimated to be about 754,400 tons during the first decade of implementing the Proposed Action, less than estimated under existing conditions (Table 3.2-16). This estimate does not explicitly account for many of the proposed conservation measures intended to reduce sediment delivery from the road network, such as a shift to a road system in which more than half the roads are temporary. Under the Proposed Action, MRC would manage temporary roads in accordance with the standards included in the 2012 CFPRs (14 CCR §923), and would apply additional measures designed to further control surface runoff and sediment delivery, including removing all watercourse crossings with culverts unless the watercourse crossing is left maintenance-free or there is no controllable erosion, excavating channels (similar to the natural watercourse) through watercourse crossing fills, stabilizing excavated material and any cut banks, and installing waterbreaks or rolling dips to limit accumulated runoff from the road prism. These conservation measures, if implemented throughout potentially unstable areas in the primary assessment area, would have the **beneficial effects** of reducing the number of road-related landslides and associated sediment delivery relative to existing conditions. Fewer road-related shallow landslides would reduce sediment delivery to stream channels. Reduction in management-related shallow landsliding would not substantially affect chronic fine sediment delivery associated with surface erosion processes (sheetwash, rilling, and gullying).

Table 3.2-15. Estimated extent of riparian roads after the first decade of implementing the Proposed Action.

Watershed analysis unit[a]	Decommissioned roads (mi)	New road construction (mi)	New construction in Class I or large Class II Aquatic Management Zones (mi)	Total road length ≤ 200 ft of a channel (mi)
Albion River	0	0	0	58.4
Big River	8	17	0.5	154.9
Cottaneva Creek[b]	0	0	0	40.1
Garcia River[c]	0	2	0	43.2
Greenwood Creek[d]	0	0.4	0	112.8
Hollow Tree Creek	7.3	7.3	0	50.7
Navarro River	23	20	1	235.4
Noyo River	5	15	0.5	92.6
Upper Russian River	2	3.5	1	18.5

[a] Data were not available for Alder Creek/Schooner Gulch, Elk Creek, and Rockport Coastal Streams watershed anaysis units.
[b] Includes Howard, Hardy, and Juan creeks.
[c] Includes portions of the Gualala River basin.
[d] Includes Alder, Elk, and Mallow Pass creeks.
Source: MRC HCP/NCCP (2012).

Table 3.2-16. Estimated sediment delivery from road-related mass wasting in the primary assessment area watershed anaysis units during first decade of the No Action alternative and Proposed Action.[a]

Watershed analysis unit[b]	Estimated sediment delivery (tons per decade)		
	Long-term average[c]	No Action[d]	Proposed Action[d]
Albion River	86,500	59,000	59,000
Big River	176,700	120,700	118,100
Cottaneva Creek	55,800	38,100	38,100
Garcia River[e]	60,500	41,300	41,300
Greenwood Creek	61,500	72,500	72,500
Hollow Tree Creek	93,600	63,900	61,400
Navarro River	328,700	224,500	216,800
Noyo River	120,000	82,900	80,400
Rockport Small Coastal Streams	6,100	37,100	37,100
Upper Russian River	9,400	6,400	6,000
Other/Unknown	200	23,700	23,700
Total	**999,000**	**770,100**	**754,400**
% of long-term average		**77%**	**75%**

[a] Insufficient information exists to estimate sediment delivery for Alternatives A and B by Watershed Analysis Unit. For these alternatives, sediment delivery in the first decade is estimated at the scale of the primary assessment area as described above. The effects of implementing Alternative C during the first decade would be identical to those during the first decade of the Proposed Action.

[b] Data were not available for the Alder Creek/Schooner Gulch and Elk Creek watershed anaysis units.

[c] Long-term landslide sediment delivery was extrapolated using long-term average rates calculated for Terrain Stability Units 1–5 using data reported in watershed analyses in the primary assessment area (MRC 2000c, 2003a–e, 2004a–d, 2005).

[d] Landslide sediment delivery under the altneratives was estimated using average post-CFPR rates (typically from the period 1989–2004) applied to watershed anaysis units. Post-CFPR rates were derived from landslide data in MRC's watershed anaysis units. Estimated sediment delivery during the first decade of implementation was determined by multiplying the average landslide rate by the total length of the anticipated road network after decommissioning and new road construction.

[e] Includes portions of the Gualala River basin.

The Proposed Action includes reducing 100% of controllable erosion from point sources identified during the initial survey within 40 years. Reduction in sediment delivery from road-related point-source erosion would be achieved by treating 1,652,000 yd^3 (1,263,045 m^3) of controllable erosion within the first three decades (approximately 54,100 yd^3 [41,362 m^3] per year). Efforts would focus on controlling erosion at high and moderate priority sites within "core coho watersheds" (Table 3.2-17). The Proposed Action would result in slower annual treatment of controllable point-erosion sources than achieved during the last decade (an average reduction of 73,000 yd^3 [55,813 m^3] per year during the period from 1998 to 2007). This 73,000 yd^3 annual sediment reduction was achieved primarily by completing large sediment control projects located along the Masonite Road in the Navarro River watershed, and there are few sites that would involve such large volumes of sediment control in the future.

The Proposed Action would ensure a more predictable rate of treatment in specific areas where the erosion priority is greatest and where anadromous salmonids would most benefit. The Proposed Action would have the **beneficial effects** of reducing sediment delivery from road-related point sources of erosion relative to existing conditions.

Table 3.2-17. Percentage of controllable erosion treated per decade[a] under the Proposed Action.

Treatment priority	Coho salmon core areas (%)				Non-core areas (%)			
	Decade				Decade			
	1	2	3	4	1	2	3	4
High	70	30	–	–	33	33	33	–
Moderate	50	50	–	–	33	33	33	–
Low	25	25	25	25	25	25	25	25

Source: MRC HCP/NCCP (2012)
[a] All controllable erosion would be treated by decade 4 under the Proposed Action.

Analysis of the effects of the Proposed Action on road surface erosion assumed an average existing surface erosion rate from roads of 33.4 tons $mi^{-1}yr^{-1}$, the average of the surface erosion rates reported in MRC's watershed analyses. The agencies adjusted this average surface erosion rate for road surface type (i.e., paved, rocked, native) based on the Washington Department of Natural Resources methodology (WFPB 1997). Sediment delivery from road surface erosion was extrapolated from the anticipated road network within 200 ft (61 m) of a watercourse (Table 3.2-15), since road segments within 200 ft (61 m) of a stream channel are typically more hydrologically connected to stream channels and sediment delivery from road surfaces located greater than 200 ft (61 m) is comparatively small (Rice et al. 1979, Lewis 1998, Stillwater Sciences 1999).

The analysis of effects indicated that MRC would likely reduce sediment delivery from road surface erosion by approximately 8.6% in the decade following implementation of all road decommissioning and new road construction projects (Table 3.2-18). MRC anticipates completing most of the changes to its road network (including decommissioning and new road construction) during the first 20–40 years and does not specify in the HCP/NCCP how the road network would change after the first decade. The effects of any changes that may occur in subsequent decades were not evaluated. Implementation of road maintenance standards and other conservation measures that address road-related surface erosion during the remainder of the plan period would further reduce sediment delivery. The Proposed Action would have a **beneficial effect** of reducing sediment delivery from road-related surface erosion relative to existing conditions.

Table 3.2-18. Estimated sediment delivery from road-related surface erosion in the primary assessment area watershed anaysis units following the first decade of the Proposed Action compared with existing conditions.

Watershed analysis unit[a]	Estimated sediment delivery[b] (tons per decade)	
	Existing conditions	Proposed Action
Albion River	14,300	14,300
Big River	46,300	43,700
Cottaneva Creek	9,900	9,900
Garcia River[c]	12,700	12,700
Greenwood Creek[d]	42,800	36,200
Hollow Tree Creek	18,200	15,700
Navarro River	75,300	67,700
Noyo River	31,500	29,900
Rockport Small Coastal Streams	7,800	6,600
Upper Russian River	4,700	4,200

Watershed analysis unit[a]	Estimated sediment delivery[b] (tons per decade)	
	Existing conditions	Proposed Action
Total	263,500	240,900
Percent reduction		8.6%

[a] Data were not available for the Alder Creek/Schooner Gulch and Elk Creek watershed anaysis units.
[b] Assumes average sediment delivery rate of 33.4 tons mi^{-1} yr^{-1} from surface erosion reported in MRC watershed analyses. Factors for surface type are from the Washington Deptarment of Natural Resources methodology (WFPB 1997).
[c] Includes portions of the Gualala River basin.
[d] Includes Elk Creek, Alder Creek, and Schooner Gulch.

Under the Proposed Action, road use and management associated with post-fire timber salvage would follow the prescriptions in MRC's proposed HCP/NCCP, which include site-specific measures to reduce erosion and sediment delivery to streams from roads and stream crossings. The HCP/NCCP measures would provide additional erosion control in burned areas and would reduce the potential for sediment delivery to streams and other aquatic habitats compared with existing conditions and the No Action alternative.

3.2.2.4 Alternative A

Hillslope mass wasting

Total estimated sediment delivery from management-related shallow landsliding (unrelated to roads) in the primary assessment area under Alternative A is shown in Figure 3.2-1. Alternative A would result in more harvest and therefore slightly more estimated sediment delivery compared with existing conditions and other alternatives during the first decade. Sediment delivery would drop below that estimated for existing conditions, the No Action alternative, and the Proposed Action by decade 2 and remain about 40 to 60% of the No Action alternative through decade 8. Management-related shallow landsliding (unrelated to roads) would deliver about 324,000 tons of sediment during the eight decades of implementation, 55% of that estimated under the No Action alternative. During the eight decades of implementation, 20% of the total sediment delivery would originate from Terrain Stability Unit 1 (steep slopes along low gradient watercourses), 10% from Terrain Stability Unit 2 (inner gorge and steep slopes adjacent to high-gradient watercourses), 38% from Terrain Stability Unit 3 (dissected and convergent topography), 32% from Terrain Stability Unit 4 (non-dissected topography), and < 0.05% from Terrain Stability Unit 5 (Figure 3.2-2). Under Alternative A, sediment delivery from Terrain Stability Unit 1 would be lower than under existing conditions and other alternatives due to the additional restrictions on harvest, yarding, and road construction in inner gorge areas. Alternative A would have the **beneficial effect** of reducing the number of management-related shallow landslides (unrelated to roads) and associated sediment delivery relative to existing conditions. Fewer management-related shallow landslides would minimize damage to road infrastructure and in runout areas and reduce sediment delivery to stream channels. Reduction in management-related shallow landsliding may not substantially affect chronic fine sediment delivery associated with surface erosion processes (sheetwash, rilling, and gullying). Post-fire timber salvage under Alternative A would be the same as under the Proposed Action, with similar measures to minimize landslide erosion and sediment delivery to streams.

During the eight decades of implementation of Alternative A, approximately 2,736 ac (1,107 ha) would be harvested on deep-seated landslides mapped as rockslides with toe and/or body morphology classes of 1 or 2 (Figure 3.2-3). This cumulative area estimate includes multiple cycles of harvest in the same landslide area. Harvest on deep-seated landslides under Alternative

A would be cyclical, alternating from a high of about 400–420 ac (162–170 ha) in one decade to a low of about 240–290 ac (97–117 ha) in the next (Figure 3.2-3). The area harvested on deep-seated landslides under Alternative A would be substantially less than under the No Action alternative after decade 3, and less than the Proposed Action throughout the plan period (Figure 3.2-3). Harvest would not occur on earthflows having toe and/or internal morphology of 1 or 2, but a total of approximately 2,100 ac (850 ha) would be harvested on earthflows with toe and/or internal morphology of 3 or 4 over eight decades (Figure 3.2-4). Alternative A would have a **beneficial effect** of reducing management-related sediment delivery from deep-seated landslides. Alternative A may have an additional **beneficial effect** of reducing sediment production from sheetwash, rilling, and gullying where these processes are active and influenced by management within deep-seated landslide areas.

Surface erosion from harvest areas (unrelated to roads and skid trails)

Management activities and conservation measures related to sediment delivery under Alternative A (identical to those proposed under the Proposed Action) would result in greater canopy retention and basal area (Figure 3.2-5), less ground disturbance from yarding practices, and less hydrologic change (e.g., increased runoff) than under existing conditions or the No Action alternative. These practices, in combination with specific conservation measures that minimize and/or avoid disruption of the ground and associated drainage by equipment operation, would have the **beneficial effects** of reducing soil compaction and sediment delivery from surface erosion (e.g., sheetwash, rilling, and gullying) in harvest areas relative to existing conditions and the No Action alternative. Additional measures (not included under the Proposed Action) that prohibit harvest in inner gorges, restrict harvest to high retention selection on steep streamside slopes, and require helicopter yarding in roadless areas would further reduce management-related surface erosion in these areas and associated sediment delivery to nearby watercourses. Post-fire timber salvage under Alternative A would be the same as under the Proposed Action, with similar measures to minimize surface erosion and sediment delivery to streams. Therefore, implementation of Alternative A would have the additional **beneficial effects** of reducing soil compaction and surface erosion compared with other alternatives.

Road-related erosion

The effects of Alternative A on road-related erosion and sediment delivery would be similar to those that would occur under the Proposed Action. Additional measures that restrict road construction and require hauling to cease for 72 hours following 0.5 in (1.3 cm) of rain during April or May would further reduce surface erosion from these roads. Removal of unnecessary roads in sensitive watersheds proposed under Alternative A would have the **beneficial effects** of reducing sediment delivery from road-related shallow landslides and surface erosion (e.g., sheetwash, rilling, and gullying) in these areas relative to existing conditions and the other alternatives. Alternative A would also have the **beneficial effects** of reducing damage to road infrastructure and in runout areas and reducing sediment delivery from road-related point sources of erosion relative to existing conditions. The effects cannot be quantified because the location, type, and length of roads to be removed, the timing of road removal, and the potential sediment delivery saved by removing these roads under Alternative A have not been defined.

Road use and management associated with post-fire timber salvage under Alternative A would be the same as under the Proposed Action, with similar measures to minimize erosion and sediment delivery to streams from road surfaces and stream crossings.

3.2.2.5 Alternative B

Hillslope mass wasting

Total estimated sediment delivery from management-related shallow landsliding (unrelated to roads) in the primary assessment area under Alternative B is shown in Figure 3.2-1. Alternative B would deliver more sediment than the No Action alternative during the first decade, drop to 78–95% of the No Action alternative during decades 2 and 3, and then decrease to less than 50% of the No Action alternative by decade 8. Throughout the plan period, implementation of Alternative B would result in less sediment delivery at the scale of the primary assessment area than under existing conditions, due primarily to harvest restrictions in reserves. Management-related shallow landsliding (unrelated to roads) would deliver about 365,000 tons of sediment over eight decades of implementation, 63% of that estimated under the No Action alternative. Over the 80-year life of the plan, 30% of the total sediment delivery would originate from Terrain Stability Unit 1 (inner gorge and steep slopes along low-gradient watercourses), 10% from Terrain Stability Unit 2 (inner gorge and steep slopes adjacent to high-gradient watercourses), 34% from Terrain Stability Unit 3 (dissected and convergent topography), 25% from Terrain Stability Unit 4 (non-dissected topography), and less than 0.05% from Terrain Stability Unit 5 (Figure 3.2-2).

Under Alternative B, post-fire timber salvage outside the reserves would be the same as under the No Action alternative, and there would be no effect on landslide erosion and sedment delivery compared with existing conditions. There would be no timber salvage operations in the reserves. Alternative B would have the **beneficial effects** of reducing the number of management-related shallow landslides (unrelated to roads) and associated sediment delivery in reserves relative to existing conditions. Fewer management-related shallow landslides in reserves would reduce sediment delivery to stream channels in reserves. Reduction in management-related shallow landsliding may not affect chronic fine sediment impacts associated with surface erosion processes (sheetwash, rilling, and gullying).

Impact 3.2-4 Increased sediment delivery to stream channels from management-related shallow landsliding. Under Alternative B, areas outside of the reserves would be subject to more intensive timber management practices (e.g., clearcut) than under existing conditions or proposed under other alternatives. Alternative B would therefore have **potentially significant effects** due to increased landslide erosion and sediment delivery to stream channels from harvest areas relative to existing conditions and other alternatives. An increase in landslide sediment delivery to stream channels outside reserves under Alternative B could degrade aquatic habitat.

Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding. Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding by (1) reducing the amount and rate of clearcut timber harvest, and (2) using aerial yarding (i.e., helicopter) rather than ground-based yarding systems on potentially unstable slopes. Potentially unstable slopes include those in Terrain Stability Unit 1 (inner gorge and steep slopes along low-gradient watercourses), Terrain Stability Unit 2 (inner gorge and steep slopes adjacent to high-gradient watercourses), and Terrain Stability Unit 3 (dissected and convergent topography). This mitigation measure would reduce potential effects to **less than significant**.

Over eight decades of implementing Alternative B, approximately 2,200 ac (890 ha) would be harvested on deep-seated landslides mapped as rockslides with toe and/or body morphology classes of 1 or 2 (Figure 3.2-4). This cumulative area estimate includes multiple cycles of harvest in the same landslide area. Approximately 380 ac (154 ha) would be harvested on deep-seated landslides during the first decade of implementation, then drop to a relatively steady level of about 240–270 ac (97–109 ha) per decade through decade 8 (Figure 3.2-3). The area harvested on deep-seated landslides under Alternative B would be substantially less than under the No Action alternative and Proposed Action after the first decade of implementation (Figure 3.2-3). A variety of silvicultural treatments would occur within these areas. Harvest would not occur on earthflows having toe and/or internal morphology of 1 or 2, but a total of approximately 1,300 ac (526 ha) would be harvested on earthflows with toe and/or internal morphology of 3 or 4 over eight decades (Figure 3.2-4). Alternative B would have a **beneficial effect** of reducing management-related sediment delivery to stream channels from deep-seated landslides relative to existing conditions. Reduced sediment delivery to stream channels in reserves may result in higher quality aquatic habitat. Alternative B may have an additional **beneficial effect** of reducing sediment production from sheetwash, rilling, and gullying where these processes are active within deep-seated landslide areas. Although deep-seated landslides outside reserves may be subject to more intensive timber management practices (e.g., clearcut), the effects analysis indicates that less area would be harvested within deep-seated landslides under Alternative B than under the Proposed Action or other alternatives because some deep-seated landslides are in reserves and will not be harvested.

Surface erosion from harvest areas (unrelated to roads and skid trails)

Retaining canopy and basal area and eliminating ground disturbance in reserves where little or no timber harvest would occur would reduce soil compaction and sediment delivery to stream channels from surface erosion (e.g., sheetwash, rilling, and gullying) in these areas below that expected under existing conditions and the other alternatives. However, soil compaction and sediment delivery to stream channels from surface erosion outside of reserves under Alternative B is expected to be substantially greater than under existing conditions due to predominantly clearcut silvicultural treatments that result in less canopy retention and basal area (Figure 3.2-5), more ground disturbance, and greater hydrologic change (e.g., increased runoff) than under existing conditions or other alternatives. Under Alternative B, post-fire timber salvage outside the reserves would be the same as under the No Action alternative, and there would be no effect on surface erosion compared with existing conditions. There would be no timber salvage operations in the reserves.

Impact 3.2-5: Increased sediment delivery to stream channels from management-related surface erosion in harvest areas. Alternative B would likely result in substantially more management-related surface erosion associated with clearcut harvest outside of reserves than occurs under existing conditions. This effect would increase sediment delivery to stream channels and would be **potentially significant**.

Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion. Reduce the potential for management-related surface erosion (e.g., sheetwash, rilling, and gullying) and delivery to stream channels by (1) reducing the amount and rate of clearcut timber harvest; (2) limiting equipment use in headwater streams and swales; and (3) using aerial rather than ground-based yarding systems. These mitigation measures would reduce potential effects to **less than significant**.

Road-related erosion

Under Alternative B, roads within reserve areas would be inventoried and considered for removal. Road inventory, construction, and maintenance outside reserves would occur in accordance with the CFPRs (14 CCR §923) (similar to the No Action alternative). Heavy equipment would be allowed in reserves for maintenance of roads and crossings. Hauling would be allowed on existing mainline roads through reserves if no suitable alternative routes exist. Winter operation would be restricted in accordance with CFPRs (14 CCR §914.7) (similar to the

No Action alternative). Less road-related erosion and sediment delivery to stream channels would occur within reserves than from the same areas under existing conditions or under other alternatives. The effects of roads on erosion and sediment delivery to stream channels outside of reserves under Alternative B would be similar to the No Action alternative.

Under Alternative B, road use and management associated with post-fire timber salvage outside the reserves would be the same as under the No Action alternative, and there would be no effect on road-related erosion and sedment delivery compared with existing conditions. There would be no timber salvage operations in the reserves.

Impact 3.2-6: Increased sediment delivery to stream channels from road-related erosion. Although conservation measures included in Alternative B for reserves would likely result in less road-related erosion and sediment delivery to stream channels than occurs in the same areas under existing conditions, the lack of a comprehensive road management approach and schedule for road inventory outside of reserves would increase sediment delivery to stream channels outside reserves. This effect would be **potentially significant**.

Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach. A comprehensive road management approach ensures that sediment delivery to stream channels from the existing and future road network is minimized by (1) defining when and how road-related point sources of erosion and sediment delivery would be treated; (2) prioritizing removal of road segments that pose the greatest erosion hazards and risks to aquatic resources; (3) specifying best management practices for inventory, maintenance and upgrade of existing roads; (4) specifying when, where and how new roads would be constructed; and (5) regulating road use. A comprehensive road management approach would include a schedule for inventory and control of road-related point sources of sediment and removal of unnecessary road segments. This mitigation measure would reduce potential effects to **less than significant**.

3.2.2.6 Alternative C

Within the 40-year period of implementing Alternative C, sediment delivery from mass wasting (unrelated to roads) would be reduced at least 10%. All of the controllable erosion sites with high and moderate priority in core coho watersheds and 66% of the high and moderate priority sites in non-core watersheds would be treated. Targets for road improvement and reduction in sediment delivery to stream channels established in the Proposed Action for decades after decade 4 would not apply under Alternative C.

The effects of Alternative C would be identical to those during the first four decades of the Proposed Action. These **beneficial effects** include a reduction in the number of shallow landslides associated with timber harvest areas and roads; a reduction in fine sediment delivery to stream channels from surface erosion (e.g., sheetwash, rilling, and gullying) associated with harvest areas and roads; and a reduction in point-source erosion relative to existing conditions. Fewer management-related landslides and less management-related surface erosion associated with roads and harvest areas would reduce sediment delivery to stream channels relative to existing conditions. Benefits expected under the Proposed Action after 40 years of HCP implementation would not be achieved under Alternative C. Effects of post-fire timber salvage on landslides, erosion, and sediment delivery under Alternative C would be the same as under the Proposed Action for the first 40 years, with potential benefits due to reduced sediment delivery to streams.

3.2.2.7 Comparison of alternatives

Table 3.2-19 provides a summarized comparison of effects on geology, soils, and geomorphology under the alternatives.

The Proposed Action would reduce and minimize sediment delivery to stream channels from management-related mass wasting, surface erosion, and roads. Objectives in the HCP/NCCP for reduction of sediment delivery to stream channels from management-related shallow landsliding (unrelated to roads) would likely be met by the end of decades 4 and 8. Greater canopy retention and basal area and less ground disturbance from yarding practices would result in less soil compaction and sediment delivery from surface erosion in harvest areas than under the existing condition or No Action alternative. Targets for reducing sediment delivery to stream channels from road-related mass wasting and road-related surface erosion would likely be met by the end of decades 4 and 8. Commitments for treating road-related point-source erosion under the Proposed Action would result in a greater and more predictable rate of sediment reduction in high priority areas where anadromous salmonids would most benefit. Sediment delivery to stream channels from road-related surface erosion would be less than under existing conditions or the No Action alternative.

The effects of Alternative A would be similar to the Proposed Action, except that less sediment would be delivered from Terrain Stability Unit 1 due to additional restrictions in inner gorge areas and less area would be harvested on deep-seated landslides. Additional conservation measures would result in less sediment delivery to stream channels from management-related soil compaction and surface erosion (unrelated to roads and skid trails) in inner gorge areas, on steep streamside slopes, and in roadless areas. Removal of unnecessary roads in sensitive watersheds would have a potentially significant effect on reducing road-related mass wasting and surface erosion. Alternative A would provide the greatest beneficial effects of any alternative.

Alternative B would result in some beneficial effects associated with less sediment delivery to stream channels from within reserves where no commercial timber harvest would occur. Management strategies outside of reserves, predominantly clearcut silviculture, would have potentially significant adverse effects on sediment delivery to stream channels from management-related landsliding and surface erosion. There would be potentially significant effects associated with road-related sediment delivery to stream channels due to the lack of a comprehensive road management approach that includes specific commitments for treating road-related point-source erosion.

Alternative C offers benefits similar to the Proposed Action during the first four decades. Some benefits expected under the Proposed Action and Alternative A require time periods longer than four decades and would not be realized under Alternative C.

1 **Table 3.2-19.** Comparison of alternatives for geology, soils, and geomorphology.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Hillslope Mass Wasting	Sediment delivery to stream channels from management-related shallow landsliding (unrelated to roads) would be significantly greater than under existing conditions and other alternatives after decade 5. Effects would be **potentially significant.** The area harvested on deep-seated landslides would be significantly greater than under existing conditions and other alternatives after decade 3. Effects would be **potentially significant.** Management measures for post-fire timber salvage would be similar to current practices (**no effects)**.	Objectives in the HCP/NCCP for reduction of sediment delivery to stream channels from management-related shallow landsliding (unrelated to roads) could be met at decades 4 and 8, and the resulting sediment delivery to stream channels would be less than under existing conditions or the No Action alternative. Effects would be **beneficial**. The area harvested on deep-seated landslides would be less than under existing conditions and the No Action alternative. Effects would be **beneficial**. Post-fire timber salvage under the proposed action would follow prescriptions in MRC's proposed HCP/NCCP, which include site-specific measures that would reduce the potential for erosion and sediment delivery compared with existing conditions and the No Action alternative. Effects would be **beneficial**.	Less sediment would be delivered from management-related shallow landsliding (unrelated to roads) in Terrain Stability Unit 1 than under existing conditions and other alternatives due to additional restrictions in inner gorge areas. Effects would be **beneficial**. The area harvested on deep-seated landslides would be significantly less than under the No Action alternative and Proposed Action. Effects would be **beneficial**. Post-fire timber salvage under Alternative A would be the same as under the Proposed Action, with similar measures to minimize sediment delivery from landsliding. Effects would be **beneficial**.	Less sediment would be delivered from management-related shallow landsliding (unrelated to roads) than under existing conditions due to restrictions in terrestrial reserves. Effects would be **beneficial**. Landslide erosion and sediment delivery to stream channels from harvest areas outside of the reserves would be greater than under the No Action alternative or the Proposed Action due to more intensive timber management practices (e.g., clearcut). Effects would be **potentially significant.** The area harvested on deep-seated landslides would be significantly less than under the No Action alternative and Proposed Action. Effects would be **beneficial**. Post-fire timber salvage outside the reserves would be the same as under the No Action alternative, and there would be **no effect** on erosion and sediment delivery. There would be no timber salvage operations in the reserves.	Plans, programs, and conservation measures included in Alternative C are identical to those included in the first four decades of the Proposed Action. The effects would be similar to those during the first four decades of the Proposed Action. Effects would be **beneficial**.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Surface Erosion	Sediment delivery to stream channels from surface erosion in harvest areas (unrelated to roads and skid trails) would be less than the long-term average but not significantly different than under existing conditions. **No effects.** Management measures for post-fire timber salvage would be similar to current practices (**no effects)**.	Greater canopy and basal area retention and less ground disturbance would result in less sediment delivery to stream channels from surface erosion in harvest areas than under existing conditions. Effects would be **beneficial**. Post-fire timber salvage, prescriptions in MRC's proposed HCP/NCCP would provide additional erosion control in burned areas and would reduce the potential for sediment delivery compared with existing conditions and the No Action alternative. Effects would be **beneficial**.	Additional conservation measures would result in less sediment delivery to stream channels from management-related surface erosion (unrelated to roads and skid trails) in inner gorges, steep streamside slopes, and roadless areas than under existing conditions or other alternatives. Effects would be **beneficial**. Post-fire timber salvage under Alternative A would be the same as under the Proposed Action, with similar measures to minimize sediment delivery from surface erosion. Effects would be **beneficial**.	Establishment of reserves would result in some reduction in sediment delivery to stream channels from surface erosion (unrelated to roads and skid trails). Sediment delivery to stream channels from surface erosion outside of reserves is expected to be significantly greater than under existing conditions or the other alternatives. Effects would be **potentially significant.** Post-fire timber salvage outside the reserves would be the same as under the No Action alternative, and there would be **no effect** on erosion and sediment delivery. There would be no timber salvage operations in the reserves.	Plans, programs, and conservation measures included in Alternative C are identical to those included in the first four decades of the Proposed Action. The effects would be similar to those during the first four decades of the Proposed Action. Effects would be **beneficial**.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Road-related sediment delivery	The length of the road and skid trail network would change little from existing conditions, and conservation measures applied under the No Action alternative would be similar to existing conservation measures. Commitments for treating road-related point-source erosion have not been established. The lack of a comprehensive road management approach would result in **potentially significant effects** associated with road-related sediment delivery to stream channels. Road use and management associated with post-fire timber salvage would be similar to current practices (**no effects**).	Sediment delivery to stream channels from road-related mass wasting during the first decade would be less than under the No Action alternative and existing conditions. Effects would be **beneficial**. Treatment of road-related point-source erosion would result in a more predictable rate of sediment reduction in high priority areas where anadromous salmonids would most benefit. Sediment delivery to stream channels from road-related surface erosion would be less than under existing conditions or the No Action alternative. Effects would be **beneficial**. Road use and management associated with post-fire timber salvage would follow prescriptions in MRC's proposed HCP/NCCP, which would reduce the potential for road-related erosion and sediment delivery compared with existing conditions and the No Action alternative. Effects would be **beneficial**.	Removal of unnecessary roads in sensitive watersheds would have a significant effect on reducing road-related mass wasting and surface erosion relative to existing conditions and the No Action alternative. Effects would be **beneficial**. Alternative A would likely result in less road-related mass wasting and surface erosion than the Proposed Action, although these effects cannot be quantified without more specific information about road removal. Additional conservation measures would reduce surface erosion from some roads. Effects would be **beneficial**. Road use and management associated with post-fire timber salvage would be the same as under the Proposed Action, with similar measures to minimize sediment delivery from surface erosion. Effects would be **beneficial**.	Less road-related erosion and sediment delivery to stream channels would occur within reserves than from the same areas under existing conditions or under other alternatives. Management strategies outside of reserves, predominantly clearcut silviculture, would result in increased sediment delivery to stream channels from management-related landsliding. There would be **potentially significant effects** associated with road-related sediment delivery to stream channels due to the lack of a comprehensive road management approach.	Plans, programs, and conservation measures are identical to those included in the first four decades of the Proposed Action. The effects would be similar to those during the first four decades of the Proposed Action. Effects would be **beneficial**.

3.2.3 PTEIR alternate standard analysis for the Proposed Action, Alternative A, and Alternative C

In its TMP (Appendix A) and HCP/NCCP, MRC has proposed alternate standards to the current (2012) CFPRs, which would be implemented and included in PTHPs prepared under the Proposed Action, Alternative A, or Alternative C. Alternate standards are not proposed for the No Action alternative because no TMP, HCP, or NCCP would be implemented. Likewise, alternate standards are not proposed for Alternative B because no TMP or NCCP would be implemented. The 2012 CFPRs (14 CCR §1092[b]) authorize CAL FIRE to accept alternate standards in a PTHP where it has been demonstrated in a PTEIR that the alternate standard provides resource protections that are equal to or better than the standard operational rule and its implementation would have a less than significant impact on the environment. Also, where future changes in the CFPRs occur, the current operational standards (2012 CFPRs) may be accepted by CAL FIRE as alternate standards where the PTEIR has similarly demonstrated a less than significant impact.

The proposed alternate standards were reviewed by the lead agencies to determine the resource area(s) to which they apply (see Attachment D to Appendix A). For each alternate standard that applies to Geology, Soils, and Geomorphology, the analysis in Sections 3.2.2.3, 3.2.2.4, and 3.2.2.6 and the cumulative effects analysis in Sections 4.2.2, 4.2.3, and 4.2.5 demonstrates that its implementation as part of the Proposed Action, Alternative A, or Alternative C would provide equal or better protection to Geology, Soils, and Geomorphology than the 2012 CFPR standard and its implementation would either (1) not result in adverse environmental impacts or (2) result in impacts that are below the level of significant effect on the environment. This analysis considered the effects of implementing the proposed alternate standards as part of a suite of management and conservation measures contained in the HCP, NCCP, and TMP.

The following are the CFPRs for which alternate standards (or current operational standards, which due to a rule change could become an alternate standard) have been proposed by MRC in its TMP (Appendix A) and/or its HCP/NCCP and are applicable to Geology, Soils, and Geomorphology:

895.1, 913.1(a)(2), 913.1(a)(2)(A), 913.1(a)(2)(E), 913.6(b)(4), 913.6(e)(1), 914.2(d), 914.2(f-i), 914.3(a), 914.6(a-i), 914.7(a), 914.7(b), 914.7(b)(3,4,5,7,9,10,11), 914.8(d-f), 915, 915.1, 915.2, 915.3(a), 915.4, 916.2(b-c), 916.3(a), 916.3(c), 916.3(c)(1-4), 916.3(f-g), 916.4(b-f), 916.5, 916.6(a), 916.7, 916.11(a), 923(d-f), 923.1(a), 923.1(c-h), 923.1(j), 923.2(b-c), 923.2(f-t), 923.2(v), 923.3, 923.4(a-d), 923.4(f-i), 923.4(l-o), 923.5, 923.8, and 923.9(a-e).

The EIS/PTEIR analysis demonstrates that these alternate standards would provide equal or better protection to Geology, Soils, and Geomorphology than the 2012 CFPR standard. Implementation of these alternate standards would have a less than significant impact and would not contribute to cumulative effects on Geology, Soils, and Geomorphology, and may be proposed in PTHPs by MRC and approved by CAL FIRE (14 CCR §1092[c]).

A complete list of MRC's proposed alternate standards is included in the TMP (Appendix A) as Attachment D. Attachment D of the TMP also includes a reference to the location of each alternate standard in the TMP and/or HCP/NCCP, and the CFPR standard (rule) it would replace.

3.3 Hydrology, Beneficial Uses of Water, and Water Quality

This section describes the hydrology, beneficial uses of water, and water quality concerns within the assessment area, as well as the potential effects of implementing the alternatives on these resources. Unless otherwise noted, the assessment area for hydrology and water quality includes the watershed analysis units and CalWater planning watersheds that contain the primary assessment area (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1) (Appendix F, Figure F-1). CalWater planning watersheds are delineated at the drainage scale, generally covering 5–16 mi^2 (3,000–10,000 ac), and are a smaller-scale extension of the six federal designations for watershed boundaries (i.e., region, sub-region, basin, sub-basin, watershed, sub-watershed). Planning watersheds are designed for use at the local watershed level (CalWater 2004) and have been adopted by MRC in its HCP/NCCP as the smallest watershed units considered for a variety of hydrologic analyses.

In several instances, the assessment area for hydrology and water quality also includes the watershed analysis units that contain the secondary assessment area, since these lands may be acquired and managed by MRC at some point in the future. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, the land in the secondary assessment area that would potentially be acquired by MRC is of a similar forest type, geology, climate, and hydrology as land in the primary assessment area, and it has been subject to similar management (i.e., commercial timber harvest). Thus, the agencies assume that the affected environment and potential effects of the alternatives would be similar to those in the primary assessment area.

3.3.1 Affected environment/Environmental setting

3.3.1.1 Watershed characteristics

Regional watersheds

MRC-covered lands are located in 50 planning watersheds and 12 watershed analysis units in the North Coast Region of California (Appendix F, Figure F-1). Table 3.3-1 lists characteristics of the watershed analysis units within the primary assessment area by their elevation range, total area, drainage density, and area of MRC-covered lands (both total acres and percent). As shown in Table 3.3-1, elevation ranges from sea level in the coastal watershed analysis units to 3,414 ft (1,041 m) above sea level in the Navarro River watershed analysis unit. Drainage density (total length of stream channels per unit area) ranges from 5.4 to 7.1 mi/mi^2.

Table 3.3-1. Area, elevation, and drainage density of watershed analysis units in the primary assessment area.

Watershed analysis unit	Area of watershed analysis unit (ac)	Elevation range (ft)[a]	Drainage density (mi/mi^2)[b,c]
Albion River	14,748	0–1,568	6.8
Alder Creek/Schooner Gulch	12,906	0–2,745	6.0
Big River	33,499	36–2,812	5.7
Cottaneva Creek	7,798	0–1,976	5.9
Elk Creek	14,079	0–2,744	6.6
Garcia River[d]	12,699	20–2,706	5.5

Watershed analysis unit	Area of watershed analysis unit (ac)	Elevation range (ft)[a]	Drainage density (mi/mi²)[b,c]
Greenwood Creek	9,561	0–2,298	7.1
Hollow Tree Creek	20,411	596–2,964	5.4
Navarro River	54,421	0–3,414	6.4
Noyo River	19,240	30–3,211	6.8
Rockport Small Coastal Streams	10,079	0–2,394	5.5
Upper Russian River	3,591	660–3,181	6.6

[a] Elevation ranges for each watershed analysis unit were determined using ArcGIS and a 10-meter Digital Elevation Model. Digital Elevation Model-derived values were converted from meters to feet.
[b] Source: MRC
[c] Only Class I and II watercourses were included in drainage density calculations. ArcGIS was used to measure channel length in miles.
[d] Includes portions of the Gualala River basin.

Climate

The assessment area has a Mediterranean climate, characterized by a pattern of low-intensity rainfall in the winter and cool, dry summers with coastal fog. The North Coast Region has distinct temperature zones: along the coast, the climate is moderate and foggy and the temperature variation is minimal; inland, however, seasonal temperature ranges in excess of 100°F (38°C) have been recorded (North Coast Regional Water Quality Control Board 2006). Air temperature is strongly influenced by the coastal fog belt, which typically extends about 10 mi (16 km) inland during summer nights, generally burning off over land by afternoon. Mean monthly air temperatures between 1990 and 1995, measured in the Caspar Creek watershed in the central part of the assessment area, range from 60°F (15.6°C) in July and August to 44°F (6.7°C) in December (Ziemer 1996). Because of the temperature gradient from the coast to inland areas, evapotranspiration is greater inland and at higher elevations than it is near the coast.

Isohyetal maps for the period of record (1971–2000) indicate that mean annual precipitation ranges from 40 in (102 cm) along the coast at Fort Bragg and Point Arena to 60 in (152 cm) between Fort Bragg and Willits (The PRISM Climate Group 2006). Mean annual precipitation ranges from 30 to 50 in (76 to 127 cm) near Ukiah. Mean annual precipitation measured at United States Department of Agriculture Forest Service gages on Caspar Creek ranges from 46–51 in (116–129 cm) (United States Department of Agriculture Forest Service 2007). Based on records from climate stations in Point Arena (Station No. 7009) and Willits 1NE (Station No. 9684), approximately 95% of the precipitation occurs from October through May (Figure 3.3-1). January is on average the wettest month, when about 19% of the average annual total precipitation is recorded. The driest month is July, with less than 1% of the total annual precipitation.

Precipitation in the assessment area occurs predominately in the form of rain, but snow occasionally falls at the higher elevations. Only a small portion of precipitation falls as snow, and as it rarely remains as snow pack for long periods of time, snowfall is hydrologically insignificant.

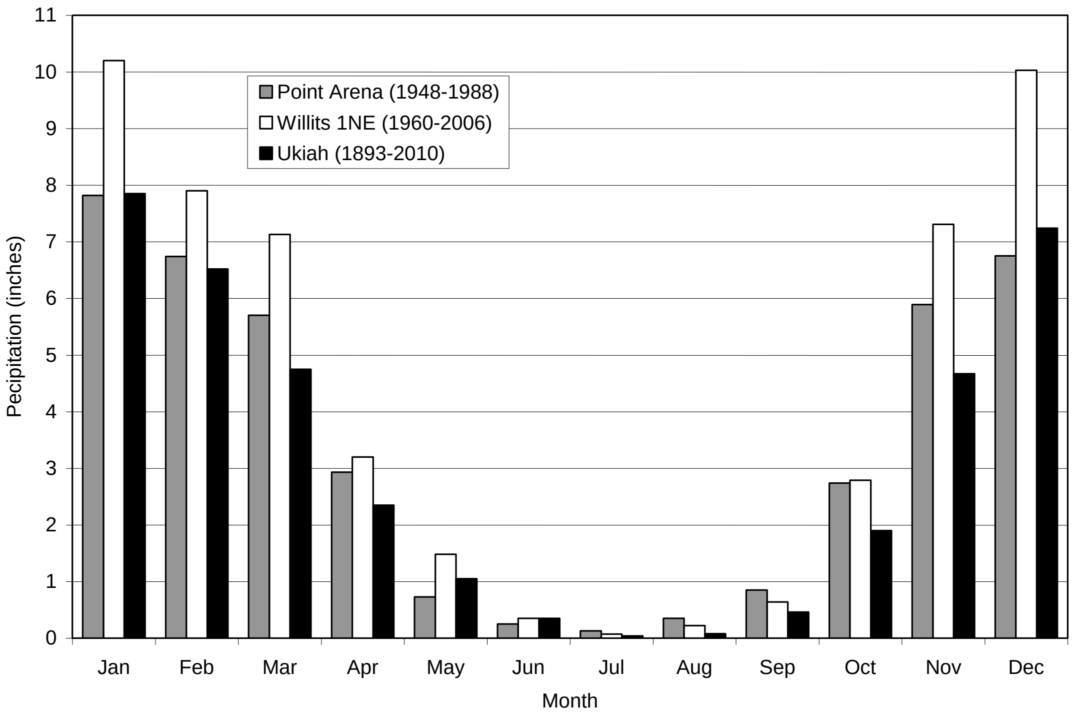


Figure 3.3-1. Monthly precipitation from Point Arena (Station No. 7009) and Willits 1NE (Station No. 9684) (Western Regional Climate Center 2011).

3.3.1.2 Hydrology

Runoff characteristics

In the North Coast Region, where MRC forestlands are located, the greatest precipitation, and hence flooding, typically occurs in late fall and winter (November–March) (Figure 3.3-1). Inter-annual variation in runoff also occurs due to variation in storm frequency and magnitude. Prior to 1952, available records suggest that large floods occurred in 1852, 1861–62, 1867–68, 1879, 1881, 1888, 1890, and 1937 (Janda et al. 1975, Ricks 1985). Coghlan (1984) suggests that large-scale changes in atmospheric circulation have affected runoff patterns in northwestern California during the past 150 years. Whereas the latter half of the 1800s appears to have generally been wet in northwestern California, Coghlan (1984) suggests that a change in the atmospheric flow pattern occurred around 1915, resulting in fewer and smaller storms. In approximately 1950, a transition back to atmospheric circulation conditions similar to the pre-1915 period apparently occurred, resulting in an increased frequency and magnitude of both large storms and floods. This view is supported by the regional flood data, which indicate that numerous large events occurred during the latter half of the 1800s and since approximately 1950, while few large flood events occurred in the first half of the 1900s. Periods of the most intensive timber harvesting in the region (approximately 1860 to the early 1900s, and the 1950s to the present) appear to have coincided with periods of wet climatic conditions.

The Caspar Creek watershed is centrally located in the primary assessment area and has been the site of considerable research on the effects of forest harvest on hydrology. The Pacific Southwest Research Station and CAL FIRE have jointly measured precipitation at a gage in the South Fork Caspar Creek and runoff of water and sediment at weirs in both the South and North forks of Caspar Creek since 1963. Precipitation has also been measured at a gage in the North Fork

Caspar Creek basin since 1978. The annual totals for precipitation and runoff for the North and South forks of Caspar Creek are shown in Figure 3.3-2 and Figure 3.3-3.

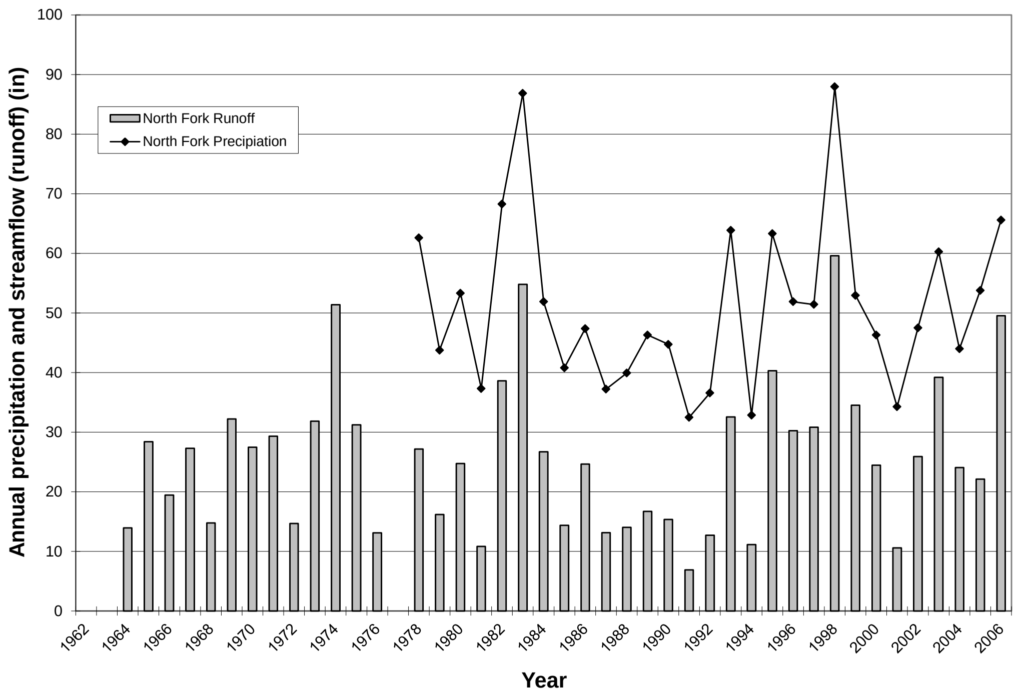


Figure 3.3-2. Annual precipitation and streamflow (runoff) totals for North Fork Caspar Creek, 1963–2006 (United States Department of Agriculture Forest Service 2007). Runoff data are not available prior to 1964 and in 1977. Precipitation data are not available prior to 1978.

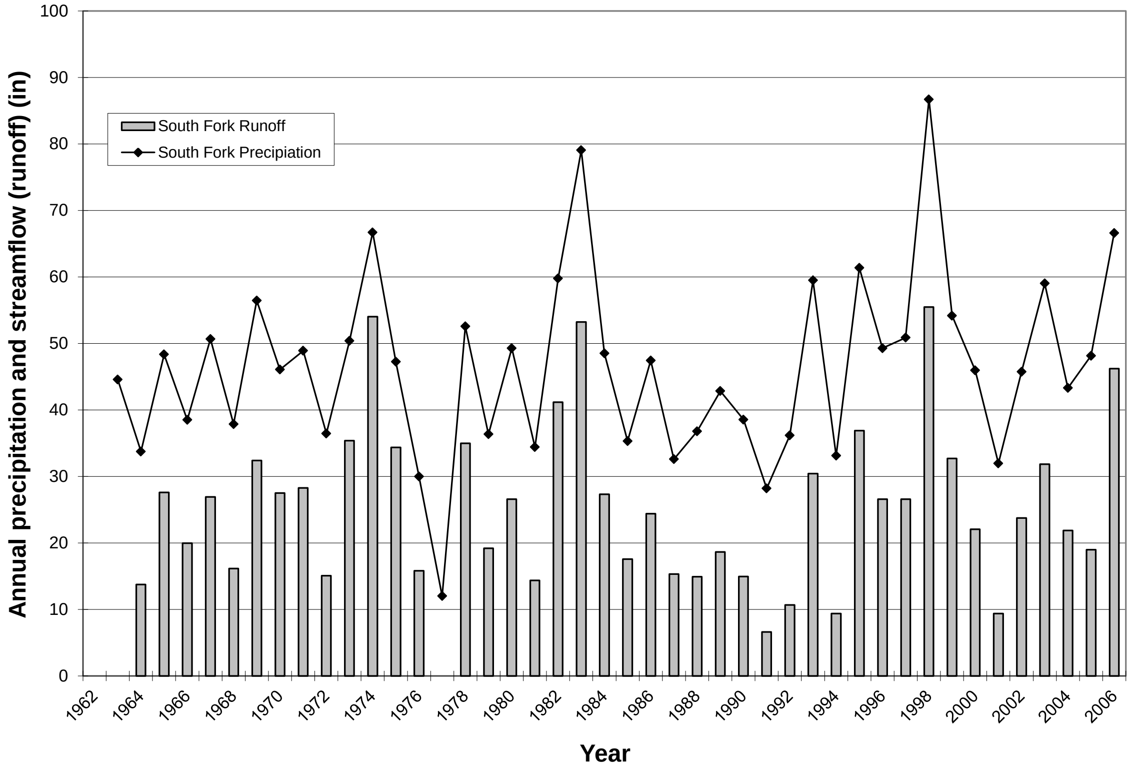


Figure 3.3-3. Annual precipitation and streamflow (runoff) totals for South Fork Caspar Creek, 1963-2006 (United States Department of Agriculture Forest Service 2007). Runoff data are not available prior to 1964 and in 1977. Precipitation data are not available prior to 1963.

Given the similar, and similarly varied, land-use practices, there is little reason to suspect systematic differences in hydrology between primary and secondary assessment area watersheds.

Peak flows

Flood magnitudes for different recurrence intervals for the main river basins in the assessment area were calculated using a Log-Pearson Type III distribution (Table 3.3-2). Based on the peak flow record from the Noyo River, 1951–2008, the largest recorded flood occurred in 1974 (26,600 cubic feet per second [753 cubic meters per second]), which is approximately a 50-year recurrence interval flood (Table 3.3-2, Figure 3.3-4). Peak flow records for the Noyo River for the last 50 years indicate that four years (1956, 1965, 1974, and 1993 water years [i.e., the 12-month period 1 October– 30 September of the year in which the period ends]) with peak flows greater than a 25-year recurrence interval and six years with floods greater than a 10-year recurrence interval have occurred.

The largest recorded flood from the Navarro River peak flood record (1951–2008) occurred in the 1956 water year (64,500 cubic feet per second [694 cubic meters per second] in December 1955); the 1956 water year was only the 4th largest peak flood year at the Noyo gage for the similar time period. The 1956 flood has a recurrence interval of almost 50 years for the Navarro (Table 3.3-2, Figure 3.3-5). Since 1951, two peak floods greater than a 25-year event (1956 and 1974 water years) and eight peak floods greater than a 10-year event have occurred on the Navarro River. Comparison of peak flood recurrence intervals calculated at the Noyo and Navarro gages indicates that the Noyo appears to have had a higher frequency of larger floods (> 25-year recurrence interval). Although higher peak flows do occur in similar years at the Navarro and Noyo gages, the relative recurrence interval magnitude varies between the two gages during larger peak floods. For example, the 1956 and 1995 water years are more prominent floods in the Navarro River, whereas the 1974 and 1993 water years are more prominent floods in the Noyo River. The differences may be attributed to variations in localized storm intensities, drainage area differences that can cause attenuation of peak flood response in larger basins, and potential differences in current and/or historical land use.

Peak flows for a range of recurrence intervals were calculated using data from the four United States Geological Survey stream flow gaging stations located in watershed analysis units within the primary or secondary assessment area (Table 3.3-2). Due to short periods of peak flow records, the precision of estimates of flood magnitudes for different recurrence interval flows in the Garcia River and South Fork Big River are limited. The largest flood of record (1961–1974 water years) in the South Fork Big River occurred in the 1965 water year (Figure 3.3-6). The Garcia River's peak flood record was extended by synthesizing existing data from the Navarro River gage, from which the flood of record is the 1995 water year (37,000 cubic feet per second [1,050 cubic meters per second]) and considered to be close to a 50-year event (Philip Williams and Associates 1996). The second-largest flood of record occurred in the 1986 water year.

Table 3.3-2. Calculated peak flows (Q) for flood recurrence intervals in the primary assessment area watershed analysis units.

Watershed analysis unit	United States Geological Survey gage ID	Drainage area (mi^2)	Calculated peak flow (Q) for recurrence interval (cubic feet per second)					
			2 years (Q_2)	5 years (Q_5)	10 years (Q_{10})	25 years (Q_{25})	50 years (Q_{50})	100 years (Q_{100})
Big River (near Comptche)[a]	11468070	36.2	3,100	5,060	6,360	8,000	Not applicable	Not applicable
Garcia River[b]	11467600	98.5	14,000	22,000	27,000	34,000	39,000	Not applicable
Navarro River (near Navarro)[c]	11468000	303	18,300	32,780	43,450	57,850	68,840	80,150
Noyo River (at Fort Bragg)[c]	11468500	106	6,010	11,125	15,450	21,950	27,750	34,100

[a] Recurrence interval flow data from Big River watershed analysis unit (MRC 2003a). Gaging record only contains 12 years of record; therefore, flows beyond a 25-year return interval are not presented.

[b] Recurrence interval flow data from Garcia River watershed analysis unit (MRC 2003b). Gaging record is extended with synthesized data based on the Navarro River gage data (Philip Williams and Associates 1996). The Garcia River watershed analysis unit ncludes portions of the Gualala River basin.

[c] Calculated in Excel[TM] from United States Geological Survey gage data using a Log-Pearson Type III distribution.

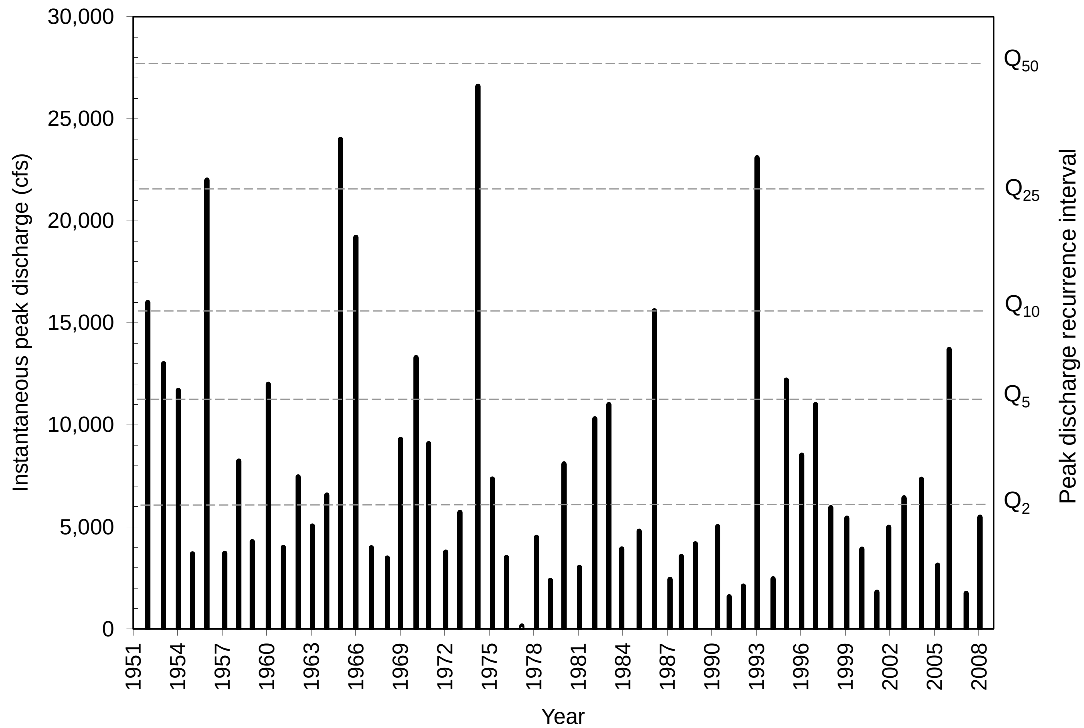


Figure 3.3-4. Peak flows or discharge(Q) for Noyo Creek at Fort Bragg, 1951–2009 (United States Geological Survey Gage 11468500); cfs = cubic feet per second.

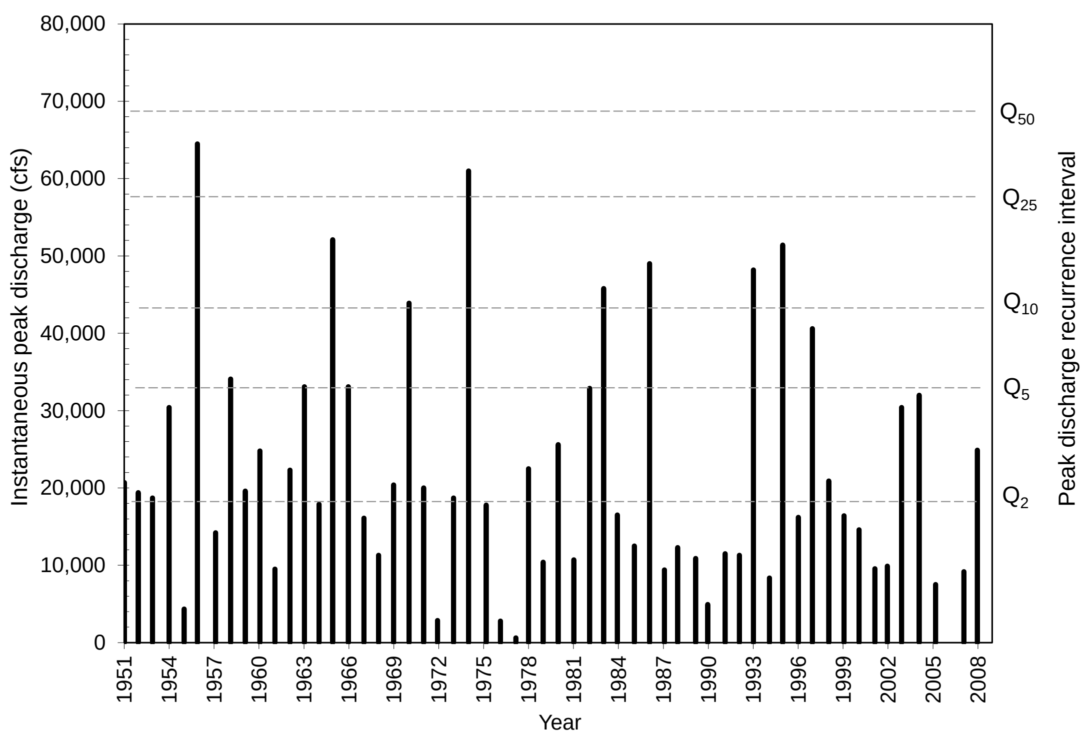


Figure 3.3-5. Peak flows or discharge (Q) for Navarro Creek near Navarro, 1951–2009 (United States Geological Survey Gage 11468000); cfs = cubic feet per second.

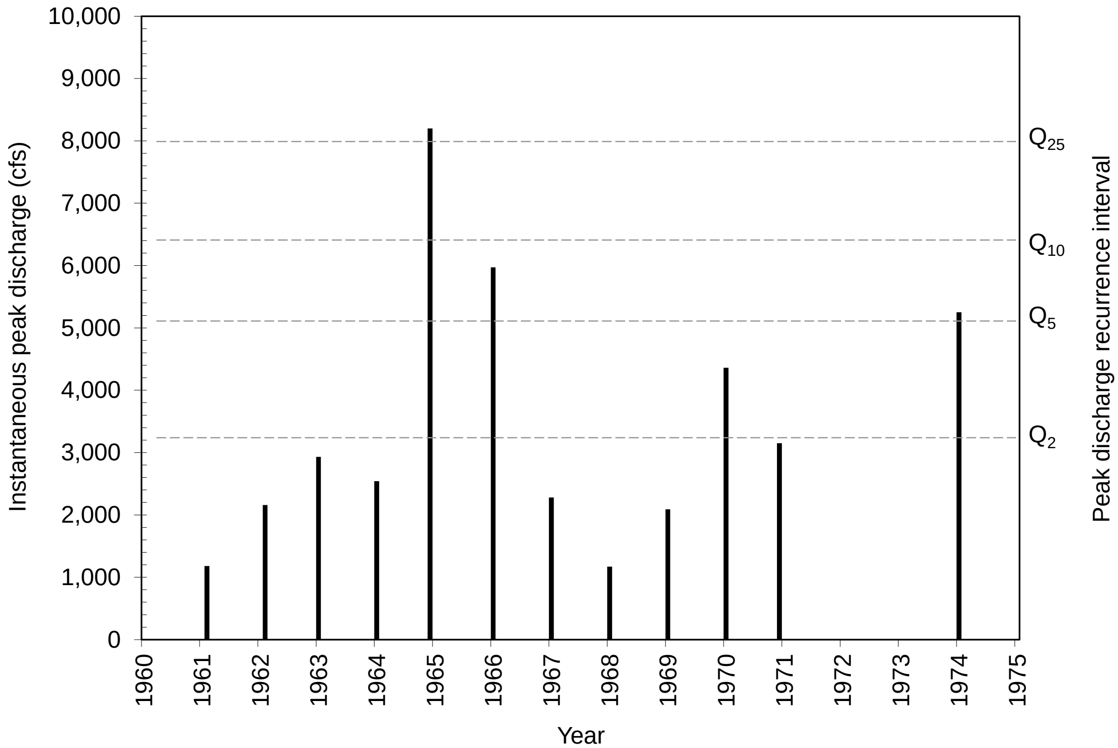


Figure 3.3-6. Peak flows or discharge (Q) for South Fork Big River near Comptche, 1961–1975 (United States Geological Survey Gage 11468070); cfs = cubic feet per second.

Water yield and daily flow frequency

Annual water yield for the Noyo River ranges from 7,920 to 350,420 acre-feet per year and averages 152,860 acre-feet per year (Figure 3.3-7). Comparatively, the Navarro River annual water yield ranges from 18,060 to 948,450 acre-feet per year and averages 368,180 acre-feet per year. The variability in the annual water yield is higher in the Navarro River than in the Noyo River. The driest year of record for both gages was the 1977 water year while the 1983 water year was the wettest. Normalizing the annual water yield by drainage area indicates that in almost all years the Noyo River watershed yields more water per unit area than that of the Navarro River (Figure 3.3-8).

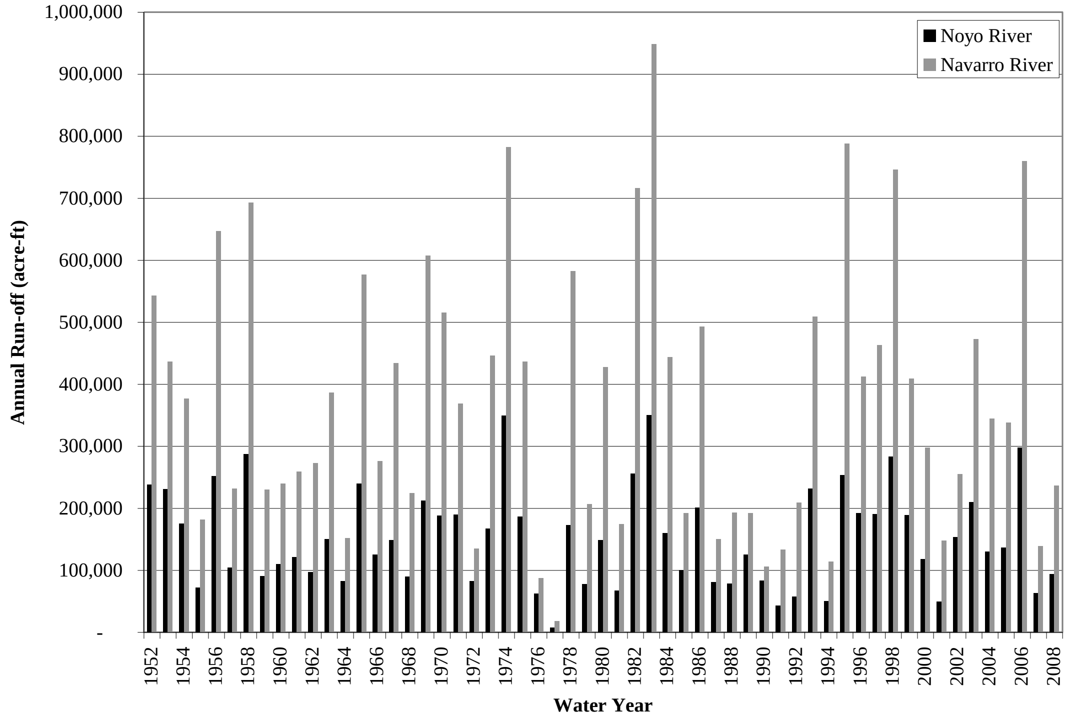


Figure 3.3-7. Annual runoff for Noyo River at Fort Bragg, 1951–2009 (United States Geological Survey Gage 11468500) and the Navarro River near Navarro, 1951–2009 (United States Geological Survey Gage 11468000).

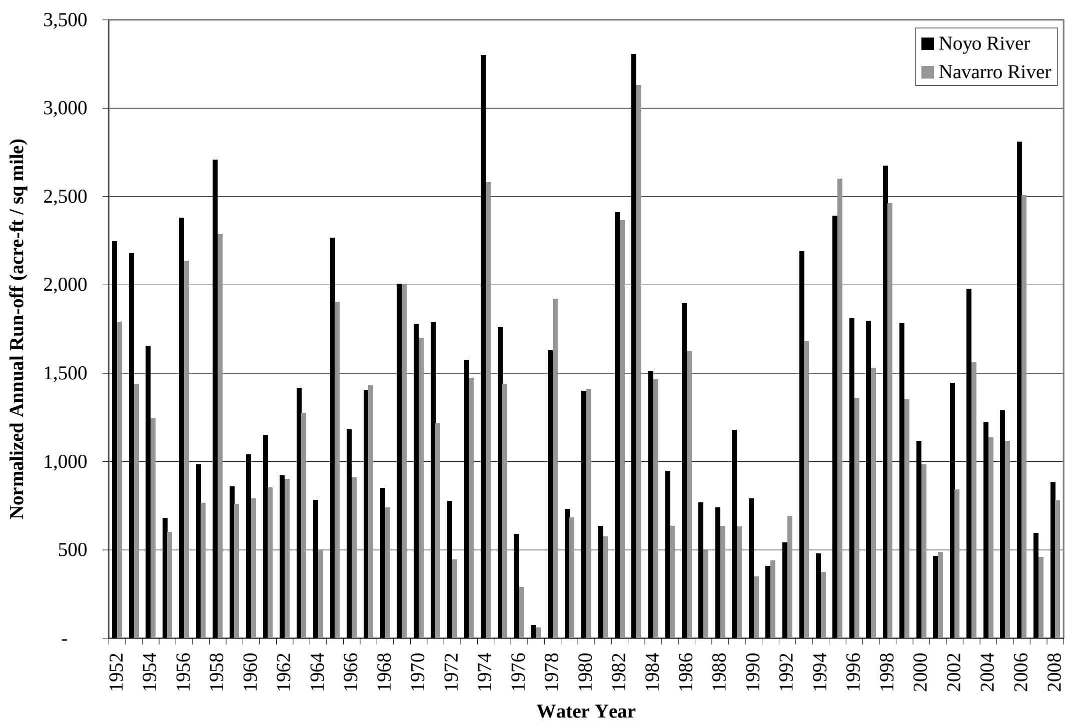


Figure 3.3-8. Annual runoff normalized by drainage area for Noyo River at Fort Bragg, 1951-2009 (United States Geological Survey Gage 11468500) and the Navarro River near Navarro, 1951–2009 (United States Geological Survey Gage 11468000).

Flow exceedance curves of the mean daily flow record indicate that flow regimes are extremely variable in both the Noyo and Navarro River watersheds. Flows vary by more than four orders of magnitude, and for both gages the 10% exceedance flows are more than 100 times greater than the 90% exceedance flows (Figure 3.3-9). This is consistent with a Mediterranean climate (see prior sections), where rainfall and associated runoff are seasonal and infrequent large storms result in extrememly high discharge volumes and flooding.

For a given exceedance probability, flows in the Navarro River are generally 2 to 2.5 times greater than the Noyo River, although the drainage area of the Navarro River watershed is approximately 3 times greater than that of the Noyo River (Table 3.3-2). The median flow (50% exceedance probability) is 33 cubic feet per second in the Noyo River and 58 cubic feet per second in the Navarro River.

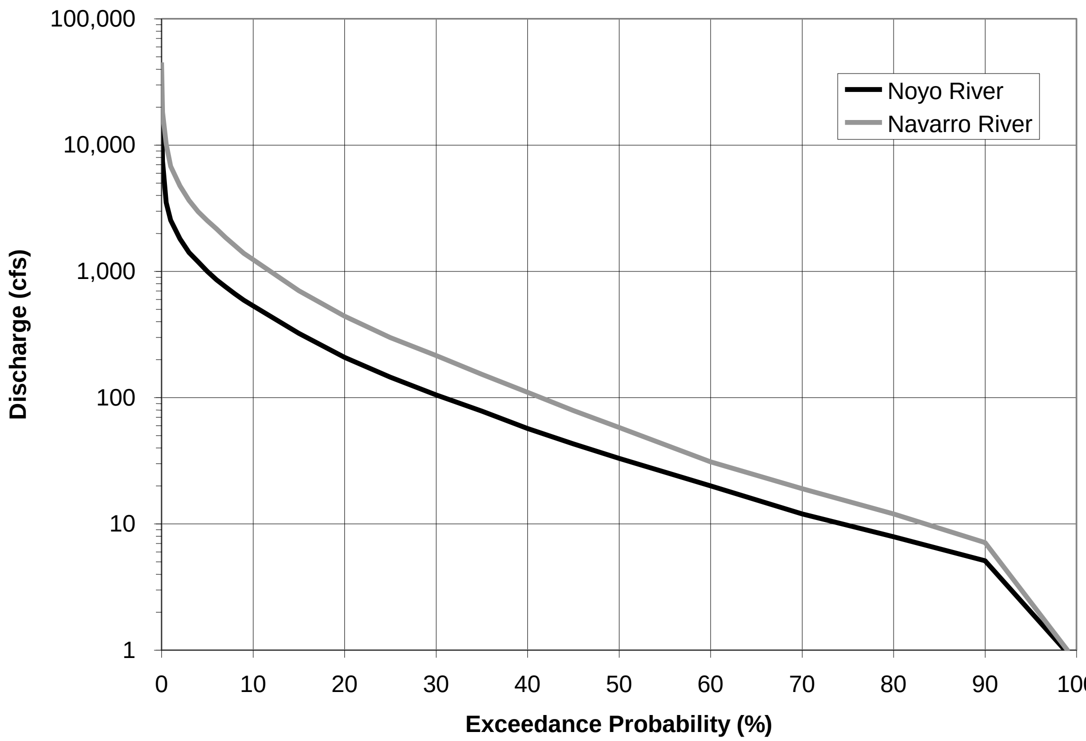


Figure 3.3-9. Flow exceedance curves of the mean daily flow record for Noyo River at Fort Bragg, 1951–2009 (United States Geological Survey Gage 11468500) and the Navarro River near Navarro, 1951–2009 (United States Geological Survey Gage 11468000); cfs = cubic feet per second.

The low-flow period in the assessment area is typically from June through September. At the Noyo River gage (United States Geological Survey Gage 11468500), mean daily flows in the low-flow period typically range between 6 and 25 cubic feet per second, and average approximately 15 cubic feet per second (Figure 3.3-10). The annual variability in the mean low flow, as well as the maximum flow during the low-flow period, appears to increase at the Noyo River gage after 1980, as compared with the annual variability from 1951 to 1980. At the Navarro River gage (United States Geological Survey Gage 11468000), mean daily flows in the low-flow period usually range between 10 and 40 cubic feet per second, and average approximately 25 cubic feet per second (Figure 3.3-11). A similar increase in the annual variability at the Navarro

River gage is evident after about 1980. The variability at both the Navarro and Noyo river gages may be due to changes in regional climatic conditions such as seasonal coastal fog cover and precipitation; however, additional data are needed to assess the validity of the apparent trend and reasons for its existence.

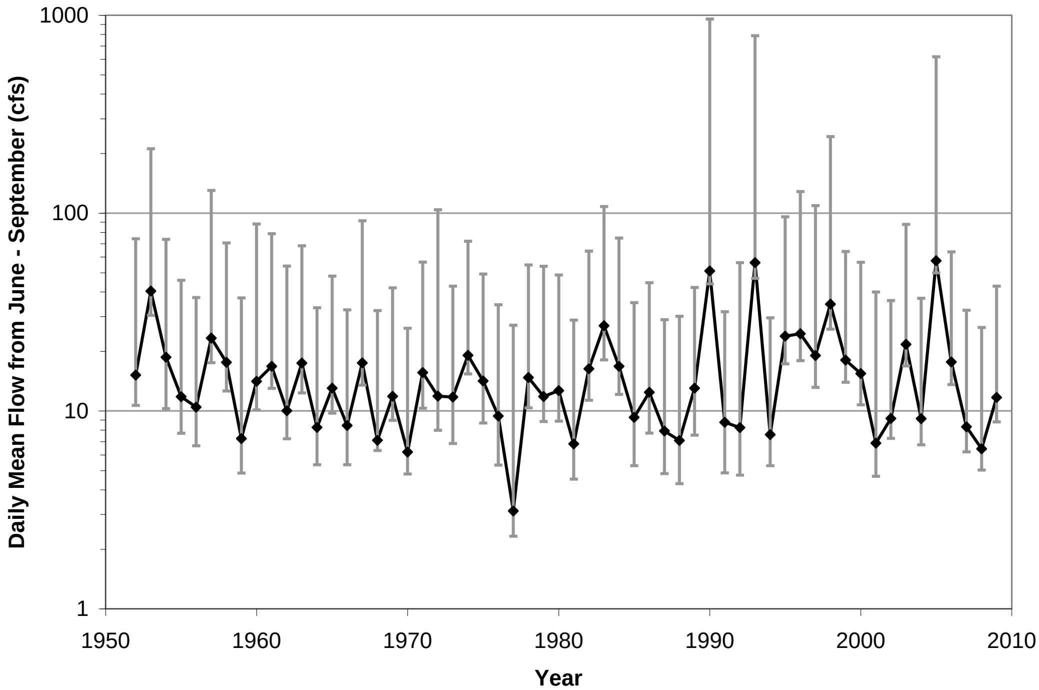


Figure 3.3-10. Daily mean flow during the low-flow period (June–September) for Noyo River at Fort Bragg, 1951–2009 (United States Geological Survey Gage 11468500). Bars represent the maximum and minimum flow during the period; cfs = cubic feet per second.

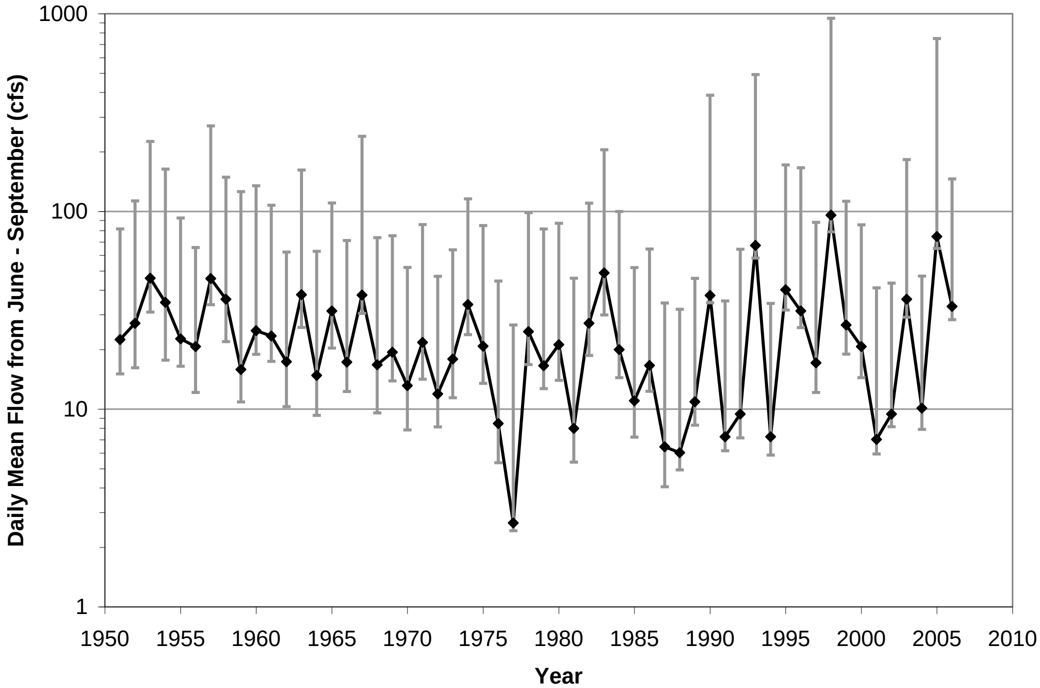


Figure 3.3-11. Daily mean flow during the low-flow period (June–September) for Navarro River near Navarro, 1951–2009 (United States Geological Survey Gage 11468000). Bars represent the maximum and minimum flow during the period; cfs = cubic feet per second.

3.3.1.3 Designated beneficial uses of water

Designated beneficial uses of water as defined in the California Porter-Cologne Water Quality Control Act in the assessment area for hydrology and water quality are described in Table 3.3-3. Beneficial uses for each major water body in the primary assessment area, as identified by the North Coast Regional Water Quality Control Board, are listed in Table 3.3-4 (North Coast Regional Water Quality Control Board 2006).

Table 3.3-3. Designated beneficial uses of water in the primary assessment area.

Description
Agricultural Supply Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
Aquaculture Uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.
Cold Freshwater Habitat Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Commercial and Sport Fishing Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

Description
Native American Culture Uses of water that support the cultural and/or traditional rights of indigenous people such as subsistence fishing and shellfish gathering, basket weaving and jewelry material collection, navigation to traditional ceremonial locations, and ceremonial uses.
Estuarine Habitat Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).
Freshwater Replenishment Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).
Ground Water Recharge Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
Hydropower Generation Uses of water for hydropower generation.
Industrial Process Supply Uses of water for industrial activities that depend primarily on water quality.
Industrial Service Supply Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
Marine Habitat Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).
Migration of Aquatic Organisms Uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish.
Municipal and Domestic Supply Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
Navigation Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.
Water Contact Recreation Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
Non-contact Water Recreation Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Rare, Threatened, or Endangered Species Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.
Shellfish Harvesting Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sports purposes.

Description
Spawning, Reproduction, and/or Early Development Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
Warm Freshwater Habitat Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Wildlife Habitat Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Source: North Coast Regional Water Quality Control Board 2006.

Table 3.3-4. Designated beneficial uses of water for water bodies in the primary assessment area watershed analysis units (North Coast Regional Water Quality Control Board 2006).

Watershed analysis unit[a]	Designated beneficial use[b]																					
	Municipal and domestic supply	Agricultural supply	Industrial service supply	Industrial process supply	Ground water recharge	Freshwater replenishment	Navigation	Hydropower generation	Water contact recreation	Non-contact water recreation	Commercial and sport fishing	Warm freshwater habitat	Cold Freshwater habitat	Wildlife habitat	Rare, threatened, or endangered species	Marine habitat	Migration of aquatic organisms	Spawning, reproduction, and/or early development	Shellfish harvesting	Estuarine habitat	Aquaculture	Native American culture
Albion River	E	E	E	P	E	E	E	P	E	E	E	-	E	E	E	-	E	E	-	E	P	-
Alder Creek/Schooner Gulch	E	E	E	P	E	E	E	P	E	E	E	-	E	E	E	-	E	E	-	E	P	-
Big River	E	E	E	P	E	E	E	P	E	E	E	-	E	E	E	-	E	E	-	E	P	-
Cottaneva Creek[c]	E	P	P	P	P	P	P	-	P	P	E	P	P	E	E	P	P	P	-	E	P	P
Elk Creek	P	P	E	P	E	E	E	P	E	E	E	-	E	E	E	-	E	E	-	E	P	-
Garcia River[d]	E	E	E	P	-	E	E	P	E	E	E	-	E	E	E	-	E	E	-	E	P	-
Greenwood Creek	E	E	E	P	E	E	E	P	E	E	E	-	E	E	E	-	E	E	-	E	P	-
Navarro River	E	E	E	P	E	E	E	P	E	E	E	-	E	E	E	-	E	E	-	E	P	-
Noyo River	E	E	E	P	E	E	E	E	E	E	E	-	E	E	E	-	E	E	-	E	E	-
Rockport Small Coastal Streams	E	E	E	P	E	E	E	P	E	E	E	-	E	E	E	-	E	E	-	E	P	-
Upper Russian River	E	E	E	P	E	E/-	E	E/P	E	E	E	E	E	E	E	-	E	E	P/-	-	P	-

[a] Hollow Tree Creek watershed analysis unit does not have designated beneficial uses.
[b] P = Potential; E = Existing
[c] Cottaneva Creek beneficial uses are those listed as “Minor Coastal Streams” by North Coast Regional Water Quality Control Board 2006.
[d] Includes portions of the Gualala River basin.

With the possible exception of bacterial contamination of municipal and recreational uses, the aquatic resources associated with maintenance of resident and anadromous fisheries are generally considered to be the most sensitive beneficial uses (North Coast Regional Water Quality Control Board 2001a). The existing conditions narrative presented here is also provided to determine whether the other identified beneficial uses (primarily municipal and domestic water supply and water-contact recreation) are currently affected by forest management activities or are susceptible to future effects.

Agriculture, domestic, municipal, and industrial water uses

Water supply in the assessment area is limited (North Coast Regional Water Quality Control Board 2001a). Agricultural water use occurs in more areas than domestic, municipal and industrial use, particularly in the Eel River watershed. Groundwater throughout the region is also used for domestic, agricultural, and industrial supply. Shallow groundwater is frequently used for domestic supply. Shallow groundwater is often interconnected to deeper aquifers through intervening geologic layers.

Major appropriative water rights in Mendocino County (on the order of thousands of acre-feet per year) are along the Russian and Eel rivers, which are both outside of the assessment area. While there are a few appropriative water rights within the assessment area, they are relatively small (i.e., less than 1,000 acre-feet per year) surface water diversions (Electronic Water Rights Information Management System database accessed 14 September 2009). For example, water rights on Garcia Creek and the Navarro River in Anderson Valley range from less than 100 to greater than 500 acre-feet per year, with water uses mainly for agriculture (e.g., vineyards, ranching). The City of Fort Bragg draws about 60% of its water supply from an intake on the Noyo River, 2.5 mi (4 km) downstream of the confluence of the South Fork Noyo River with the mainstem (SHN Consulting Engineers & Geologists, Inc. 1995). The City's entitlement at the diversion is 3 cubic feet per second (0.08 cubic meters per second) year-round, with a maximum of 1,500 acre-feet per year (1,851,000 cubic meters per year), but the actual diversion averages less than 1 cubic foot per second because of low-flow and bypass requirements. This diversion is screened with a CDFG-approved fish screen to reduce the potential for fish entrainment. Although at much smaller appropriation (40.3 acre-feet per year [49,709 cubic meters per year]), the Elk County Water District draws water from the Greenwood Creek (subterranean stream). The Lower Noyo River planning watershed is not within the primary assessment area; however, MRC management activities in the Noyo River watershed have the potential to affect the water quality in the lower watershed, since MRC forestlands occupy a substantial portion of the Noyo River watershed.

Fish and wildlife uses

The condition of fisheries and aquatic habitat is discussed in Section 3.4 (Aquatic and Riparian Habitats and Species of Concern) and conditions related to wildlife are discussed in Section 3.6 (Terrestrial Habitat and Wildlife Species of Concern). Effects on the Cold Freshwater Habitat beneficial use, considered to be the most sensitive beneficial use for aquatic species, are considered in Section 3.3.2.

Recreational uses

Recreational beneficial uses relate to whether receiving waters are safe for human contact, swimming, and the incidental ingestion of water potentially occurring during these activities. Recreational use occurs in the assessment area in both fresh and salt water (North Coast Regional Water Quality Control Board 2006). Recreational use on MRC lands is limited to permit holders (Table 3.3-5), although recreational use without a permit does commonly occur on MRC property. The coastal area receiving the greatest permitted recreational use is the Rockport Beach.

The Navarro River receives the largest level of permitted recreational use in the primary assessment area. Fishing and river running are popular on the rivers, while fishing, clamming and beach combing predominate at the ocean beaches and bays. Tourism is an important recreational activity throughout all of the North Coast Region.

Table 3.3-5. Estimated monthly usage for permitted recreational activities in the primary assessment area.

Area	Recreation theme	# of Permits or leases per year	Total user days per year	Month											
				J	F	M	A	M	J	J	A	S	O	N	D
Various	Hiking/ Horseback riding	30	80	-	-	5	10	10	10	10	10	10	10	5	-
Various	Mushroom picking	5	30	10	-	-	-	-	-	-	-	-	-	10	10
Various	Birdwatching	5	24	2	2	2	2	2	2	2	2	2	2	2	2
Big River	Hunting	1	360	-	-	-	10	-	-	50	150	100	50	-	-
Buehler Ranch	Hunting	1	210	-	-	-	10	-	-	20	80	80	20	-	-
Garcia	Hunting	1	360	-	-	-	10	-	-	50	150	100	50	-	-
Navarro East	Hunting	1	360	-	-	-	10	-	-	50	150	100	50	-	-
Navarro River West	Fishing	5	170	50	50	50	-	-	-	-	-	-	-	-	20
Cape Horn	Camping	5	40	-	-	-	-	-	10	20	10	-	-	-	-
Elk Creek	Hunting	1	360	-	-	-	10	-	-	50	150	100	50	-	-
Noyo	Hunting	1	210	-	-	-	10	-	-	20	80	80	20	-	-
Rockport Guest House	Vacation rental	45	390	10	10	20	20	60	60	60	60	40	20	20	10
Rockport Beach	Camping	7	500	-	-	-	50	50	80	200	50	50	20	-	-
Rockport	Hunting	1	360	-	-	-	10	-	-	50	150	100	50	-	-
Rockport Beach	Fishing	5	30	5	5	5	-	-	-	-	-	-	5	5	5
Rockport Beach	Day beach use	15	60	5	5	5	5	5	5	5	5	5	5	5	5
Ukiah Tract	Hunting	1	210	-	-	-	10	-	-	20	80	80	20	-	-
Total		**130**	**3,754**	**82**	**72**	**87**	**167**	**127**	**167**	**607**	**1,127**	**847**	**372**	**47**	**52**

Source: MRC (2003f).

3.3.1.4 Water quality

Applicable surface-water quality objectives and criteria for beneficial uses in the primary assessment area are listed in Table 3.3-6.

Table 3.3-6. Applicable surface-water quality objectives and criteria for the primary assessment area.

Parameter	Criteria/Limit	Applicable beneficial uses	Source
Suspended Material	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.	All	North Coast Regional Water Quality Control Board (2011)
Settleable Material	Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or adversely affect beneficial uses.	All	North Coast Regional Water Quality Control Board (2011)
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.	All	North Coast Regional Water Quality Control Board (2011)
Turbidity	Turbidity shall not be increased more than 20% above naturally occurring background levels. Allowable zones of dilution within which higher percentages can be tolerated may be defined for specific discharges upon the issuance of discharge permits or waiver thereof.	All	North Coast Regional Water Quality Control Board (2011)
Temperature	The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the North Coast Regional Water Quality Control Board that such alteration in temperature does not adversely affect beneficial uses. The temperature of any cold or warm freshwater habitat shall not be increased by more than 5ºF (2.8ºC) above natural receiving water temperature.	Cold Freshwater Habitat and Warm Freshwater Habitat; for nontidal waters	North Coast Regional Water Quality Control Board (2011)
Dissolved oxygen	5.0 mg per liter minimum.	Warm Freshwater Habitat and Marine Habitat	North Coast Regional Water Quality Control Board (2011)
	6.0 mg per liter minimum.	Cold Freshwater Habitat	
	7.0 mg per liter minimum.	Spawning, Reproduction, and/or Early Development	
	9.0 mg per liter minimum.	Spawning, Reproduction, and/or Early Development during critical spawning and egg incubation periods	
	7.0 mg per liter minimum; 7.5 mg per liter as a 90% lower limit (i.e., 90^{th} percentile value for a calendar year, where 90% or more of the values must be greater than or equal to a lower limit.); and 10.0 mg per liter as a 50% lower limit (i.e., 50^{th} percentile value of the monthly means for a calendar year, where 50% or more of the monthly means must be greater than or equal to a lower limit.)	Additional dissolved oxygen objectives applicable to the South Fork Eel River, Ten Mile River, Noyo River, Big River, Albion River, Navarro River, Garcia River, Gualala River, and Russian River	

Parameter	Criteria/Limit	Applicable beneficial uses	Source
Biostimulatory Substances	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.	All	North Coast Regional Water Quality Control Board (2011)
Fecal coliform	Median fecal coliform concentration of 5 or more samples collected in a 30-day period <50 per 100 ml. No more than 5 samples in a 30-day period can exceed this value.	Water Contact Recreation	North Coast Regional Water Quality Control Board (2011), California Department of Health Services (California Department of Health Services 2006)
	No more than 10% of total samples during any 30-day period can exceed a fecal coliform concentration of 400 per 100 ml.	Water Contact Recreation	
	Fecal coliform concentration < 43 per 100 ml for a 5-tube decimal dilution test, or Fecal coliform concentration < 49 per 100 ml for a 3-tube decimal dilution test.	Shellfish Harvesting	North Coast Regional Water Quality Control Board (2011)
pH	The pH shall not be depressed below 6.5 units nor raised above 8.5 units.	All	North Coast Regional Water Quality Control Board (2011)
	Changes in normal ambient pH levels shall not exceed 0.2 units within the range specified above.	Cold Freshwater Habitat, Warm Freshwater Habitat	

Timber harvesting and other land uses (e.g., cattle grazing, recreation) have the potential to alter water quality, thereby affecting other beneficial uses of water bodies. The North Coast Regional Water Quality Control Board is responsible for implementing and regulating water quality control plans for the North Coast Hydrologic Unit Basin Planning Area of northern California through administration of the Basin Plan (North Coast Regional Water Quality Control Board 2006). The Basin Plan provides a definitive program of actions designed to preserve and enhance water quality and to protect beneficial uses of water in the North Coast Region.

Total Maximum Daily Load development

In accordance with Section 303(d) of the Clean Water Act, the North Coast Regional Water Quality Control Board has listed several basins in the primary assessment area as impaired for sediment or temperature. This designation is assigned to streams where established water quality objectives as specified in the Basin Plan are not being met or where beneficial uses are not protected. Placement of a waterbody on the 303(d) List acts as the trigger for developing a pollution control plan, called a Total Maximum Daily Load, for each water body and associated pollutant/stressor on the list. The Total Maximum Daily Load serves as the means to attain and maintain water quality standards for the impaired water body. During each 303(d) listing cycle, the water bodies on the list are prioritized and a schedule is established for completing the Total Maximum Daily Loads. Thus far, several water bodies in the primary assessment area, including in the Albion River, Big River, Garcia River, Hollow Tree Creek, Navarro River, and Noyo River watershed analysis units, have been placed on the 303(d) list as impaired for either sediment or temperature. The Gualala River and the Eel River (South Fork) (Hollow Tree Creek watershed analysis unit) were also recently listed for aluminum in 2008. As shown in Table 3.3-7, temperature Total Maximum Daily Loads for three rivers within the primary assessment area (Big

River, Garcia River, Gualala River, and the Noyo River) have not yet been developed (MRC 2012).

Table 3.3-7. Total Maximum Daily Loads in the primary assessment area (Source: North Coast Regional Water Quality Control Board 2009).

Watershed analysis unit[a]	Total Maximum Daily Load completion date	Pollutant
Albion River	2001	Sediment
	2019[b]	Temperature
Big River	2004	Sediment
	2019[b]	Temperature
Garcia River[c]	2002	Sediment
	2019[b]	Temperature
Hollow Tree Creek[d]	2021[b]	Aluminum
	1999	Sediment
	1999	Temperature
Navarro River	2000	Sediment
	2000	Temperature
Noyo River	1999	Sediment
	2019[b]	Temperature

[a] Alder Creek/Schooner Gulch, Cottoneva Creek, Elk Creek, Greenwood Creek, Rockport Small Coastal Streams, and Upper Russian River watershed analysis units are not listed as impaired for water quality.
[b] The Total Maximum Daily Load completion date is the date the Environmental Protection Agency approved or is expected to approve the Total Maximum Daily Load.
[c] Includes portions of the Gualala River basin.
[d] Hollow Tree Creek watershed analysis unit is included in the Eel River (South Fork) Total Maximum Daily Load.

Suspended sediment and turbidity

A number of factors control suspended sediment and turbidity in streams, including climate, hydrology, geology, fire regimes, and land management practices. While suspended sediment is a measure of concentration, turbidity is an optical property referring to the amount of light scattered or absorbed by a fluid, and is measured in nephelometric turbidity units. The exact relationship between turbidity and suspended sediment is dependent on the parent geology and must be determined for each watershed (Montgomery 1985, MacDonald et al. 1991). Turbidity affects organisms directly (e.g., interfering with vision) or indirectly by changing water temperature and dissolved oxygen, and is often associated with the sorption of contaminants from the water column (e.g., polar organics and cationic metal forms). Municipal and domestic water supply beneficial uses can also be adversely affected by changes in suspended sediment concentrations and turbidity in streams.

Suspended sediment and turbidity sources to streams in the primary assessment area include inflows, bank erosion, and resuspension of localized bed sediments during scouring high flows (Section 3.2; Geology, Soils, and Geomorphology). The North Coast Regional Water Quality Control Board (2006) narrative water quality objective for sediment states that the suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses (Table 3.3-6). While multiple designated beneficial uses (Table 3.3-4) are present in the assessment area, the Cold

Freshwater Habitat beneficial use associated with salmonids is typically the most sensitive to increased levels of sediment and turbidity (NCRWQCB 2001a). The numeric water quality objective for turbidity indicates that turbidity shall not be increased more than 20% above naturally occurring background levels (Table 3.3-6). As shown in Table 3.3-7, multiple streams in the primary assessment area are impaired for sediment meaning that they do not currently meet the numeric water quality objective for turbidity and/or the narrative objective for sediment, and they do not support designated beneficial uses, including Cold Freshwater Habitat.

While turbidity data are not readily available for all of the 303(d)-listed waterbodies in assessment area, some data are available for several creeks in the Garcia River watershed analysis unit and the Noyo River watershed analysis unit in the primary assessment area, and South Fork Wages Creek and the North and South Forks of Caspar Creek in the in the secondary assessment area. These data are presented below as generally representative of turbidity conditions for those watershed analysis units in the primary assessment area that currently have waterbodies impaired for sediment (i.e., Albion River, Big River, Garcia River, Hollow Tree Creek, Navarro River, and Noyo River watershed analysis units).

In the Garcia River watershed (listed as sediment impaired, see Table 3.3-7), turbidity data collected from 2004–2005 ranged up to 1,800 nephelometric turbidity units in the mainstem and in tributaries, with peaks generally occurring during late winter and early spring and corresponding to higher flows (Barber and Birkas 2006). At most sampling locations, the number of hours that turbidity values were in excess of 30 nephelometric turbidity units, 60 nephelometric turbidity units, or 150 nephelometric turbidity units ranged from approximately 11 to over 700 (equivalent to 0.5–32 days) (Table 3.3-8). The data indicate a positive relationship between the number of hours above turbidity thresholds and both road density and timber harvest intensity (Figure 3.3-12 and Figure 3.3-13, Barber and Birkas 2006).

Table 3.3-8. Total hours above turbidity thresholds of 30, 60, and 150 nephelometric turbidity units in Garcia River watershed turbidity sampling stations 2004–2005 (Source: Barber and Birkas 2006).

Turbidity (nephelometric turbidity unit) Thresholds	Garcia Creek	Mill Creek	Pardaloe Creek	South Fork Garcia Creek	Whitlow Creek
2004					
> 30	759.8	207.3	205.7	203.8	343.7
> 60	335.7	101.5	110.3	125.3	152.5
> 150	156.8	39.5	42.2	39.8	62.8
2005					
> 30	335.8	253.3	184.8	145.7	435.5
> 60	97.7	145.5	57.8	60.5	165.7
> 150	36.5	11.3	13.5	16.2	43.5

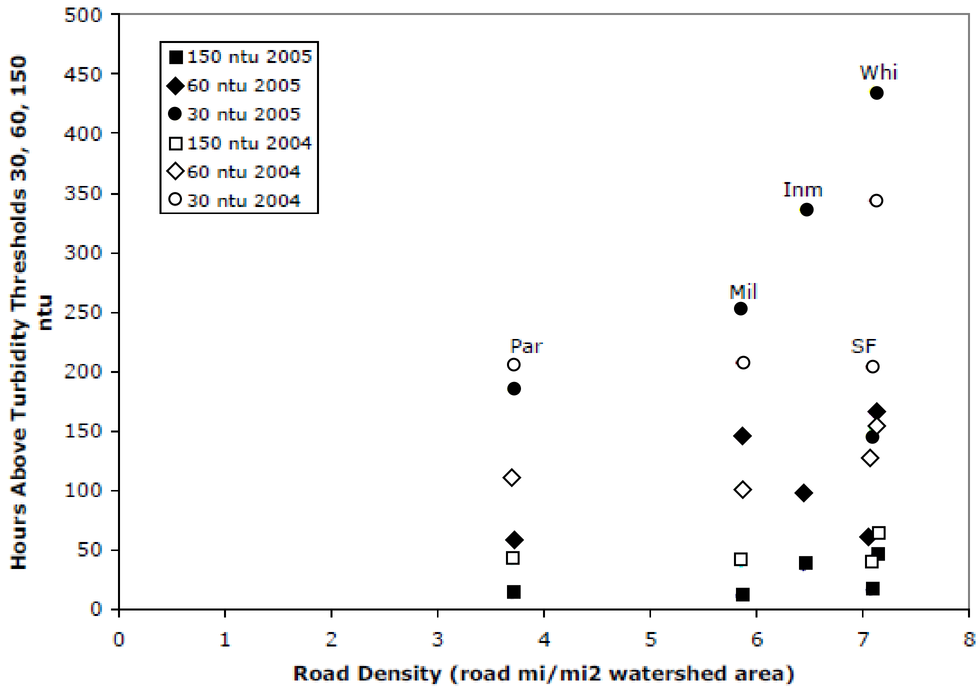


Figure 3.3-12. Hours above turbidity thresholds versus road density in the Garcia River watershed. Inm = Inman Creek, Mil = Mill Creek, Par = Pardaloe Creek, SF = South Fork, Whi = Whitlow Creek; ntu = nephelometric turbidity unit (Source: figure is modified from Barber and Birkas 2006 to be a black and white image).

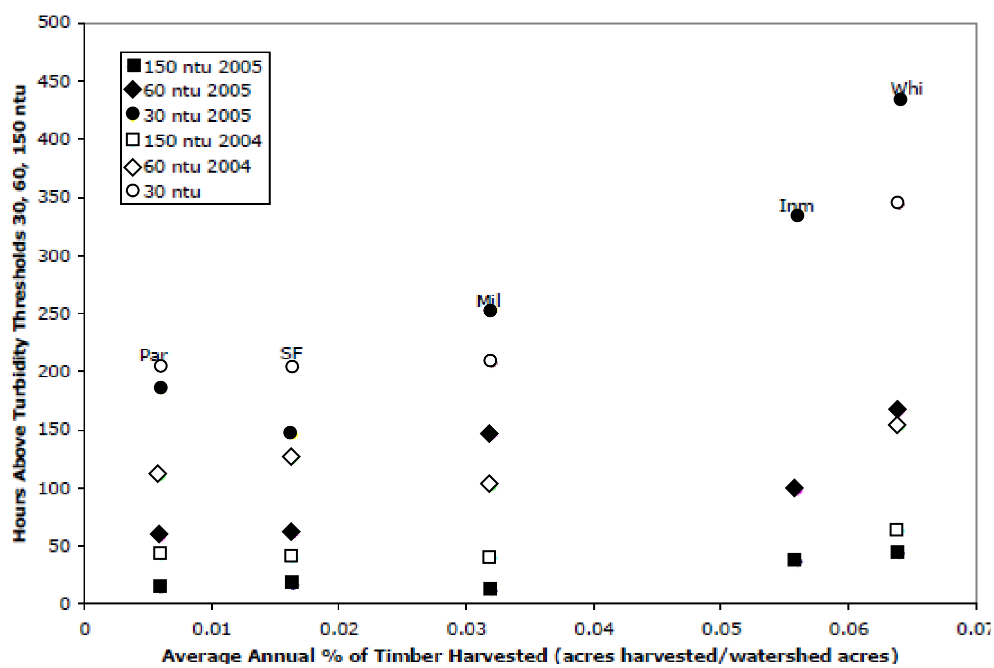


Figure 3.3-13. Hours above turbidity thresholds versus timber harvest in the Garcia River watershed. Inm = Inman Creek, Mil = Mill Creek, Par = Pardaloe Creek, SF = South Fork, Whi = Whitlow Creek; ntu = nephelometric turbidity unit (Source: figure is modified from Barber and Birkas 2006 to be a black and white image).

Beginning in the 1960s and continuing to the present, the amount of sediment delivered to the Noyo River and its tributaries as a result of watershed disturbance has exceeded the river's ability to remove it (the Noyo River is listed as sediment impaired, see Table 3.3-7). The United States Army Corps of Engineers currently conducts annual dredging of the harbor channel, demonstrating the impact of continued sediment deposition on the lower channel (LaVen et al. 2002). In 1990, the City of Fort Bragg's water intake on the Lower Noyo River was relocated due to problems with sedimentation of infiltration galleries (LaVen et al. 2002). Turbidity caused by fine sediment is a water quality concern for the City's drinking water supply due to increased demand for coagulant use and filtration facilities.

In South Fork Wages Creek, located in the secondary assessment area, turbidity measured from November 2003 to March 2004 averaged 1–5 nephelometric turbidity units during low flow events (i.e., less than 15 cubic feet per second), peaked during winter months at 23 nephelometric turbidity units corresponding to higher flows (i.e., approximately 55 cubic feet per second), and was positively correlated with suspended sediment concentrations (Figure 3.3-14, Graham Matthews & Associates 2004).

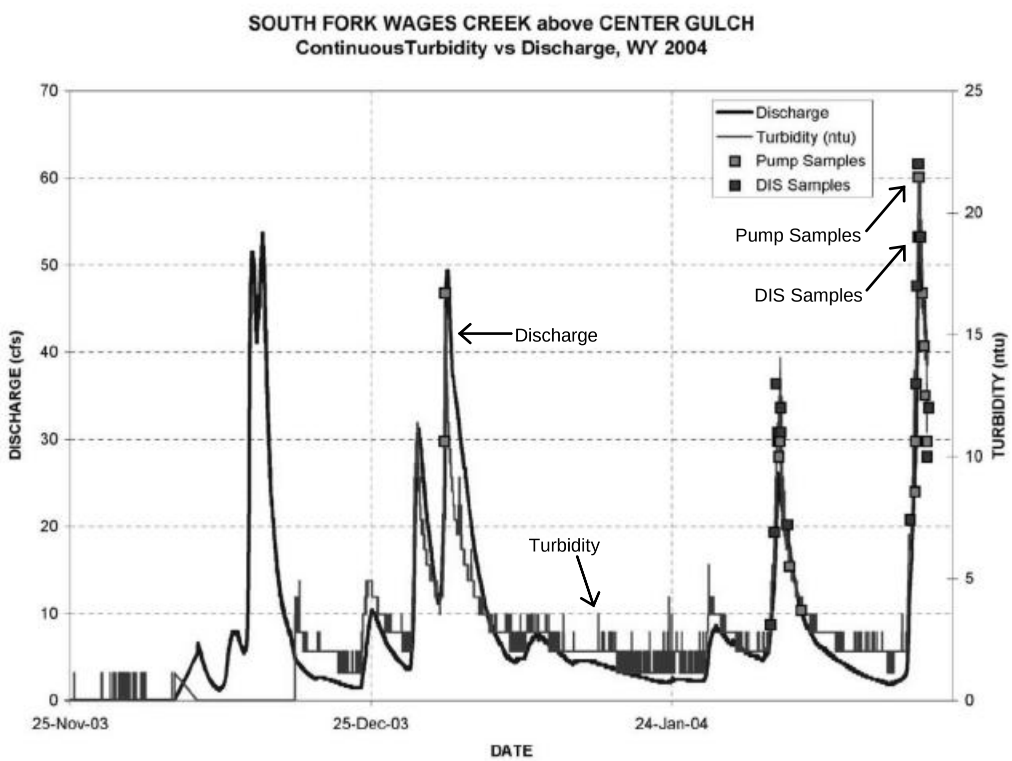


Figure 3.3-14. South Fork Wages Creek Turbidity 2003-2004 (Source: figure is modified from Graham Matthews & Associates 2004 to be a black and white image); cfs = cubic feet per second; ntu = nephelometric turbidity unit.

Finally, in the Jackson Demonstration State Forest, turbidity monitored in North and South Forks of Caspar Creek from 1996–1999 documented few exceedances greater than 500 nephelometric turbidity units (i.e., less than one day per year); exceedances greater than 100 nephelometric turbidity units occurred from less than one day per year up to 9.2 days in South Fork during 1999 (Table 3.3-9; CAL FIRE 2005).

Table 3.3-9. Turbidity frequency expressed in the number of days exceeded 1996–1999 for North Fork and South Fork Caspar Creek (Source: CAL FIRE 2005).

Turbidity (nephelometric turbidity units)	1996		1997		1998		1999	
	North Fork	South Fork	North Fork	South Fork	North Fork	South Fork	North Fork	South Fork
40	7.9	4.6	12.7	13.0	32.1	33.6	14.8	25.9
60	2.8	2.0	8.2	6.5	12.9	20.1	6.8	10.9
80	1.1	1.2	7.0	4.2	7.0	13.0	3.1	7.1
100	0.8	0.6	5.8	3.4	4.7	9.2	1.5	5.1
150	0.4	0.3	2.2	2.2	2.0	5.1	0.7	2.9
200	0.3	0.2	1.5	1.5	0.9	2.9	0.5	1.7
250	0.1	0.0	1.0	0.8	0.4	1.9	0.4	1.1
300	0.1	0.0	0.8	0.5	0.2	1.3	0.3	0.9
400	0.1	0.0	0.6	0.3	0.2	0.7	0.2	0.5
500	0.0	0.0	0.6	0.2	0.1	0.4	0.2	0.4

Water temperature

Water temperature is influenced by many factors including latitude, altitude, season, time of day, flow, channel width and depth, groundwater flow, stream shading from topography or vegetation, and coastal fog (MacDonald et al. 1991). Stream temperature is an important habitat parameter for coho salmon, steelhead, and many amphibians, aquatic macroinvertebrates, and other organisms, potentially influencing reproductive success and survival during all freshwater life stages (e.g., Bjornn and Reiser 1991).

The North Coast Regional Water Quality Control Board (2006) temperature criteria state that the water temperature shall not be increased by more than 5ºF (2.8ºC) above natural receiving water temperature for any waters supporting cold or warm freshwater habitat (Table 3.3-6). Several basins in the primary assessment area have been listed as impaired for temperature under Section 303(d) of the Clean Water Act, including Albion River, Big River, Garcia River, Hollow Tree Creek, Navarro River, and Noyo River (Table 3.3-7). Water temperature suitability thresholds for aquatic organisms, particularly anadromous salmonids can be evaluated using a variety of criteria. The maximum weekly average temperature (calculated as the maximum of the daily average temperatures, recorded over a moving seven-day period during the period of interest; e.g., the summer) approach is recommended by the North Coast Regional Water Quality Control Board (per NMFS and USFWS 1997). Another potentially useful metric for summer water temperature in streams is the maximum weekly maximum temperature (calculated as the maximum of the daily maximum termperatures, recorded over a moving seven-day period during the period of interest). (Oregon Department of Environmental Quality 1995, as cited in Sullivan et al. 2000). The highest instantaneous maximum temperature in a stream can also be used as a metric of water quality.

Stream temperature monitoring has been conducted by MRC and the previous land owner for several rivers and major tributaries on MRC timberlands since 1989 (MRC 2008b, Table 3.3-10).

Table 3.3-10. Stream temperature monitoring data within the primary assessment area watershed analysis units, 1989–2008.

Watershed analysis unit[a, b]	Period of record	Number of sites	Number of streams	Max temp range (˚F)	Maximum weekly average temperature range (˚F)	Maximum weekly maximum temperature range (˚F)
Albion River	1992–2008	23	18	54.3–76.8	53.7–68.5	54.1–74.3
Big River	1992–2008	29	22	55.2–80.9	53.7–74.8	54.5–79.1
Garcia River[c]	1994–2008	15	9	55.0–75.3	53.9–71.9	54.6–74.6
Navarro River	1989–2008	42	34	54.6–85.1	54.1–76.4	54.3–83.1
Noyo River	1991–2008	19	11	57.3–81.5	55.7–70.7	56.6–77.3
Rockport Small Coastal Streams	1992–2008	39	34	53.2–77.1	53.2–71.6	53.2–75.2

[a] These correspond to "tracts" in MRC 2008b.
[b] Stream temperature monitoring data (1989–2008) are not available for Alder Creek/Schooner Gulch, Cottoneva Creek, Elk Creek, Greenwood Creek, Hollow Tree Creek, and Upper Russian River watershed analysis units.
[c] Includes portions of the Gualala River basin.

While more details regarding species-specific temperature criteria are discussed in Section 3.4 (Aquatic and Riparian Habitats and Species of Concern), 1989–2008 temperature monitoring within the primary assessment area indicates that current summer stream temperatures do not appear to support the coldwater beneficial use for salmonids and amphibians. This is consistent with the fact that a number of these watershed analysis units are included on the 303(d) list for water temperature (i.e., Albion River, Big River, Garcia River, Navarro River, and Noyo River; see Table 3.3-7). The preferred water temperature range for southern torrent salamander is 43.7–59°F (6.5–15°C) (Welsh and Lind 1996) and for coastal tailed frog is 41–65.3°F (5–18.5°C) (Brown 1975), with both ranges below or on the low end of the maximum temperature range measured during 1989-2008 (Table 3.3-10). While not directly analogous to a preferred temperature range for coho, Welsh et al. (2001) found that coho salmon were present in all streams in the Mattole River watershed that had a maximum weekly average temperature lower than 58.1°F (14.5°C) but were absent from streams with a maximum weekly average temperature greater than 62.1°F (16.7°C). The 1989–2008 water temperature data include over 200 sites in Class I streams, sites where coho salmon are known to be present, and selected Class II streams where coastal tailed frogs are known to occur (MRC 2002a, 2008b), suggesting that these species are present under less than optimal conditions.

Based on available data, water temperatures measured in secondary assessment area watersheds are comparable to temperatures measured in primary assessment area watersheds. Maximum weekly average temperatures measured in the North Fork Gualala River ranged from 55.0ºF (12.8ºC) to 72.0ºF (22.2ºC) from 1994 through 2001 (North Coast Watershed Assessment Program [NCWAP] 2002), and maximum weekly average temperatures in Rockpile Creek ranged from 57.0ºF (13.9ºC) to 69.1ºF (20.6ºC). In Ten Mile Creek Basin, most tributaries and some mainstem locations were found to have maximum weekly average temperatures below 64.9ºF (18.3ºC) in 1996 through 1998 (NCRWQCB 2001b).

Dissolved oxygen

Dissolved oxygen refers to the concentration of oxygen dissolved in water. Dissolved oxygen concentrations in water depend on several factors, including temperature (colder water is able to dissolve more oxygen), the volume and velocity of water flowing in the water body (re-aeration), salinity, and the number of organisms using oxygen for respiration.

Dissolved oxygen is a very important indicator of a water body's ability to support aquatic invertebrates and fish. The current dissolved oxygen water quality standards set by the North Coast Regional Water Quality Control Board (2006) are listed in Table 3.3-6 for the beneficial uses of the waters in the primary assessment area. Salmonids are particularly sensitive to reduced dissolved oxygen.

In its 2002 *Aquatic Species Distribution Report* (MRC 2002b), MRC collected dissolved oxygen data for various streams in the primary assessment area (Table 3.3-11). Based on the results of MRC monitoring, it is apparent that Basin Plan dissolved oxygen criteria have not been met during July through September in at least one location in all watershed analysis units. The lack of a clear spatial or temporal pattern in dissolved oxygen values indicates the possibility of site-specific controls on dissolved oxygen and suggests a need for additional monitoring to better characterize dissolved oxygen in the assessment area, including differences between mainstem reaches and smaller tributary reaches during low flow conditions.

Table 3.3-11. Dissolved oxygen monitoring data within primary assessment area watershed analysis units, 2000-2002.

Watershed analysis unit[a]	Number of sites	Number of streams	Dissolved oxygen (mg per liter)		Notes
			Minimum (location, date)	Maximum (location, date)	
Albion River	39	19	4.5 (Bull Team Gulch, 8/16/02)	11.18 (South Fork Albion River, 10/24/03)	Most values ranged 5.5–9.0 mg per liter. Dissolved oxygen was measured in July and August from 2000 to 2002, and values appeared to fluctuate without any discernable patterns according to month, year, or stream for all sample sites.
Big River	65	28	2.25 (Snuffins Creek, 8/24/01)	15.2 (North Fork Ramon Creek, 8/4/03)	Most values ranged 6–11.0 mg per liter. Dissolved oxygen at all sample sites was consistently lowest in 2001.
Garcia River[b]	14	8	6.2 (Garcia River, 8/9/01)	10.1 (Rolling Brook Creek, 8/26/02)	Most values ranged 7–10.0 mg per liter. There were no evident patterns describing dissolved oxygen values, which fluctuated within the range at all sample sites from year to year.
Navarro River	122	54	1.2 (Tank 4 Gulch, 8/24/00)	13.8 (McGarvey Creek, 8/28/02)	Most values ranged 5–10.0 mg per liter. There were no apparent patterns for values, which fluctuated from year to year at all sample sites.
Noyo River	59	27	3.2 (unnamed trib [#8] to the Noyo River, 8/3/01)	13.00 (unnamed trib [#1], 9/12/02)	Most values ranged 6.5–11.0 mg per liter. Dissolved oxygen was lowest in 2001 for all sample sites (particularly July 2001), and highest values were recorded in

Watershed analysis unit[a]	Number of sites	Number of streams	Dissolved oxygen (mg per liter) Minimum (location, date)	Dissolved oxygen (mg per liter) Maximum (location, date)	Notes
					September 2002.
Rockport Small Coastal Streams	41	18	5.9 (Juan Creek, 9/6/01)	12.01 (Juan Creek, 8/7/02)	Most values ranged 7–10.0 mg per liter.

[a] Dissolved oxygen monitoring data (2000–2002) is not available for Alder Creek/Schooner Gulch, Cottoneva Creek, Elk Creek, Greenwood Creek, Hollow Tree Creek, and Upper Russian River watershed analysis units.
[b] Includes portions of the Gualala River basin.

Dissolved oxygen data for the secondary assessment area are not available. However, given similar, and similarly varied land use practices in secondary assessment areas basins, there is little reason to suspect systematic differences in dissolved oxygen between primary and secondary assessment area watersheds.

Nutrients

The nutrients nitrogen and phosphorus stimulate plant growth and influence primary production (driven primarily by photosynthesis) and potentially secondary production (generally refers to heterotrophic consumption of primary producers by herbivorous consumers). The section below discusses discuss nitrogen and phosphorus and describes potential linkages with timber harvest practices in the primary assessment area.

Nitrogen

Forest streams in the North Coast Region are generally nitrogen-limited, with background concentrations of nitrogen compounds often lower than 0.01 mg per liter (Gessel et al. 1979, as cited in MacDonald et al. 1991). Nitrogen export to the aquatic system varies greatly during the year, reaching annual maximums in autumn with leaf fall and senescence of aquatic plants and algae (WDNR 1997). Nitrogen-fixing plants such as alder can increase levels of dissolved nitrogen (nitrate) in stream runoff (Binkley and Brown 1993). Nitrate is the predominant form in unpolluted water, but ammonia may exist as an intermediate breakdown product of organic nitrogen, fertilizers, and animal wastes. Both ammonium and nitrate are readily taken up by aquatic biota, so increased nitrate concentrations upstream tend to diminish rapidly downstream. The primary concern with nitrates is that increased algal growth and subsequent die-off due to increased concentrations of nitrogen can deplete dissolved oxygen, which may adversely affect fish and other aquatic organisms (MacDonald et al. 1991). The North Coast Regional Water Quality Control Board Basin Plan narrative water quality objective for biostimulatory substances states that waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

Existing conditions nitrogen data are not readily available for the primary assessment area. However, a study by Dahlgren (1998a) on the effects of clearcutting on nitrate concentration in stream water in the Caspar Creek experimental watershed indicated that from 1991–1996 stream water nitrate concentrations ranged approximately 0.1–1 mg per liter in clearcut areas, 0.3–5 mg per liter in clearcut and burned areas, and 0.01–0.1 mg per liter in non-harvested areas, with higher concentrations associated with elevated streamflow during winter months. Elevated nitrate concentrations were substantially reduced downstream of the clearcut areas, and they returned to background levels following dilution and possible instream immobilization (uptake) at the point of exit from the experimental watershed. Thus, while the nitrate concentrations measured in Caspar Creek clearcut areas during 1991–1996 may have been sufficiently high to promote algal growth, they did not occur during the growth season (i.e., late-spring to early-fall) and they were not associated with slow-moving, quiescent waters that would support excessive algal growth.

Nitrogen data for the secondary assessment area are not available. However, given similar, and similarly varied land use practices in secondary assessment areas basins, there is little reason to suspect systematic differences in nitrogen between primary and secondary assessment area watersheds.

Phosphorus

Similar to nitrate, phosphorus is often a limiting nutrient in natural waters, and high levels of phosphorus can contribute to eutrophication (Horne and Goldman 1994). Phosphorus may be found in low levels in natural waters and in wastewaters almost solely as phosphates. The principally bioavailable form includes several classes of phosphates: orthophosphates, condensed phosphates, and organically bound phosphates. These compounds are found in solution (by natural weathering or fertilizer application), in detritus, and in tissues of aquatic organisms (organic phosphates).

Because forests in the Pacific Northwest region have been shown to be nitrogen-limited (Gessel et al. 1979, as cited in MacDonald et al. 1991), the dynamics of phosphorus and sediment in stream systems of western coastal forests have received little attention. In these systems, phosphorus tends to be present as total phosphorus in association with fine sediments (Meyer 1979, Holton et al. 1988) and is not highly bioavailable. While increased sedimentation from forest harvest may increase total phosphorus concentrations in proximal watercourses, particularly during peak flow periods, ortho-phosphorus (i.e., bioavailable phosphorus) may not be increased or may remain low during summer months when algal growth is highest (WDNR 1997). While the Basin Plan does not include a numeric water quality objective for phosphorus, the narrative biostimulatory objective applies as is the case for nitrogen (Table 3.3-6). Phosphorus data for the primary and secondary assessment area are not available.

Bacteria

Sources of bacteria to waterways include the natural environment (soils and decaying vegetation), stormwater, urban runoff, animal wastes (both wildlife and domestic animals), and human sewage. High bacterial levels in streams have the potential to impact municipal and domestic water supply and water contact recreation. Good water quality is essential for contact recreation activities such as boating, swimming, and water skiing. Contact with the water when bacteria levels are high increases the risk of infections and gastrointestinal illnesses.

Basin Plan criteria for bacteria levels are listed in Table 3.3-6. Levels that do not meet Basin Plan objectives do not necessarily pose a health threat, but they do indicate the need for further investigative sampling. In addition, the California Department of Health Services' Draft Guidance for Fresh Water Beaches (California Department of Health Services 2006) describes bacteria levels that may require posted warning signs in order to protect public health. These guidelines are:

- Total coliform: 10,000 per 100 ml
- Fecal coliform: 400 per 100 ml
- *Enterococcus*: 61 per 100 ml
- *Escherichia coli* (*E. coli*): 235 per 100 ml

Low levels of Giardia cysts, viruses, and heterotrophic plate count bacteria have been measured in the water sources that supply the City of Fort Bragg, probably attributable to grazing and wild animals. However, historical data from the Noyo River, Newman (Lower Noyo River), and Simpson/Waterfall Gulch (Hare Creek) diversions revealed no problems with general mineral, physical, or inorganic water quality parameters (SHN Consulting Engineers & Geologists, Inc. 1995). Bacteria data for the secondary assessment area are not available. However, given similar, and similarly varied land use practices in secondary assessment areas basins, there is little reason to suspect systematic differences in bacteria between primary and secondary assessment area watersheds.

pH

pH is a measure of the acidic or basic (alkaline) nature of a solution. The concentration of the hydrogen ion [H+] activity in a solution determines the pH. Typical freshwater pH values range from 6 to 9 pH units (Horne and Goldman 1994). Altered pH can have adverse physiological effects on aquatic organisms, and increase vulnerability to other environmental stressors.

In its 2002 *Aquatic Species Distribution Report* (MRC 2002b), MRC collected pH data for various streams in the primary assessment area (Table 3.3-12). Results indicate that during 2000–2002 pH values at the low end of those measured in multiple watershed analysis units are below the minimum water quality objective for pH (6.5, see Table 3.3-6).

Table 3.3-12. pH monitoring and levels in primary assessment area watershed analysis units, 2000–2002.

Watershed analysis unit[a]	Number of sites	Number of streams	pH range
Albion River	39	19	5.9–7.9
Big River	65	28	6–8.2
Garcia River[b]	14	8	6.1–8.9
Navarro River	122	54	5.4–8.4
Noyo River	59	27	5.9–8.1
Rockport Small Coastal Streams	41	18	5.8–8.2

[a] pH monitoring data (2000–2002) is not available for Alder Creek/Schooner Gulch, Cottoneva Creek, Elk Creek, Greenwood Creek, Hollow Tree Creek, and Upper Russian River watershed analysis units.

[b] Includes portions of the Gualala River basin.

pH data for the secondary assessment area are available for the Caspar Creek watershed; available data indicate that while soil pH values in the upper soil horizons of a clearcut watershed decreased by 0.2 to 0.5 units following harvest, stream water pH values remained generally consistent between the clearcut and reference watersheds and fell within the range of 6.5 to 7.5 pH units (Dahlgren 1998b). Given similar, and similarly varied land use practices in secondary assessment areas basins, there is little reason to suspect systematic differences in pH between primary and secondary assessment area watersheds.

3.3.2 Environmental effects and mitigation

Effects on hydrology, beneficial uses of water, and water quality are considered significant if the alternatives would:

- Substantially alter existing hydrology, including through the alteration of the course of a stream or river and/or change in peak flow conditions, which could result in an increase in flooding (through increase the rate or amount of surface runoff) or erosion or siltation on- or off-site.

- Substantially alter existing hydrology, including a change in low flow conditions, which would result in substantial adverse effects on beneficial uses of water.
- Substantially deplete groundwater supplies or interfere with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).
- Result in substantial adverse effects on beneficial uses of water.
- Violate existing water quality standards, waste discharge requirements, or otherwise substantially degrade water quality.
- Result in substantial adverse effects on public health or environmental receptors.
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.
- Place structures within a 100-year flood hazard area that would impede or redirect flood flows.
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.
- Substantially increase the likelihood of inundation by seiche, tsunami, or mudflow.

The alternatives would not include placing housing or structures within a 100-year flood hazard area, exposing people or structures to flooding from levee or dam failure, or increasing the likelihood of inundation by seiche, tsunami, or mudflow. Therefore, the last four potential effects in the above list do not apply to the project, and they are not considered further. In addition, substantial depletion of groundwater supplies or interference with groundwater recharge such that there would be a net deficit in aquifer volume or lowering of the groundwater table does not apply to the project and is not considered further.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.3.2.7.

3.3.2.1 Analysis approach and impact mechanisms

Timber harvest activities have the potential to affect hydrology, beneficial uses of water, and water quality in the assessment area. In order to determine the relative magnitude of the effects, the agencies reviewed the available scientific literature on timber harvest impact mechanisms as related to hydrology and runoff, suspended sediment and turbidity, water temperature, dissolved oxygen, nutrients, bacteria, and pH. The agencies used the compiled information on impact mechanisms along with data on projected harvest conditions generated by the timber model (Appendix E) to analyze the potential effects of projected future conditions in the assessment area. Effects were determined by comparing conditions that would occur under each alternative, including the relevant conservation and management measures, to the existing conditions, as described in Section 3.3.1. In order to provide a clear rationale for each effects analysis, the impact mechanisms are summarized in one to two paragraphs at the beginning of each subsection. Additional detail is available in Appendix H. The discussion of impact mechanisms is followed by a paragraph on how the information is applied to the effects analysis. A comparative evaluation of effects among the alternatives is included at the end of this section.

Analyses of climate change and cumulative effects are discussed separately in Section 3.8 (Climate and Climate Change) and Section 4 (Cumulative Effects), respectively.

Hydrology and runoff

Timber harvesting activities (e.g., construction of roads, compaction of surfaces, and canopy removal) have the potential to alter the hydrology of a watershed, affecting the timing, volume and maximum rate of runoff. Timber harvest and associated road building can affect hydrology by compacting soils, creating areas of imperviousness, triggering road surface runoff, intercepting subsurface flows, increasing late fall groundwater levels, extending the channel network, and decreasing interception and evapotranspiration (EPA 2005a, Lewis et al. 2001, Reid and Lewis 2007). Increased peak flows can cause flooding and erosion, as well as siltation that may degrade aquatic habitat. While multiple watershed-scale studies have reported increases in peak flows due to forest harvest (e.g., Ziemer 1981, Wright et al. 1990, Rice et al. 1979, Rothacher 1973, Harr 1981, Jones and Grant 1996, Thomas and Megahan 1998, Beschta et al. 2000, Lewis et al. 2001, Guillemette et al. 2005), a more recent United States Department of Agriculture Forest Service synthesis of available data in the Pacific Northwest suggests that peak flow increases may be less apparent in rain-dominated regions (such as the primary assessment area), and may only be discernible in small watersheds when > 29% of the watershed had been harvested by clearcut and for flows with a return period of 6 years or less (Grant et al. 2008) (see Appendix H for additional detail). Changes in low flow conditions can also occur due to timber harvest. Increased low flows can occur following harvest (see Appendix H for additional detail) but typically would not occur at levels that would cause flooding and erosion and adversely affect beneficial uses.

The hydrologic response of watersheds can also be altered by fire, due to its effects on interception, infiltration, soil moisture storage, overland flow, and erosion (Wondzell and King 2003). Under each of the alternatives, MRC's response to wildfire would follow its current (2011) Fire Suppression Plan or future updates to this plan (Section 3.10, Hazards and Hazardous Substances). Because the potential effects of wildfire on hydrology and runoff, as well as on beneficial uses of water and water quality, are varied and unpredictable due to the stochastic nature of wildfires, an analysis of the effects would be speculative in nature. Accordingly, effects of wildfire on these resources are not analyzed in this EIS/PTEIR. However, post-fire timber salvage may occur in burned areas to salvage trees that are likely to die or that are not viable for timber production. The effects of post-fire timber salvage on hydrology and runoff may differ by alternative based on the conservation and management measures that would be implemented under each alternative. The EIS/PTEIR therefore includes a qualitative analysis of the effects of post-fire timber salvage on hydrology and runoff.

Other effects of timber harvesting operations on hydrology may result from water "drafting." Water drafting involves the siphoning of stream flow into a water truck. Pools are often targeted for water drafting sites because they have sufficient volume to permit high diversion rates.

The effects of the alternatives on hydrology and runoff in the assessment area are evaluated under each alternative using timber model output supplied by MRC and used by the lead agencies at two analysis scales: (1) at the scale the of primary assessment area and (2) at the scale of individual planning watersheds. First, the timber model data representing the percentage of land harvested per decade at both scales are compared with presumptive thresholds for discernible peak flow effects derived from the literature. In a compilation of multiple studies of timber harvest on peak flows in Oregon and Washington, Grant et al. (2008) used existing data to construct a relationship between percentage harvested and reported change in peak flows for rain-dominated hydrologic zones and transient snow zones (Figure 3.3-15). Based on the relationship for rain-dominated zones, the authors report the following:

- For small watersheds (< 2,500 ac [< 10 km^2]) managed using clearcut, a threshold of 29% of land harvested corresponds to a maximum change in peak flows of approximately 10%, including the influence of roads (see maximum response line in Figure 3.3-15).
- For large watersheds (> 2,500 ac [> 10 km^2]) managed using clearcut, a higher threshold for percentage of land harvested is likely to apply.
- Partial harvest[29] methods would further increase the threshold for percentage of land harvested and would generally correspond to the mean response line in Figure 3.3-15.

Individual planning watersheds within the hydrology and water quality assessment area are greater than 2,500 ac [10 km^2] in size. Since peak flow effects thresholds for large watersheds are not presented in Grant et al. (2008), application of the values reported for small watersheds serves as a conservative estimate of potential peak flow effects in the assessment area regardless of harvest method. Using the mean response line in Figure 3.3-15 for partial harvest methods and the maximum response line for clearcut, the presumptive thresholds for discernible peak flow effects in the assessment area are the following:

- 50–60% land harvested corresponds to an approximate 10–15% average change in peak flows for partial harvest methods.
- 30–40% land harvested corresponds to an approximate 10–15% average change in peak flows for clearcut.

The presumptive thresholds derived from Grant et al. (2008) are consistent with data from other studies; for example, Keppeler et al. (2003) states that partially (30–50%) clearcut watersheds in the North Fork of Caspar Creek exhibited 15% increases in 2-year peak flow events, and the estimated 2-year recurrence interval storm peak increased 14% for the 8-year period following completion of selection logging in South Fork Caspar Creek (Keppeler et al. 2009).

[29] While Grant et al. (2008) do not define partial harvest methods or distinguish between types of partial harvest, for the purposes of this EIS/PTEIR analysis partial harvest includes harvest methods that do not remove all of the trees in a given area. This includes primarily uneven-aged silviculture (harvest methods resulting in a multi-aged stand, containing three or more distinct age classes), but could include even-aged silviculture (harvest methods resulting in a forest stand comprised of trees with less than a 20-year difference in age) with the exception of clearcut; see Table 3-13.

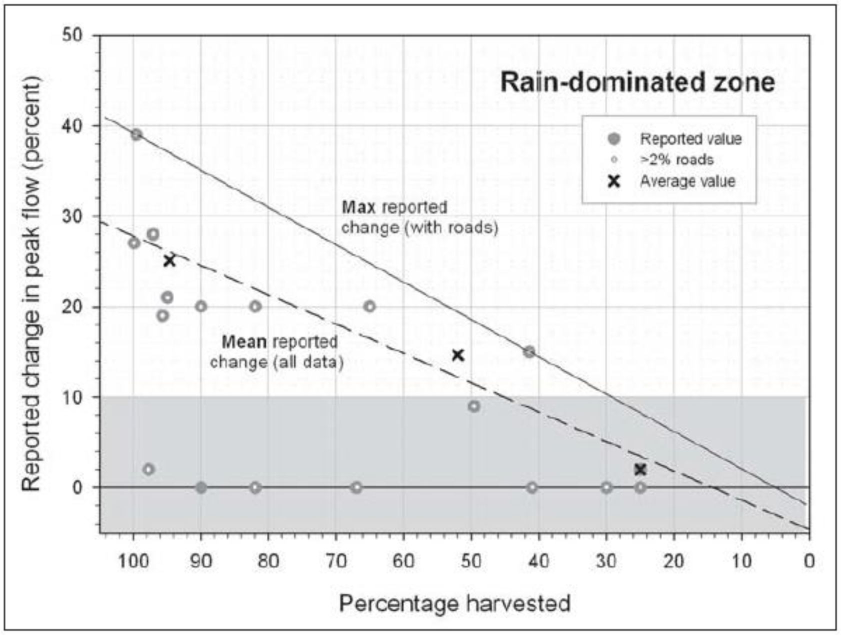


Figure 3.3-15. Peak flow response to harvest in a rain-dominated hydrologic zone. Solid line represents maximum values reported and includes the influence of roads. Dashed line is a linear fit through the average values reported from multiple studies and represents the mean reported change for all data. Gray shading around zero indicates the limit of detection (±10%). Source: Grant et al. (2008).

Because the hydrologic response to timber harvest is spatially cumulative (i.e., hydrology in a given planning watershed would be affected by harvest occurring within the planning watershed itself and harvest occurring in any upstream planning watershed), the timber model output is considered in a spatially cumulative manner for particular cases. Since peak flow increases combine to yield a lower percentage increase with distance downstream (i.e., if peak flows in two confluent subbasins each increase by 15%, the resultant increase downstream of the confluence can be no more than 15% and is likely to be less [Grant et al. 2008]), spatially cumulative calculations are only relevant for those planning watersheds that exceed the presumptive threshold for peak flow effects. For example, if the harvest percentage for the Middle Albion River planning watershed (located in the Albion River watershed analysis unit) does not exceed 50–60% for partial harvest methods, then the harvest percentage in all downstream planning watersheds would not exceed 50–60% and there would be no discernible peak flow effects in the Middle Albion River planning watershed or any downstream planning watershed. A spatially cumulative estimation of timber harvest is not necessary in this case. If, on the other hand, percentage harvested in the Middle Albion River planning watershed does exceed 50–60% for partial harvest methods, harvest in upstream planning watersheds (Upper Albion River, South Fork Albion River) must be considered cumulatively to estimate total harvest percentage across the larger area of the combined planning watersheds and determine whether there are likely to be peak flow effects. In some cases, a spatially cumulative harvest calculation still results in exceedances to the presumptive peak flow threshold, while in other cases relatively less upstream harvest results in a decrease in spatially cumulative peak flow effects (see Appendix I, Table I-2). Exceedances of the presumptive thresholds for peak flow effects (50–60% for partial harvest methods, 30–40% for clearcut) primarily occur for the No Action alternative, so estimation of cumulative peak flow effects is carried out for all planning watersheds under this alternative (see

Appendix I, Table I-2). For other alternatives, harvest estimates by planning watershed are generally sufficiently low that spatially cumulative calculations are not needed.

Second, silviculture effects on peak flows are considered for both upland and riparian buffer zones (i.e., Aquatic Management Zones for the Proposed Action, Alternative A, and Alternative C; Watercourse and Lake Protection Zones for the No Action alternative and Alternative B outside of the reserves). Increasing use of uneven-aged silviculture, particularly in riparian buffer zones, is expected to reduce the potential for increases in peak flows by decreasing the number of trees removed. For the planning watershed-scale analysis, it is assumed that silviculture method does not vary substantially by planning watershed. Silviculture methods are listed in Table 3.3-13.

Table 3.3-13. Silviculture methods considered.

<table>
<tr><th>Uneven-aged silviculture</th><th>Even-aged silviculture</th></tr>
<tr><td>Single tree selection</td><td>Variable retention</td></tr>
<tr><td>Selection (group selection)</td><td>Seed tree removal</td></tr>
<tr><td>High retention selection</td><td>Shelter wood removal</td></tr>
<tr><td>Medium retention selection</td><td>Rehabilitation</td></tr>
<tr><td>Small Class II selection</td><td rowspan="2">Commercial thinning</td></tr>
<tr><td>Flood plain selection</td></tr>
<tr><td>Coastal Zone selection</td><td rowspan="2">Clearcut</td></tr>
<tr><td>Transition[a]</td></tr>
</table>

[a] The goal of transition silviculture is to develop uneven-aged stands from even-aged stands and/or to improve stocking levels in understocked stands (Appendix E).

Lastly, where possible, the peak flow analysis results are compared with MRC model results presented in the HCP/NCCP by CalWater planning watershed and inventory block (Tables 3-16, 8-23, and 8-24 in MRC 2012). MRC model results estimate the cumulative effect of harvest on peak flow at the 2-year return interval for 2002, 2010, and by decade to 2060, using canopy cover as a surrogate for the percentage of land harvested under the Proposed Action. Peak flow increases are referenced to “watershed conditions of dense second-growth forest” and model results are only available for the Proposed Action (MRC 2012).

Less is known about thresholds of measurable effects for summer low flows, although tree removal has been shown to reduce evapotranspiration and interception, increasing total water yield and summer low flow in the North Coast region for 8–18 years, based on Caspar Creek research (Reid and Lewis 2011, EPA 2005a, Ziemer 1987; see Appendix H). In addition, annual water yields have been found to decrease slightly following forest harvest in areas where fog drip was a significant hydrologic input (Moore and Wondzell 2005). Low flows also became more extreme (i.e., lower) after harvest in the two cases where fog drip was important; however, the authors suggest that conifer-dominated riparian buffers might reduce the likelihood that forest harvest and post-harvest compositional changes would influence low flow discharge (Moore and Wondzell 2005). In multiple studies, water yield and low flows, which had initially increased following harvest, returned to pre-harvest levels or lower with forest re-growth (Reid 2012, Reid and Lewis 2011, Perry 2007, Hicks et al. 1991; see Appendix H for additional information). Low flows that declined below expected pre-treatment values remained low for long time periods (i.e., 20 years) (Reid 2012).

For each of the alternatives, the analysis of low flow effects considers (1) the percentage of land harvested per decade by planning watershed; (2) silviculture method in uplands and riparian buffer zones; (3) the width of the riparian buffer zone; (4) potential effects on fog drip; and (5) the amount of water drafting as compared with existing conditions. With respect to fog drip, the Coast Range ridges and mountains provide an effective barrier to inland penetration of marine fog layers, so that most inland portions of the primary assessment area receive little fog (MRC 2012). Existing data indicate that primary assessment area watersheds directly adjacent to the coast receive fog precipitation for 30–50% of the days in June, July, and August (Goodridge 1978, as cited in MRC 2012), while just a few miles inland, fog precipitation occurs for 10–35% of the days for the same time period (Keppeler 1998, as cited in MRC 2012). A more recent study indicated that that although rates varied greatly between sites in the Caspar Creek watershed, fog drip was greatest at the five ridge-top sites, averaging 39 mm for June–September 1999 or an amount equivalent to 3% of the mean annual precipitation (Keppeler 2007). Watershed analysis units located directly adjacent to the coast include Albion River, Alder Creek/Schooner Gulch, Cottoneva Creek, and Rockport Small Coastal Streams. Downstream portions of the Navarro River, Greenwood Creek, and Elk Creek watershed analysis units are also directly adjacent to the coast, but the majority of those watershed analysis units and the remaining watershed analysis units within the primary assessment area are located inland and are assumed to receive little to no fog precipitation.

Beneficial uses

The most sensitive designated beneficial use and the use that most broadly supports aquatic biota (i.e., fish, amphibians, benthic macroinvertebrates) present in the assessment area (see Section 3.4, Aquatic and Riparian Habitats and Species of Concern) is Cold Freshwater Habitat. Thus, effects on beneficial uses are analyzed primarily for Cold Freshwater Habitat and all other beneficial uses are assumed to be supported if Cold Freshwater Habitat is supported. The exception to this approach is in the case of anticipated significant effects on any water quality parameter that is linked to a beneficial use, even if the particular beneficial use only represents a small fraction of the existing beneficial uses in the primary assessment area. For example, if significant increases in turbidity and suspended sediment are anticipated under a given alternative, effects on the associated beneficial uses (e.g., Municipal and Domestic Supply; Water Contact Recreation; Spawning, Reproduction, and/or Early Development) from increased turbidity would be possible and are therefore included as part of the analysis.

Water quality

Suspended sediment and turbidity

Land management activities currently and historically occurring within the primary assessment area have the potential to increase delivery of sediment to watercourses. Erosion rates are naturally high in the Coast Ranges, and management-related activities (e.g., changes in land use patterns) have been found to accelerate erosion rates in many areas (Anderson 1981). Timber harvesting activities, including yarding, road-building, and log transport, have been and continue to be the primary cause of elevated levels of fine sediment in the primary assessment area.

In addition, fires tend to increase hillside erosion and sediment delivery to streams because they strip the ground of protective cover, exposing the soil to more erosional forces and increasing the potential for overland flow and surface erosion. As described previously in this section, fire may also alter the hydrologic response of watersheds due to its effects on interception, infiltration, soil moisture storage, overland flow, and erosion (Wondzell and King 2003).

Post-fire timber salvage may occur in burned areas to salvage trees that are likely to die or that are not viable for timber production. The effects of post-fire timber salvage on suspended sediment and turbidity may differ by alternative based on the conservation and management measures that would be implemented under each alternative. The EIS/PTEIR therefore includes a qualitative analysis of the effects of post-fire timber salvage on suspended sediment and turbidity.

Sediment budget work in north coastal California watersheds has shown that approximately two thirds of management-related sediment delivery originates from forest roads, most of which is related to inadequate road and crossing design, construction, and maintenance (Cafferata et al. 2007). Sediment may be eroded from road surfaces, road fills, or slope failures associated with road construction (e.g., blocked culverts) and can enter streams, increasing suspended sediment concentrations and turbidity levels during peak flow periods. Increased sediment yields tend to be persistent from both slope failures and road surface runoff. Timber harvesting often results in surface erosion from landings, skid trails, and other compacted areas (MacDonald et al. 1991, Moring 1982). Ziemer et al. (1996) noted a 400% increase in suspended sediment following road building, and a 100 to 500% increase after logging in the early 1970s in the Caspar Creek watershed. They noted much smaller effects for logging that occurred from 1985 to 1991 because of improvements in best management practices (Ziemer et al. 1996). Implementation of improved CFPRs over the last 20 years is considered to have substantially reduced sediment input to streams relative to past practices (Cafferata and Spittler 1998; Lewis 1998; CAL FIRE 1987, 1995). The effects of sediment in the primary assessment area on stream channels and aquatic habitat are addressed in Section 3.4 (Aquatic and Riparian Habitats and Species of Concern).

The effects of the alternatives on suspended sediment and turbidity are qualitatively assessed under each alternative using results from the sediment delivery analysis described in Geology, Soils, and Geomorphology (Section 3.2). As road-building has been identified as the primary cause of elevated fine sediment delivery in the primary assessment area, under both historical and existing conditions, application of the analysis results from Geology, Soils, and Geomorphology (Section 3.2) focuses on the estimated change in surface erosion from roads and the projected net change in sediment delivery afforded through treatment of road-related point sources for each river basin.

Water temperature

Effects on water temperature in managed forest ecosystems are primarily associated with summer stream temperature increases, particularly if timber harvesting is conducted near streams. In small to intermediate-sized streams in forested regions, incoming solar radiation represents the dominant form of energy input to streams during the summer, with convection, conduction, evaporation, and advection playing relatively minor roles (Beschta et al. 1987, Sullivan et al. 1990). Stream heating in excess of natural levels associated with timber harvesting arises primarily from local increases in the amount of solar radiation directly incident on streams due to either the removal of streamside vegetation or to stream widening caused by increased sedimentation (EPA 1999b). Prior to timber harvesting in the primary assessment area, dense riparian canopies formed largely by old-growth trees on alluvial valley flats would have allowed very little solar radiation to reach the stream (Sedell and Luchessa 1982), and water temperatures are expected to have been well within the range suitable for salmonids and other native aquatic species. In contrast, existing temperature records from basins in the primary assessment area show elevated temperatures, possibly due to historical or ongoing timber harvesting (Section 3.3.1.4)

Timber harvesting may also affect water temperatures by altering watershed hydrology. Reduced evapotranspiration due to tree removal could increase summer baseflows, which could lead to a decrease in stream temperature (Keppeler and Ziemer 1990). Changes in groundwater discharge and runoff rates related to road construction and timber harvesting also have the potential to alter stream temperatures. Increased sediment deposition associated with timber harvesting activities can also increase channel width, which decreases shade coverage and increases stream temperatures.

The effects of the alternatives on water temperature in the primary assessment area are qualitatively assessed under each alternative by conceptually linking riparian stand condition to shade (i.e., denser riparian stands provide more shade and cooler water temperatures). While Basin Plan water temperature objectives (i.e., temperature of any Cold or Warm Freshwater Habitat shall not be increased by more than 5ºF [2.8ºC] above natural receiving water temperature; Table 3.3-6) cannot be quantitatively addressed, a qualitative analysis of the likelihood of meeting applicable beneficial uses associated with water temperature in the primary assessment area is presented. First, trends in the average number of large riparian (Aquatic Management Zone or Watercourse and Lake Protection Zone) trees and canopy cover by cover class are analyzed for the primary assessment area and by watershed analysis unit under each of the alternatives. Next, riparian buffer width, as represented by Aquatic Management Zone or Watercourse and Lake Protection Zone width, is considered by stream class for each alternative, with relative increases in buffer width anticipated to decrease water temperatures in the associated stream class. The riparian buffer width(s) used for this analysis represent the widths that would be implemented under each alternative, rather than the buffer width(s) used for purposes of timber modeling (which, as a simplifying assumption, are modeled as the same width for each alternative; see Section 2.1.2 [Alternatives, Modeling forest conditions under each alternative] for additional information).

Dissolved oxygen

Effects on dissolved oxygen in managed forest ecosystems are primarily associated with additions of fine organic matter to streams, increases in nutrient availability to primary producers (i.e., algae), and alterations in stream temperature. In general, forest streams have low vulnerability to dissolved oxygen depletion because fine organic matter is generally minimal and re-aeration of flowing water is more than sufficient to maintain high levels of dissolved oxygen. Current forest practices are not believed to input enough duff or natural organic matter on sediments to cause management-induced depletion of dissolved oxygen through an increase in biological oxygen demand, except where dissolved oxygen is naturally low. Adverse depletion of dissolved oxygen may occur, however, when the following conditions are present (MacDonald et al. 1991; Ice 1991): (1) very slow-moving, low-gradient, warm streams with low discharge (i.e., low aeration rates), including impounded wetlands, and (2) heavy inputs of fine organic debris into low-flow streams causing a large biological oxygen demand, or naturally high concentrations of organics in transported sediment loads.

The lack of a clear spatial or temporal pattern in dissolved oxygen under existing conditions (Section 3.3.1.4) means that a quantitative analysis of the effects of the alternatives on dissolved oxygen is not possible. While in general, activities under the various alternatives would not directly affect dissolved oxygen, increases in stream temperature, nutrient availability, or (organic) sediment inputs are likely to result in indirect adverse effects on dissolved oxygen (i.e., decreased solubility in water, increases potential for eutrophication and the associated dissolved oxygen demand). Therefore, effects on dissolved oxygen in the primary assessment area are assumed to be potentially significant where adverse effects on stream temperature, nutrient availability, and (organic) sediment inputs are determined. Effects on dissolved oxygen are assumed to be beneficial where beneficial effects on stream temperature, nutrient availability, and (organic) sediment inputs are determined. Effects on dissolved oxygen under other conditions cannot be determined given the available information. Therefore, continued monitoring and analysis of dissolved oxygen trends in the primary assessment area, with the specific goal of identifying the underlying reasons for low dissolved oxygen under existing conditions, is necessary to support further analysis.

Nutrients

Concentrations of phosphorus are associated with fine sediments and increased concentrations of nitrate due to soil leaching and higher runoff rates following harvest (i.e., Dahlgren [1998a], see Section 3.3.1.4). Riparian vegetation is effective at reducing nutrient enhancement of streams in forested areas by intercepting surface runoff and filtering fine sediment, removing the sediment-associated phosphorus (Liquori and Benda 2008, Rashin et al. 2006). Sediment filtration distances from several studies show a rapid rise in effectiveness of filtration within riparian zones at 35–50 ft (11–15 m) wide and a leveling off at longer distances (up to about 150 ft [46 m] wide) (CH2M Hill and Western Watershed Analysts 1999). Additionally, nitrogen uptake can occur through the riparian root zone, further reducing bioavailable forms of nitrogen (i.e., nitrate, ammonium) that would otherwise move directly into the creek through groundwater (Dahlgren 1998a, Castelle and Johnson 2000). Forest management can also affect the input of nutrients to streams in the form of leaf litter and other plant material. Effects on these inputs are addressed in Section 3.4 (Aquatic and Riparian Habitats and Species of Concern).

The effects of the alternatives on nutrients (i.e., nitrogen, phosphorus) are qualitatively assessed for the alternatives using timber model results for riparian zone width (Aquatic Management Zone width) provided by MRC and analyzed by the lead agencies. Increases in Aquatic Management Zone width under each of the alternatives relative to a 35–50 ft (11–15 m) riparian zone width are qualitatively considered, with increased Aquatic Management Zone width resulting in increased nutrient interception and decreased nutrient availability for eutrophication. MRC does not use fertilizer under existing conditions. This analysis assumes that MRC would continue to avoid use of fertilizer under any of the alternatives; therefore, no further nutrient additions would occur.

Bacteria

Timber harvest activities are unlikely to affect bacterial levels in assessment area streams. Although not specifically discussed as part of the wildlife analysis (Section 3.6, Terrestrial Habitat and Wildlife Species of Concern), streams in the primary assessment area do not provide habitat for a large volume of vertebrates, particularly large mammals that would produce substantial amounts of solid waste in or near stream courses. Similarly, it is not likely that timber management would result in a substantial enough change in riparian vegetation (see Section 3.5, Vegetation and Plant Species of Concern) under any of the alternatives to increase or decrease stream use by vertebrates. Therefore, this water quality parameter is not discussed further.

pH

Effects on nutrients in managed forest ecosystems are primarily associated with increased stream concentrations of phosphorus associated with fine sediments and increased concentrations of nitrate due to soil leaching and higher runoff rates following harvest (i.e., Dahlgren [1998a], see Section 3.3.1.4). Observations of changes in stream pH due to the effects of timber harvest (including soil disturbance and changes in hydrologic processes) have been inconclusive and vary with soil properties. Ensign and Mallin (1999) demonstrated that post-harvest pH values were significantly lower than pre-harvest pH values, yet this finding contrasts with research done in coastal Florida that showed an increase from pH 3.9 to pH 4.2 the year following harvesting (Fisher 1981, as cited in Ensign and Mallin 1999). Similarly, research done in coastal South Carolina showed an increase in pH relative to a control in drainage waters of timbered land (Askew and Williams 1986, as cited in Ensign and Mallin 1999). In contrast, clearcut of an east Texas forest had no significant effect on stream pH (Blackburn and Wood 1990, as cited in

Ensign and Mallin 1999). Because the aforementioned studies were conducted in several different locations in the United States with very different soil and climatological conditions, further information is necessary to determine whether they sufficiently represent conditions in the primary assessment area.

In the Caspar Creek watershed (secondary assessment area), available data indicate that while soil pH values in the upper soil horizons of a clearcut watershed decreased by 0.2 to 0.5 units following harvest, stream water pH values remained generally consistent between the clearcut and reference watersheds and fell within the range of 6.5 to 7.5 pH units (Dahlgren 1998b).

Due to the lack of a clear spatial or temporal pattern in pH under existing conditions (Section 3.3.1.4), and the lack of clear literature-based observational trends in forest harvest practices on stream pH, an analysis of the effects of the alternatives on stream pH is not possible.

3.3.2.2 No Action alternative

Effects on hydrology

Peak flows

Impact 3.3-1: Increased flooding, erosion, and siltation potential due to increases in peak flows. Under the No Action alternative, the percentage of land harvested per decade (18–79%; Table 3.3-14 and Figure 3.3-16 would be less than the presumptive threshold for significant peak flow effects (50–60%) for large watersheds (> 2,500 ac [> 10 km^2]) during decades 1–3. In decades 4–8 the percentage of land harvested would increase to levels equal to or greater than the threshold and would potentially result in increases to peak flows. In the first decade, the percentage of land harvested (18%) would be less than estimated current harvest levels (29%), and at 35–79% harvested it would exceed estimated current levels for decades 2–8.

Silviculture methods in upland areas for decades 1–3 would result in an increasing proportion of the uneven-aged silviculture method of selection as compared with even-aged silviculture methods such as variable retention (Figure 3.3-16), with greater than 90% of silviculture as selection by decade 4. For the primary assessment area, the increasing amount of uneven-aged silviculture in upland areas is expected to reduce the potential for increases in peak flows under the No Action alternative by decreasing the number of trees removed.

Post-fire timber salvage under the No Action alternative would be conducted in accordance with the CFPRs and the measures included in MRC's 2000 Management Plan (MRC 2000a). Because management measures for post-fire timber salvage would not differ substantially from current practices, there would be no effect on hydrology and runoff (peak flows and low flows) compared with existing conditions.

In riparian buffer zones (i.e., Watercourse and Lake Protection Zones), uneven-aged silviculture (i.e., medium-retention and high-retention selection) would be the primary harvest method used throughout the analysis period (Figure 3.3-16), which should also reduce the potential for increased peak flows by decreasing the number of trees removed directly adjacent to the stream. The lower limit of the Watercourse and Lake Protection Zone width that would be implemented under the No Action alternative is 2–25 ft (0.6–8 m) greater than under current management practices for two of four stream classes (Large Class II and Class III streams; see Section 3.4.1 [Aquatic and Riparian Habitats and Species of Concern, Affected environment/Environmental setting] for stream class descriptions), while the upper limit is 10–90 ft (3–27 m) smaller than under existing conditions in two of four stream classes (Large Class II and Small Class II streams; see Table 3.3-15). Given the variability (i.e., some widths greater, some widths smaller) in implemented buffer widths between the No Action alternative and existing conditions, large differences in peak flows would not be expected to occur relative to existing conditions under the No Action alternative.

When analyzed at the scale of the planning watershed (Appendix I), the cumulative percentage of land harvested per decade under the No Action alternative exceeds 50–60% for almost half (23 of 50) of the planning watersheds contained within primary assessment area (Appendix I, Tables I-2 and I-3). This generally occurs during decades 4–8, but sometimes occurs in decades 2–3, and in some cases exceeds 70% by the end of decade 8. For these 23 planning watersheds, increased peak flows would likely occur because the cumulative percentage of land harvested per decade is at or above the threshold for peak flow effects (50–60%; see Section 3.3.2.1). Silviculture methods are assumed to be similar for each planning watershed. The increased amount of uneven-aged silviculture in both uplands and Watercourse and Lake Protection Zones may reduce the potential for increased peak flows in these more heavily harvested planning watersheds. However, the greater level of harvest in these planning watersheds and the narrower Watercourse and Lake Protection Zones may nonetheless substantially increase peak flows compared with existing conditions such that the potential for flooding or erosion/siltation would also increase. Due to the large fraction of planning watersheds in which increased peak flows would likely occur, there would be a **potentially significant effect** on hydrology in the primary assessment area from decades 4–8 of the analysis period.

Table 3.3-14. Percentage of land harvested per decade in the primary assessment area, predicted under each alternative.

Decade	Percentage of land harvested per decade				
	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
1	18	32	30	23	32
2	35	33	30	22	33
3	41	38	35	22	38
4	53	39	35	19	39
5	66	42	38	20	–
6	71	42	37	22	–
7	75	45	39	20	–
8	79	44	38	21	–

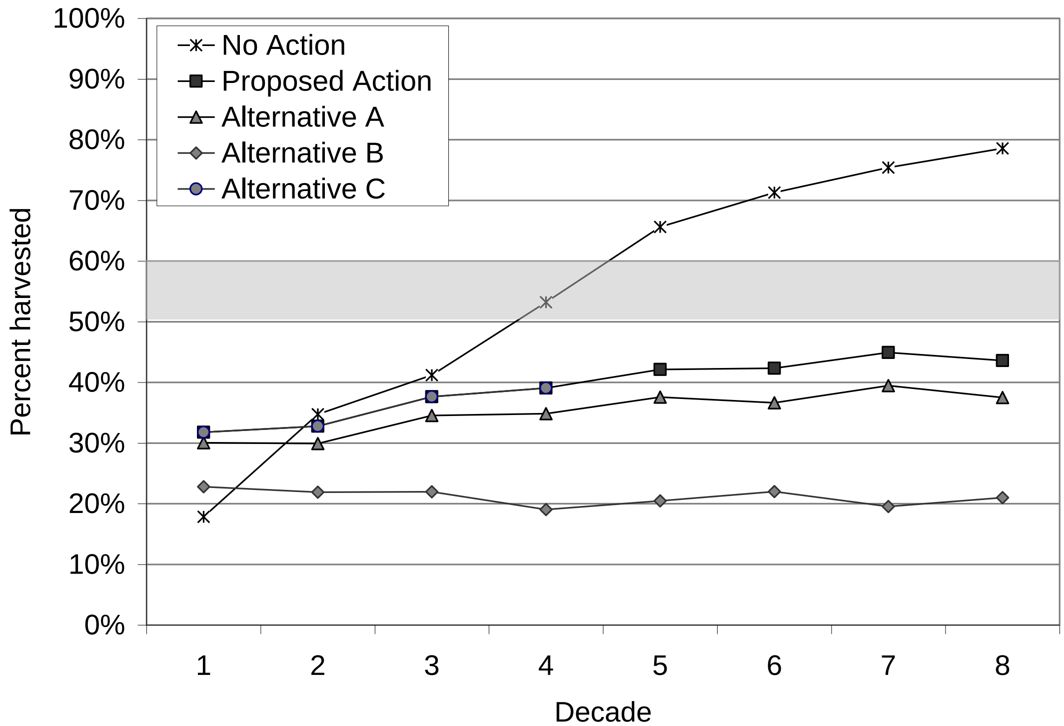
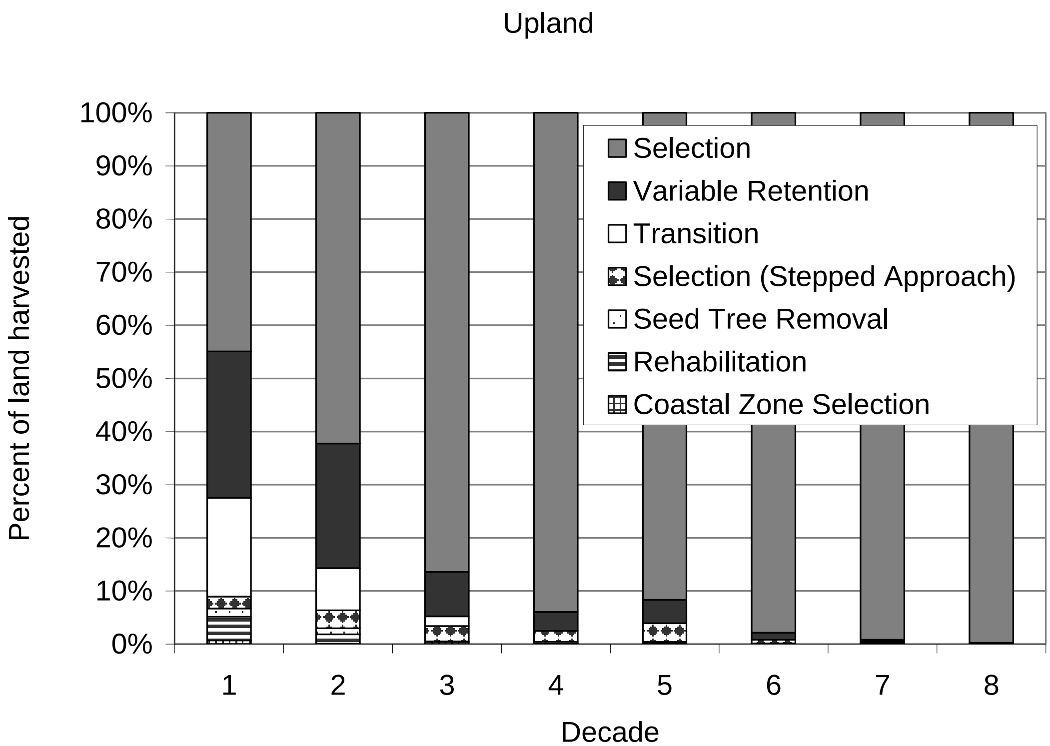


Figure 3.3-16. Percentage of land harvested per decade in the primary assessment area predicted under the alternatives. Percentage of land harvested under Alternative C is the same as that under the Proposed Action for decades 1-4. Grey shading indicates 50-60% harvested, the presumptive threshold for discernable peak flow effects in large watersheds (> 2,500 ac [> 10 km^2]) in rain-dominated hydrologic zones managed using partial harvest methods (Grant et al. 2008).



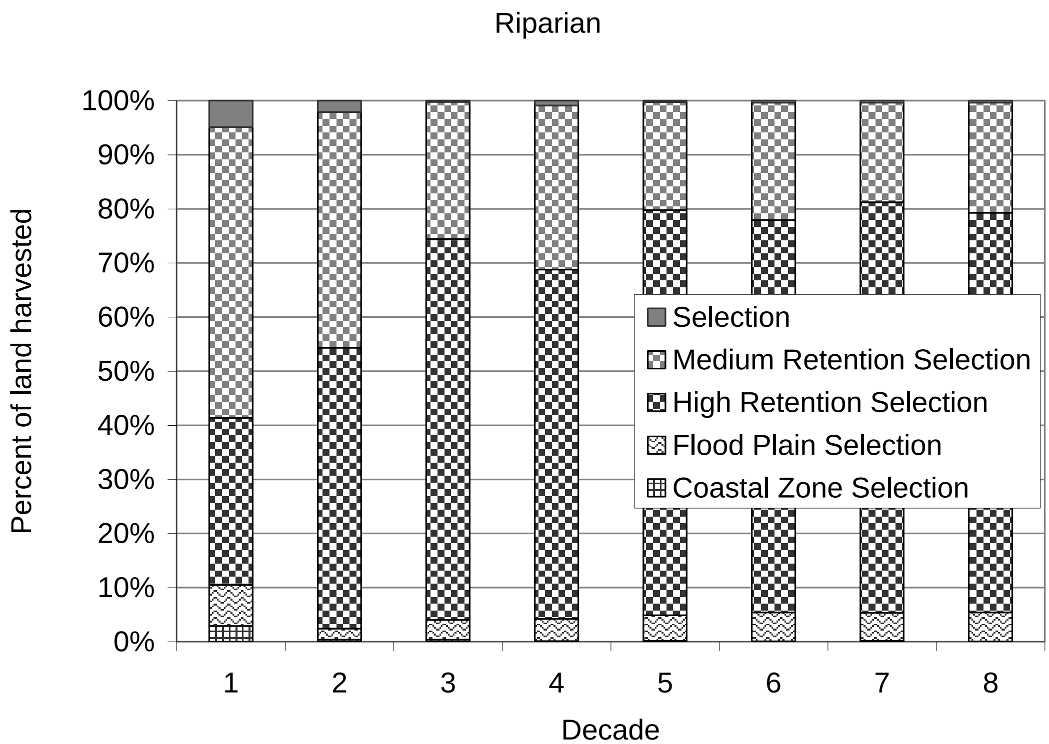


Figure 3.3-17. Percentage of land harvested per decade by silviculture method (defined in Appendix E) predicted under the No Action alternative in upland areas and Watercourse and Lake Protection Zones.

Table 3.3-15. Summary of implemented buffer widths by stream class for each alternative. Buffer width varies by valley side slope.

Stream class	Implemented buffer width (ft) by current management or project alternative[a]					
	Current management[b]	No Action[c]	Proposed Action[d]	Alternative A[d]	Alternative B[c]	Alternative C[d]
Class I	100–190	100–150[e]	130–190	Variable—equal to one site-potential tree	Not applicable inside reserves; 100–150 outside reserves	130–190
Large Class II	75–190	100	100–150	150	Not applicable inside reserves; 100 outside reserves	100–150
Small Class II	75–110	50–100	50–100	50–150	Not applicable inside reserves; 50–100 outside reserves	50–100
Class III	10–50	30–50	25–50	25–50	Not applicable inside reserves; 30–50 outside reserves	25–50

[a] Values in this table refer to the buffer width(s) likely to be implemented under each alternative, rather than buffer width(s) used for timber modeling. Modeled buffer widths are discussed in Section 2.1.2 (Alternatives, Modeling forest conditions under each alternative).

[b] MRCs current management practices are used to represent existing conditions for buffer width. Buffers are defined as Aquatic Management Zones and are divided into the inner band, middle band, and outer band (MRC 2012). Range of inner band to outer band is given, where applicable.

[c] Based on the 2012 CFPRs, buffers are defined as Watercourse and Lake Protection Zones (14 CCR §916.9); Class II streams are classified as Class II-L and Class II-S.

[d] Buffers are defined as Aquatic Management Zones and are divided into the inner band, middle band, and outer band (MRC 2012).

[e] A variable width flood prone area buffer would be added to any Class I Watercourse and Lake Protection Zone within a flood prone zone (14 CCR §916.9).

Low flows

Under the No Action alternative, percentage of land harvested per decade in the primary assessment area (Table 3.3-14 and Figure 3.3-16) would be less than existing conditions (29%) for the first decade but would increase to levels considerably greater than existing conditions (35–79%) during decades 2–8. This trend suggests the potential for slightly increased low flows and variability for decades 2–8 as compared with existing conditions. As with peak flow effects, increasing amount of uneven-aged selection silviculture (Figure 3.3-17) may decrease the number of trees removed and decrease the potential for increased low flows relative to existing conditions. In riparian buffer zones (Watercourse and Lake Protection Zones), the use of uneven-aged medium retention and high retention selection (Figure 3.3-17) would also reduce the potential for increased low flows despite the relatively higher levels of harvest in decades 2–8. While some studies have shown that timber harvest in fog-dominated areas of the Pacific Northwest may decrease low flows due to reduced interception of fog precipitation (Moore and Wondzell 2005), studies in the Caspar Creek watershed (Keppeler 1998, 2007) indicate that reduced fog precipitation is not likely to substantially decrease low flows. Due to the relatively low percentage of flow available for water drafting, the requirement for continuous bypass flows during drafting operations, and the episodic nature of water drafting (see Appendix T in MRC 2012), this forest management activity is expected to result in altered low flows only locally.

Under the No Action alternative, there would be a **less than significant effect** on hydrology in the primary assessment area due to the potential for only slightly increased low flows and flow variability, which may be at least somewhat counteracted by increasing amounts of uneven-aged selection silviculture.

Flooding potential

As stated in Appendix E of MRC (2012), the use of skid trails can significantly alter natural drainage and flow paths. Flow paths in Class II and III watercourse channels can become constrained where tractor and skid trail crossings are diverting a watercourse, have a potential to divert a watercourse, or are not properly draining. This could increase flooding potential near skid trail crossings in the primary assessment area. Much of the skid trail network in the primary assessment area is associated with historical practices and under the No Action alternative, there are no requirements to correct current or impending problems.

While skid trail and tractor crossings may result in increased flooding potential, these features would primarily increase erosion potential and sediment delivery to stream channels (see Section 3.2; Geology, Soils, and Geomorphology). Thus, under the No Action alternative, there would be a **less than significant effect** on hydrology due to continued or future flooding at locations near skid trail crossings in the primary assessment area. Impacts related to sediment delivery are discussed separately in Section 3.2.2 (Geology, Soils, and Geomorphology; Environmental Effects and Mitigation).

Effects on beneficial uses and water quality

Suspended sediment and turbidity

Impact 3.3-2: Impairment of water quality and sediment-sensitive beneficial uses due to increased suspended sediment and turbidity. Increases in road-related surface erosion under the No Action alternative would have a potentially significant effect on sediment delivery in the primary assessment area as compared with existing conditions (Section 3.2.2; Geology, Soils, and Geomorphology; Environmental Effects and Mitigation). This could result in increased concentrations of suspended sediment and turbidity levels in watercourses in the primary assessment area during peak flow periods. In addition, there would be a potentially significant increase in peak flows in 23 more heavily harvested planning watersheds (Appendix I, Table I-3), such that greater instances of flooding and/or streambed scour would occur, substantially increasing erosion and siltation in these planning watersheds (see analysis above for peak flows). The Garcia River is currently listed as impaired for sediment (Table 3.3-7), and additional sedimentation would further exacerbate poor water quality conditions with respect to suspended sediment and turbidity in this watershed analysis unit in particular. Two of the more heavily harvested planning watersheds (Rolling Brook and South Fork Garcia River) are located within the Garcia River watershed analysis unit (Appendix I, Table I-3).

Post-fire timber salvage under the No Action alternative would be conducted in accordance with the CFPRs and the measures included in MRC's 2000 Management Plan (MRC 2000a). Per the CFPRs, timber salvage would continue to be prohibited in Watercourse and Lake Protection Zones in order to minimize sediment delivery to streams. Because management measures for post-fire timber salvage would not differ substantially from current practices, there would be no effect on suspended sediment and turbidity compared with existing conditions.

Under the No Action alternative, increases in concentrations of suspended sediment and turbidity levels during peak flow periods would be a **potentially significant effect** on water quality and sediment-sensitive beneficial uses (e.g., Cold Freshwater Habitat; Municipal and Domestic

Supply; Water Contact Recreation; Spawning, Reproduction, and/or Early Development) in the primary assessment area.

Water temperature

The canopy closure guidelines, large tree retention standards, and Watercourse and Lake Protection Zone widths under the No Action alternative would increase stream shading and decrease water temperature. Buffer widths that would be implemented under the No Action alternative range from 30–50 ft (9–15 m) for Class III streams to 100–150 ft (30–46 m) for Class I streams (Table 3.3-15), which would provide stream shading and support cooler water temperatures, should canopy cover within the Watercourse and Lake Protection Zone increase. Timber modeling shows that riparian canopy closure for the assessment area would increase relative to existing conditions, with the fraction of riparian area experiencing the highest cover class (> 60% cover) increasing from 70% at existing conditions to greater than or equal to 90% by the end of decade 2 (Section 3.4 [Aquatic and Riparian Habitats and Species of Concern], Figure 3.4-3). The trend in average number of large riparian (Watercourse and Lake Protection Zone) trees in the primary assessment area under the No Action alternative is also expected to increase, from 10 trees per acre under existing conditions to roughly 35 trees per acre by the end of decade 8 (Section 3.4 [Aquatic and Riparian Habitats and Species of Concern], Figure 3.4-2). The increase in canopy closure and number of large riparian trees would result in slightly decreased water temperatures in primary assessment area streams, as compared with existing conditions.

When analyzed at the scale of the watershed analysis unit (Appendix I, Figure I-3a–c), Big River, Hollow Tree Creek, Navarro River, Noyo River, and Rockport Small Coastal Streams watershed analysis units would exhibit the greatest increases in riparian area with the highest cover class (> 60% cover) under the No Action alternative. The increased riparian cover would result in increased stream shading and lower water temperatures as compared with existing conditions. The anticipated decreases in water temperature for Big River and Noyo River watershed analysis units are likely to be particularly beneficial, as these watershed analysis units currently may be unfavorable to coldwater species during the summer (Section 3.3.1.4). Anticipated decreases in water temperatures are also important for the Navarro River and Garcia watershed analysis units, which possess mainstem reaches currently included on the 303(d) list for water temperature exceedances (Table 3.3-7). Due to the relatively consistent increase in canopy cover across the watershed analysis units, with most watershed analysis units achieving a greater than 90% portion of the riparian area at the highest cover class (> 60%) by the end of decade 2 or 3, the anticipated decreases in water temperature under the No Action alternative would be beneficial.

The increase in shading potential under the No Action alternative is important given anticipated increases in air temperature in the primary assessment area from climate change, as well as the increased incidence of wildfire and associated decreases in canopy cover (Section 3.8.2, Climate and Climate Change, Environmental effects and mitigation). While increased fog cover during summer months may cool water temperatures, an improved understanding of the likely effects of climate change on fog is needed prior to making this determination (Section 3.8.2, Climate and Climate Change, Environmental effects and mitigation).

Under the No Action alternative, slight decreases in water temperature would be a **beneficial effect** on water quality in the primary assessment area.

Dissolved oxygen

The No Action alternative would potentially significantly increase suspended sediment concentrations and turbidity levels (see above), have less than significant effect on nutrients (see below), and potentially decrease water temperature (see above) in the primary assessment area. Increases in suspended sediment and turbidity levels would likely decrease dissolved oxygen, no change in nutrient concentrations would not affect dissolved oxygen, and decreases in water temperature would likely increase dissolved oxygen. Since the primary factors affecting dissolved oxygen in the primary assessment area would not clearly positively or negatively reinforce one another, there would likely be no effect on dissolved oxygen under the No Action alternative.

Nutrients

Buffer widths implemented under the No Action alternative would range from 30–50 ft (9–15 m) for Class III streams to 100–150 ft (30–46 m) for Class I streams. The lower limit of the Watercourse and Lake Protection Zone width under the No Action alternative is 20–25 ft (6–8 m) greater than under current management practices for two of four stream classes (Large Class II and Class III streams; see Section 3.4.1 [Aquatic and Riparian Habitats and Species of Concern, Affected environment/Environmental setting] for stream class descriptions), while the upper limit is 10–90 ft (3–27 m) smaller than under existing conditions in two of four stream classes (Large Class II and Small Class II streams; see Table 3.3-15). However, since nutrient interception and uptake in the Watercourse and Lake Protection Zone is primarily expected to occur within 35–50 ft (11–15 m) of the stream channel (Section 3.3.2.1), the differing buffer widths implemented under the No Action alternative would not significantly improve or adversely affect the level of nutrient interception and uptake across the different stream classes as compared with existing conditions. The combination of only slightly changed buffer widths and no fertilizer application means that eutrophication potential under the No Action alternative is anticipated to be low. There would be a **less than significant effect** on water quality due to a lack of significant changes in nutrients in the primary assessment area.

3.3.2.3 Proposed Action

Effects on hydrology

Peak flows

Under the Proposed Action, the predicted percentage of land harvested per decade (32–45%, see Table 3.3-14 and Figure 3.3-16) is less than the presumptive threshold for increased peak flows (50–60%) for large watersheds (> 2,500 ac [> 10 km^2]) during the entire analysis period. The percentage of land harvested per decade under the Proposed Action (32–45%) would be greater than that under existing conditions (29%) for the entire analysis period.

Silviculture methods in upland areas indicate an increasing proportion of uneven-aged selection as compared with even-aged silviculture methods (Figure 3.3-18), with greater than 90% of silviculture as selection by the end of decade 3. The combination of increasing amount of uneven-aged silviculture and percentage of land harvested substantially below 50-60% means that at the scale of the primary assessment area there would be no increase in peak flows anticipated under the Proposed Action compared with existing conditions. In riparian buffer zones (Aquatic Management Zones) under the Proposed Action, high retention selection would gradually replace Small Class II Selection during the analysis period (Figure 3.3-18), which may further reduce the potential for increases in peak flows as compared with existing conditions by decreasing the number of trees removed directly adjacent to the stream (i.e., basal area retention standards for Small Class II Selection range from 10 to 25 square feet for average retention while those of high retention selection range from 25 to 100 square feet plus 20% of the largest trees; see Appendix E for additional detail on silviculture methods, including basal area retention standards for each alternative). The lower limit of the Aquatic Management Zone width under the Proposed Action is 15–25 ft (5–8 m) greater than under existing conditions in three out of four stream classes (Class I, Large Class II, and Class III streams; see Table 3.3-15), while the upper limit is 10–40 ft

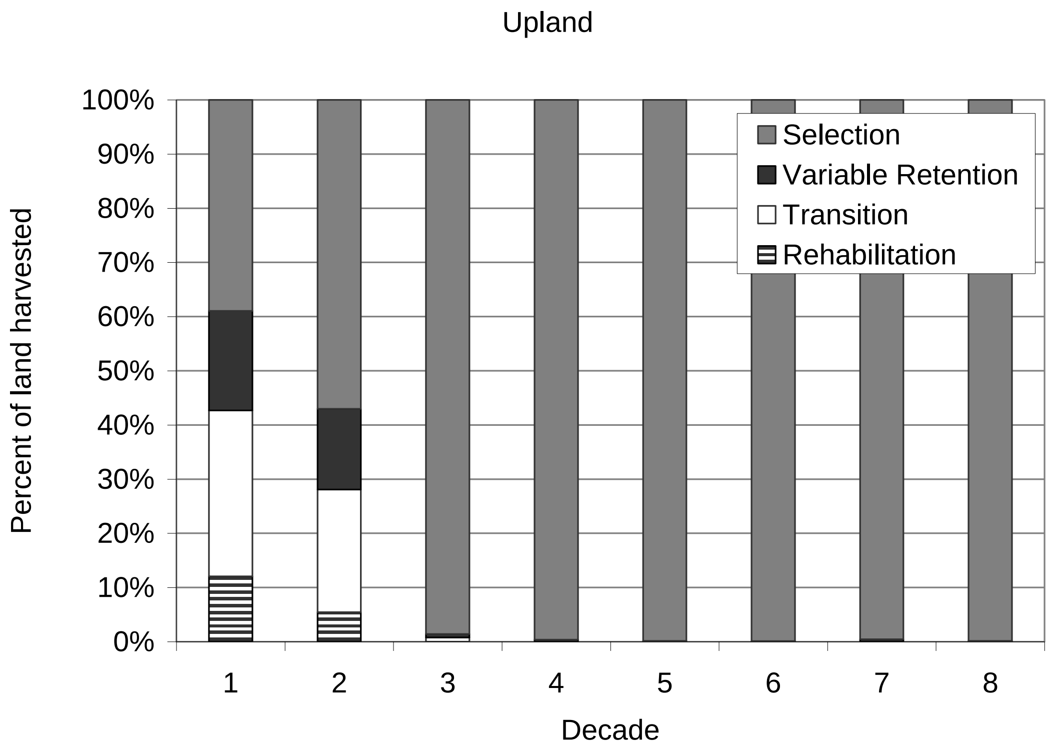
(3–12 m) smaller than that of existing conditions in two out of four stream classes (Large Class II and Small Class II streams). While this may reduce hydrologic connectivity between upland areas and streams in the primary assessment area and decrease peak flows relative to existing conditions, the effect would likely be small, since overall there would not be a large difference in typical Aquatic Management Zone width between the Proposed Action and existing conditions.

Post-fire timber salvage under the Proposed Action would follow the prescriptions in MRC's proposed HCP/NCCP, which include site-specific measures to reduce erosion and sediment delivery to streams, but would have little effect on hydrology and runoff from burned areas. Therefore, post-fire timber salvage under the Proposed Action would have no effect on peak flows (and low flows) compared with existing conditions.

When analyzed at the scale of the planning watershed (Appendix I, Tables I-2 and I-3), percentage of land harvested per decade is generally less than 45%, indicating a low likelihood of increased peak flows resulting from the Proposed Action. However, there are a few planning watersheds (i.e., 9 of 50, or 18%) that would experience harvest levels in the 50–60% range from decades 4–8, and two planning watersheds that would experience harvest greater than 60% (i.e., South Fork Garcia River planning watershed [Garcia River watershed analysis unit], Middle Fork North Fork Noyo River planning watershed [Noyo River watershed analysis unit]) during decades 6–8. Peak flow increases of 10–15% would be likely to occur in these planning watersheds during later decades of the analysis period. Silviculture methods are assumed to be the same by planning watershed. As with the primary assessment area as a whole, the increasing proportion of uneven-aged selection in both uplands and the Aquatic Management Zones by the end of decade 3 would reduce the potential for increases in peak flows in these more heavily harvested planning watersheds compared with existing conditions.

For comparison, as part of HCP/NCCP development, the cumulative effect of harvest under the Proposed Action on peak flow at the 2-year return interval was modeled using canopy cover as a surrogate for the percentage of land harvested. As described in Appendix I in MRC (2012), the model algorithm was developed from analysis on clearcut harvests in Caspar Creek (Lewis et al. 2001) and is likely a conservative estimate when applied to selective harvest practices. Model results indicated that increasing canopy cover under the Proposed Action results in decreasing peak flows in the primary assessment area (MRC 2008b), with an average maximum peak flow increase in 2060 of 9.7% over that of dense second-growth forest, as compared with a peak flow increase of 14.5% over dense second-growth forest for existing conditions (in this case, 2002). The model uses canopy cover rather than the percentage of planning watershed harvested and silviculture method, but the modeled trend generally agrees with the hydrology analysis presented here.

Overall, at the scale of the primary assessment area, the predicted percentage of land harvested per decade under the Proposed Action is less than the presumptive threshold for increased peak flows, indicating no effect on peak flows. However, there is potential for increased peak flows in the more heavily harvested planning watersheds during decades 4–8 of the analysis period. Since the number of heavily harvested planning watersheds is relatively small and the increasing use of uneven-aged selection silviculture would reduce the potential for increases in peak flows in all of the planning watersheds (but particularly in the more heavily harvested planning watersheds), under the Proposed Action there would be a **less than significant effect** on hydrology in the primary assessment area.



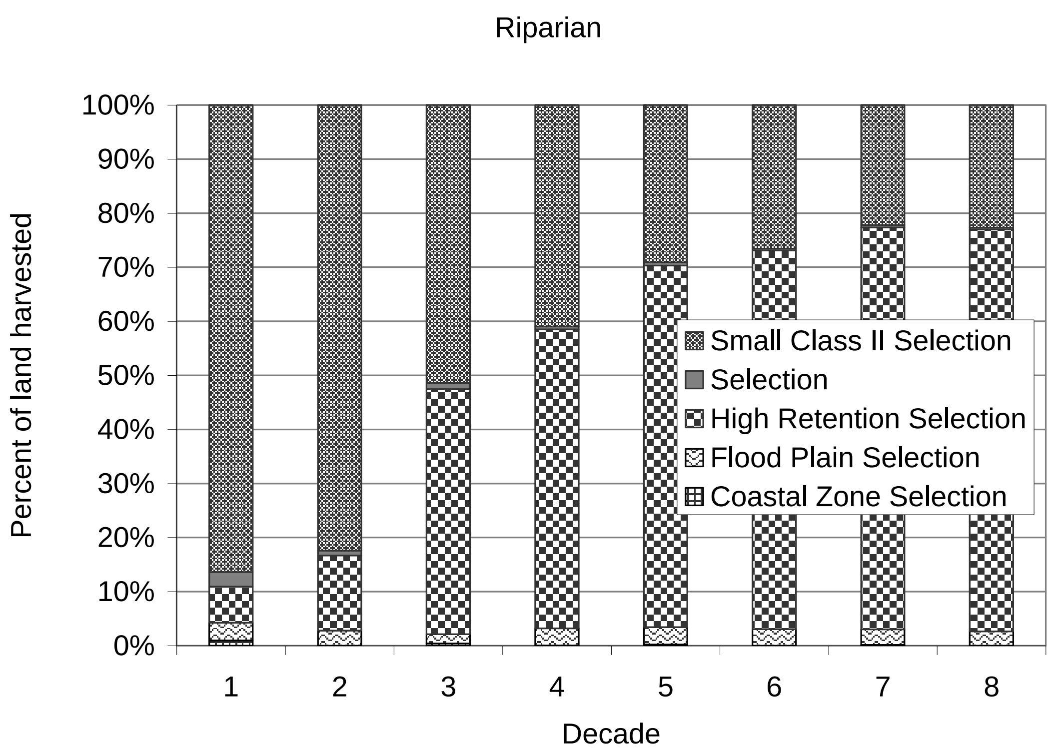


Figure 3.3-18. Percentage of land harvested per decade by silviculture method (defined in Appendix E) predicted under the Proposed Action in upland areas and Aquatic Management Zones.

Low flows

Under the Proposed Action the percentage of land harvested per decade in the primary assessment area (32–45%, see Table 3.3-14 and Figure 3.3-16) would be greater than existing conditions (29%) for the entire analysis period. The increase in the percentage of land harvested would potentially increase low flows or increase variability of low flows in the primary assessment area. In contrast to the greater percentage of land harvested (relative to existing conditions), the increasing amount of uneven-aged silviculture under the Proposed Action may decrease low flows and the variability of low flows in the primary assessment area. Harvest in upland areas would result in an increasing proportion of uneven-aged selection silviculture, with greater than 95% of silviculture as selection by the end of decade 3 (Figure 3.3-18). In Aquatic Management Zones, the use of uneven-aged high retention selection during the analysis period (Figure 3.3-18) may also decrease low flows.

While some studies have shown that timber harvest in fog-dominated areas of the Pacific Northwest may decrease low flows due to reduced interception of fog precipitation (Moore and Wondzell 2005), studies in the Caspar Creek watershed (Keppeler 1998, 2007) indicate that reduced fog precipitation is not likely to substantially decrease low flows.

Lastly, due to the relatively low percentage of flow available for water drafting, the requirement for continuous bypass flows during drafting operations, and the episodic nature of water drafting (see Appendix T in MRC 2012), this forest management activity is expected to result in altered low flows only locally.

Under the Proposed Action, there would be a **less than significant effect** on hydrology in the primary assessment area due to the potential for only slightly increased low flows and flow variability, which may be at least somewhat counteracted by increasing amounts of uneven-aged selection silviculture in uplands and the Aquatic Management Zones.

Flooding potential

Allowances and directions in the Master Agreement for Timber Operations (see Appendix T of MRC 2012) would apply under the Proposed Action and would include re-establishment of flow paths in Class II and III watercourse channels where tractor and skid trail crossings are diverting a watercourse, have a potential to divert a watercourse, or are not properly draining. Allowances and directions would also include restoration of channel cross-sectional shape and longitudinal gradient to conditions as close as possible to the natural configuration or to that which existed prior to the disturbance. While these conditions would primarily affect erosion potential (see Suspended Sediment and Turbidity analysis, below), watercourse diversions and alterations to channel cross-sectional shape and gradient could also increase flooding potential by constraining flow paths proximal to skid trail crossings. Under the Proposed Action, MRC would repair current or impending problems such that the proposed correction would result in a net benefit to watercourse conditions.

Under the Proposed Action, there would be a **beneficial effect** on hydrology in the primary assessment area due to decreased flooding potential from correction of watercourse diversions and alterations to channel cross-sectional shape and gradient at skid trail crossings.

Effects on beneficial uses and water quality

Suspended sediment and turbidity

Decreases in road-related surface erosion under the Proposed Action would have a beneficial effect on sediment delivery in the primary assessment area as compared with existing conditions (Section 3.2.2; Geology, Soils, and Geomorphology; Environmental effects and mitigation). This includes implementation of allowances and directions in the Master Agreement for Timber Operations (see Appendix T of MRC 2012) for re-establishment of flow paths and restoration of channel cross-sectional shape and longitudinal gradient. Decreases in road-related surface erosion would result in decreased concentrations of suspended sediment and turbidity levels in watercourses in the primary assessment area during peak flow periods. In addition, the Proposed Action is not expected to result in increased peak flows (see analysis above for peak flows) and consequently, there would be no increase in flooding and/or streambed scour.

Post-fire timber salvage under the Proposed Action would follow the prescriptions in MRC's proposed HCP/NCCP, which include site-specific measures to reduce erosion and sediment delivery to streams from roads, stream crossings, and general forested areas. Timber salvage would be prohibited in Aquatic Management Zones unless approved by the wildlife agencies. The HCP/NCCP measures would provide additional erosion control in burned areas and would reduce the potential for suspended sediment and turbidity in streams compared with existing conditions.

Under the Proposed Action, decreases in concentrations of suspended sediment and turbidity levels during peak flow periods would be a **beneficial effect** on water quality and sediment-sensitive beneficial uses (e.g., Cold Freshwater Habitat; Municipal and Domestic Supply; Water Contact Recreation; Spawning, Reproduction, and/or Early Development) in the primary assessment area.

Under the Proposed Action, automated suspended sediment and turbidity sampling stations would be installed near the outlet of the South Fork Albion and Little North Fork Navarro watersheds, and an automated turbidity-only sampling station would be installed in the Cottaneva Creek focus watershed. In the Cottaneva Creek watershed, manual sampling of suspended sediment levels would also be conducted. Additional data on sediment and turbidity would greatly improve the existing data record (Section 3.3.1.4).

Water temperature

Under the Proposed Action, the canopy closure guidelines, large tree retention standards, and Aquatic Management Zone widths would slightly increase stream shading and decrease water temperatures compared with existing conditions. Aquatic Management Zones implemented under the Proposed Action would range from 25–50 ft (8–15 m) for Class III streams to 130–190 ft (40–58 m) for Class I streams (Table 3.3-15), which would provide additional stream shading and result in cooler water temperatures compared with existing conditions, given a corresponding increase in canopy cover within the Aquatic Management Zone. Timber modeling shows that riparian canopy closure for the primary assessment area would increase slightly relative to existing conditions, with the fraction of riparian area experiencing the highest cover class (> 60%) increasing from 70% at existing conditions to 80–85% over the analysis period (Section 3.4 [Aquatic and Riparian Habitat and Species of Concern], Figure 3.4-5). The trend in average number of large riparian (Aquatic Management Zone) trees under the Proposed Action would also increase, from 10 trees per acre under existing conditions to just over 50 trees per acre by the end of decade 8 (Section 3.4 [Aquatic and Riparian Habitat and Species of Concern], Figure 3.4-4). The increase in canopy closure and number of large riparian trees would result in slightly decreased water temperatures in primary assessment area streams relative to existing conditions.

When analyzed at the scale of the watershed analysis unit (Appendix I, Figure I-4a-c), Big River, Hollow Tree Creek, Navarro River, Noyo River, and Rockport Small Coastal Streams watershed analysis units exhibit the greatest increases in riparian area with the highest cover class (> 60% cover), while the Cottaneva Creek watershed analysis unit exhibits a decrease in riparian area with the highest cover class. The predicted increases in riparian cover for Big River and Noyo

River watershed analysis units are likely to be particularly important, as these watershed analysis units currently may be unfavorable to coldwater species during the summer (Section 3.3.1.4). Predicted increases in shading are also particularly beneficial for the Navarro River and Garcia watershed analysis units, in which mainstem reaches are currently included on the 303(d) list for water temperature exceedances (Table 3.3-7). Due to the inconsistent increase in canopy cover across the watershed analysis units, with most watershed analysis units achieving a greater than 80% portion of the riparian area at the highest cover class (> 60%) by the end of decade 3 or 4, the anticipated decreases in summer water temperatures under the Proposed Action would be **beneficial**.

The increase in shading potential under the Proposed Action is important given anticipated increases in air temperature from climate change in the primary assessment area, as well as the increased incidence of wildfire and associated decreases in canopy cover (Section 3.8.2, Climate and Climage Change, Environmental effects and mitigation). While increased fog cover during summer months may cool water temperatures, an improved understanding of the likely effects of climate change on fog is needed prior to making this determination (Section 3.8.2, Climate and Climate Change, Environmental effects and mitigation).

Under the Proposed Action, slight decreases in water temperature would be a **beneficial effect** on water quality in the primary assessment area.

Under the Proposed Action, MRC would continue to conduct monitoring of stream temperature at strategic locations in streams throughout the primary assessment area including over 200 sites in Class I streams, sites where coho salmon are known to be present, and selected Class II streams where coastal tailed frogs are known to be present. MRC would also monitor the effects of restoration harvests on stream temperature. Air temperature would be monitored to assist in interpretation of stream temperatures. In addition, MRC would determine the average shade percentage (using a solar pathfinder) for selected streams in each planning watershed. Additional data on water temperature would improve the existing data record (Section 3.3.1.4).

Dissolved oxygen

The Proposed Action would have a beneficial effect on water quality due to decreases in suspended sediment and turbidity and water temperature (see above), and there would be less than significant effect on nutrients (see below). Decreases in suspended sediment, turbidity, and water temperature would likely increase dissolved oxygen. There would be no appreciable change in nutrient concentrations and thus likely no effect on dissolved oxygen. Since two of the three primary factors affecting dissolved oxygen in the primary assessment area would likely increase dissolved oxygen, and one factor would have no effect, overall there is likely to be an increase in dissolved oxygen concentrations. This is particularly relevant for the Big River, Noyo River, Navarro River and Garcia watershed analysis units, where summertime exceedances to dissolved oxygen Basin Plan criteria have been observed under existing conditions (Table 3.3-12). Under the Proposed Action, increased dissolved oxygen concentrations would be a **beneficial effect** on water quality in the primary assessment area.

Nutrients

Differences in the range of Aquatic Management Zone widths under the Proposed Action relative to existing conditions would vary depending on stream class; the lower limit of the Aquatic Management Zone width under the Proposed Action would be 15–25 ft (5–8 m) greater than under existing conditions in three out of four stream classes (Class I, Large Class II, and Class III streams; see Table 3.3-15), while the upper limit would be 10–40 ft (3–12 m) smaller than under existing conditions in two out of four stream classes (Large Class II and Small Class II streams).

Since nutrient interception and uptake in the Aquatic Management Zones is primarily expected to occur within 35–50 ft (11–15 m) of the stream channel (Section 3.3.2.1), the differing buffer widths under the Proposed Action would not substantially improve or adversely effect the level of nutrient interception and uptake across the different stream classes relative to existing conditions. The combination of only slightly changed buffer widths and no fertilizer application means that eutrophication potential under the Proposed Action is anticipated to be low. Under the Proposed Action, there would be a **less than significant effect** on water quality due to a lack of significant changes in nutrient levels in the primary assessment area.

3.3.2.4 Alternative A

Effects on hydrology

Peak flows

Under Alternative A, the predicted percentage of land harvested per decade (30–39%, see Table 3.3-14 and Figure 3.3-16) is less than the presumptive threshold for discernible peak flow effects (50–60%) for large watersheds (> 2,500 ac [> 10 km^2]) during the entire analysis period. The percentage of land harvested per decade under Alternative A (30–39%) would be greater than that under existing conditions (29%) for the entire analysis period.

Silviculture methods in upland areas indicate an increasing proportion of uneven-aged selection as compared with even-aged silviculture methods such as variable retention (Figure 3.3-19), with greater than 90% of silviculture as selection by the end of decade 3. The combination of the increasing amount of uneven-aged silviculture and the percentge of land harvested below 50–60% suggests there would be no increase in peak flows under Alternative A relative to existing conditions. In riparian buffer zones (Aquatic Management Zones) under Alternative A, uneven-aged high retention selection would be the dominant method used during the analysis period (Figure 3.3-19) and no harvest would be permitted within 150 ft (46 m) of Class I and Large Class II streams, which may further reduce the potential for increases in peak flows relative to existing conditions by decreasing the number of trees removed directly adjacent to the stream. The lower limit of the Aquatic Management Zone width implemented under Alternative A would be 15–25 ft (5–8 m) greater than that of existing conditions in two of four stream classes (Large Class II, and Class III streams; see Table 3.3-15), while the upper limit would be 10–40 ft (3–12 m) smaller than that of existing conditions in two out of four stream classes (Large Class II and Small Class II streams). While this may reduce hydrologic connectivity between upland areas and streams in the primary assessment area and decrease peak flows relative to existing conditions, the effect would likely be small, since overall there would not be a large difference in typical Aquatic Management Zone width between Alternative A and existing conditions.

The effects of post-fire timber salvage on hydrology and runoff under Alternative A would be the same as under the Proposed Action. Site-specific measures to reduce erosion and sediment delivery to streams would have little effect on peak flows (and low flows) from burned areas and there would be no effect compared with existing conditions.

When analyzed at the scale of the planning watershed (Appendix I), the percentage of land harvested per decade would never exceed 60% for any planning watershed, indicating a low likelihood of increased flows resulting from Alternative A. The same silviculture methods are assumed to be used in each watershed analysis unit.

There would be a low likelihood of increased peak flows under Alternative A and thus there would be **no effect** on hydrology in the primary assessment area.

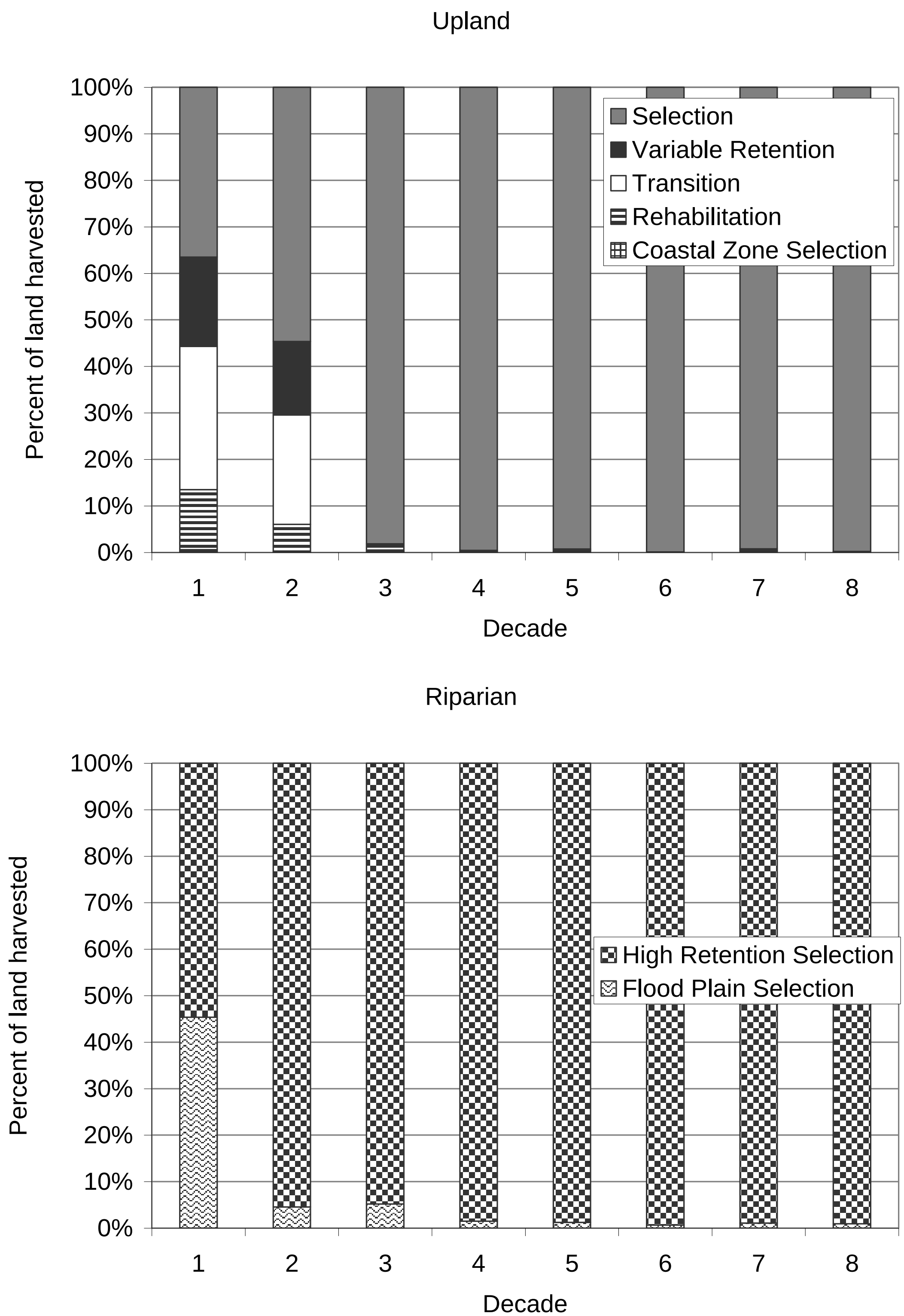


Figure 3.3-19. Percentage of harvest by silviculture method (defined in Appendix E) predicted under Alternative A in upland areas and Aquatic Management Zones.

Low flows

Under Alternative A the percentage of land harvested per decade in the primary assessment area (30–39%, see Table 3.3-14 and Figure 3.3-16) would be greater than existing conditions (29%) for the entire analysis period. This trend suggests the potential for increases in low flows or increases in variability of low flows in the primary assessment area. Silviculture methods (MRC 2008b) in upland areas indicate an increasing proportion of uneven-aged selection as compared with even-aged silviculture methods (Figure 3.3-19), with greater than 95% of silviculture as selection by the end of decade 3. In contrast to the greater percentage of land harvested (relative to existing conditions), the increasing amount of uneven-aged silviculture may decrease low flows and the variability of low flows for the primary assessment area. In Aquatic Management Zones, the use of uneven-aged high retention selection during the analysis period (Figure 3.3-19) may also decrease low flows. While some studies have shown that timber harvest in fog-dominated areas of the Pacific Northwest may decrease low flows due to reduced interception of fog precipitation (Moore and Wondzell 2005), studies in the Caspar Creek watershed (Keppeler 1998, 2007) indicate that reduced fog precipitation is not likely to significantly decrease low flows in the primary assessment area. Lastly, due to the relatively low percentage of flow available for water drafting, the requirement for continuous bypass flows during drafting operations, and the episodic nature of water drafting (see Appendix T in MRC 2012), this forest management activity is expected to result in only locally altered low flows.

Under Alternative A, there would be a **less than significant effect** on hydrology due to the potential for only slightly increased low flows and flow variability, which may be at least somewhat counteracted by increasing amounts of uneven-aged silviculture in uplands and the Aquatic Management Zones.

Flooding potential

Allowances and directions in the Master Agreement for Timber Operations (see Appendix T of MRC 2012) would apply under Alternative A and would include re-establishment of flow paths in Class II and III watercourse channels where tractor and skid trail crossings are diverting a watercourse, have a potential to divert a watercourse, or are not properly draining. Allowances and directions would also include restoration of channel cross-sectional shape and longitudinal gradient to conditions as close as possible to the natural configuration or to that which existed prior to the disturbance. While these conditions would primarily affect erosion potential (see suspended sediment and turbidity analysis, below), watercourse diversions and alterations to channel cross-sectional shape and gradient could also increase flooding potential by constraining flow paths. Under Alternative A, MRC would repair current or impending problems such that the proposed correction would result in a net benefit to watercourse conditions.

Under Alternative A, there would be a **beneficial effect** on flooding potential due to correction of watercourse diversions and alterations to channel cross-sectional shape and gradient in the primary assessment area.

Effects on beneficial uses and water quality

Suspended sediment and turbidity

Decreases in road-related surface erosion under Alternative A would have a beneficial effect on sediment delivery in the primary assessment area relative to existing conditions (Section 3.2.2; Geology, Soils, and Geomorphology; Environmental effects and mitigation). This includes implementation of allowances and directions in the Master Agreement for Timber Operations (see Appendix T of MRC 2012) for re-establishment of flow paths and restoration of channel cross-sectional shape and longitudinal gradient. Decreases in road-related surface erosion would result in decreased concentrations of suspended sediment and turbidity levels in watercourses in the primary assessment area during peak flow periods. In addition, Alternative A would result in decreased peak flows (see analysis above for peak flows) and consequently, there would be no increase in flooding and/or streambed scour.

Effects of post-fire timber salvage on suspended sediment and turbidity under Alternative A would be the same as under the Proposed Action, with site-specific measures to reduce erosion and sediment delivery to streams from roads, stream crossings, and general forested areas. Timber salvage would be prohibited in Aquatic Management Zones unless approved by the wildlife agencies. These measures would provide additional erosion control in burned areas and would reduce the potential for suspended sediment and turbidity in streams compared with existing conditions.

Under Alternative A, decreases in concentrations of suspended sediment and turbidity levels during peak flow periods would be a **beneficial effect** on water quality and sediment-sensitive beneficial uses (e.g., Cold Freshwater Habitat; Municipal and Domestic Supply; Water Contact Recreation; Spawning, Reproduction, and/or Early Development) in the primary assessment area.

Water temperature

The canopy closure guidelines, large tree retention standards, and Aquatic Management Zone widths implemented under Alternative A would increase stream shading and decrease water temperature relative to existing conditions. Aquatic Management Zones implemented under Alternative A would range from 25 to 50 ft (8 to 15 m) for Class III streams and up to 150 ft (46 m) for Large Class II and Small Class II streams (Table 3.3-15). For Class I streams, the implemented buffer would be equal to the height of one site-potential tree. The relatively greater Aquatic Management Zone widths would provide stream shading and result in cooler water temperatures relative to existing conditions, given a corresponding increase in canopy cover within the Aquatic Management Zone (and assuming site-potential is greater than 150 ft [46 m] for Class I streams). Timber modeling shows that riparian canopy closure for the assessment area would increase relative to existing conditions, with the fraction of riparian area experiencing the highest cover class (> 60%) increasing from 70% at existing conditions to greater than 95% by the end of decade 3 (Section 3.4 [Aquatic and Riparian Habitats and Species of Concern], Figure 3.4-7). The average number of large riparian trees in the primary assessment area under Alternative A would also increase, from 10 trees per acre under existing conditions to just over 65 trees per acre by the end of decade 8 (Section 3.4 [Aquatic and Riparian Habitats and Species of Concern], Figure 3.4-6). The increase in canopy closure and number of large riparian trees would result in decreased water temperatures in primary assessment area streams relative to existing conditions.

When analyzed at the scale of the watershed analysis unit (Appendix I, Figure I-5a–c), multiple watershed analysis units exhibit significant increases in riparian area with the highest cover class (> 60% cover), with the fraction of riparian area experiencing the highest cover class (> 60% cover) increasing from 60–85% under existing conditions to greater than 95% by the end of decade 3 for all watershed analysis units except for Cottaneva, which would exhibit a decrease in riparian area with the highest cover class, and Navarro, which would exceed 95% cover by the end of decade 4. The predicted increases in riparian cover for Big River and Noyo River watershed analysis units would be beneficial as these watershed analysis units currently may be unfavorable to coldwater species during the summer (Section 3.3.1.4). Predicted increases in shading would be important for the Navarro River and Garcia watershed analysis units, in which mainstem reaches are currently included on the 303(d) list for water temperature exceedances (Table 3.3-7). Due to the relatively consistent increase in canopy cover across the watershed analysis units, with most watershed analysis units achieving a greater than 95% portion of the riparian area at the highest cover class (> 60% cover) by the end of decade 3 or 4, the anticipated effects on water temperature under Alternative A would be **beneficial**.

The increase in shading potential under Alternative A is particularly important given anticipated increases in air temperature in the primary assessment area from climate change, as well as the increased incidence of wildfire and associated decreases in canopy cover (Section 3.8.2, Climate and Climate Change, Environmental effects and mitigation). While increased fog cover during summer months may cool water temperatures, an improved understanding of the likely effects of climate change on fog is needed prior to making this determination (Section 3.8.2, Climate and Climate Change, Environmental effects and mitigation).

Under Alternative A, decreases in water temperature would be a **beneficial effect** on water quality in the primary assessment area.

Dissolved oxygen

Under Alternative A, there would be a beneficial effect on water quality due to decreases in suspended sediment and turbidity and water temperature (see above), and there would be a less than significant effect on nutrients (see below). Decreases in suspended sediment, turbidity, and water temperature would likely increase dissolved oxygen. There would be no appreciable change in nutrient concentrations and thus likely no effect on dissolved oxygen. Since two of the three primary factors affecting dissolved oxygen in the primary assessment area would likely increase dissolved oxygen, and one would have no effect, overall there is likely to be an increase in dissolved oxygen concentrations. This is particularly relevant for the Big River, Noyo River, Navarro River and Garcia watershed analysis units, where summertime exceedances to dissolved oxygen Basin Plan criteria have been observed under existing conditions (Table 3.3-12). Under Alternative A, increased dissolved oxygen concentrations would be a **beneficial effect** on water quality in the primary assessment area.

Nutrients

Differences in the range of Aquatic Management Zone widths implemented under Alternative A relative to existing conditions are variable depending on stream class; the lower limit of the Aquatic Management Zone width under Alternative A would be 15–25 ft (5–8 m) greater than under existing conditions in two of four stream classes (Large Class II, and Class III streams; see Table 3.3-15), while the upper limit would be 10–40 ft (3–12 m) smaller than under existing conditions in two of four stream classes (Large Class II and Small Class II streams). Since nutrient interception and uptake in the Aquatic Management Zone is primarily expected to occur within 35–50 ft (11–15 m) of the stream channel (Section 3.3.2.1), the differing buffer widths under Alternative A would not significantly improve or adversely effect the level of nutrient interception and uptake across the different stream classes as compared with existing conditions. The combination of only slightly changed buffer widths and no fertilizer application means that eutrophication potential under Alternative A is anticipated to be low. Under Alternative A, there would be a **less than significant effect** on water quality due to a lack of significant changes in nutrients in the primary assessment area.

3.3.2.5 Alternative B

Effects on hydrology

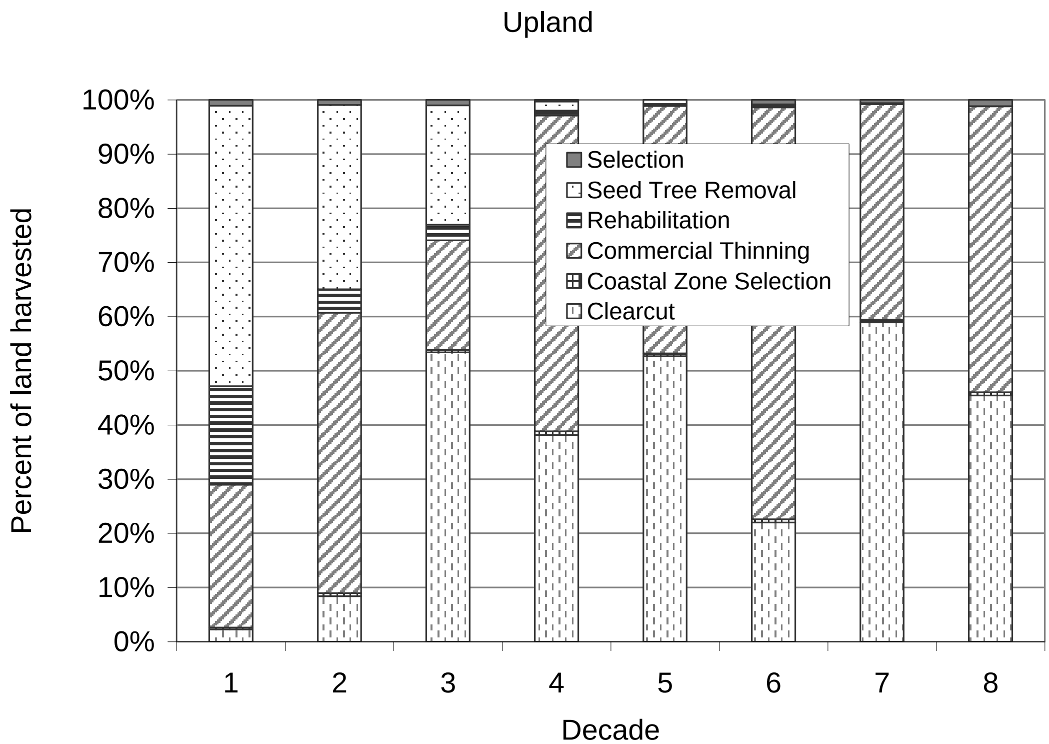
Peak flows

Under Alternative B, the percentage of land harvested per decade (Table 3.3-14 and Figure 3.3-16) outside the reserves never exceeds 23%, which is well below the presumptive threshold for measurable effects on peak flows in large watersheds (> 2,500 ac [> 10 km^2]), even for the lower threshold applied to clearcut (30–40%) (see Section 3.3.2.1 for threshold definitions). The percentage of land harvested per decade under Alternative B would also be less than that under existing conditions (29%) for the entire analysis period.

Outside of the reserves, silviculture methods in upland areas, while initially dominated by even-aged seed tree removal, would be generally dominated by some combination of commercial thinning and clearcut (Figure 3.3-20, see Table 3.3-13 for silviculture methods) by the end of decade 2. Clearcut and commercial thinning would produce the greatest peak flow increases of any silviculture method. While channels draining local clearcuts within small subwatersheds would experience localized increases in peak flows, the overall low percentage harvested per decade should minimize effects on peak flows at the scale of the primary assessment area. Further, in riparian buffer zones (Watercourse and Lake Protection Zones), uneven-aged silviculture would be the primary harvest method throughout the analysis period (Figure 3.3-20), which may help to reduce the potential for localized increases in peak flows by decreasing the number of trees removed in the riparian buffer zones. The Watercourse and Lake Protection Zone widths implemented under Alternative B are the same as under the No Action alternative; the lower limit of the Watercourse and Lake Protection Zone width under Alternative B outside the reserves would be 20–25 ft (6–8 m) greater than under current management practices for two of four stream classes (Large Class II and Class III streams), while the upper limit would be 10–90 ft (3–27 m) smaller than under existing conditions in two of four stream classes (Large Class II and Small Class II streams; see Table 3.3-15).

Effects of post-fire timber salvage on hydrology and runoff under Alternative B outside the reserves would be the same as under the No Action alternative. There would be no timber salvage in the reserves. Because management measures for post-fire timber salvage would not differ substantially from current practices, there would be no effect on peak flows and low flows compared with existing conditions.

When analyzed at the scale of the planning watershed (Appendix I), the predicted percentage of land harvested per decade generally does not exceed 25%, and never 30% (the presumptive threshold for increased peak flows), indicating a low likelihood of increased peak flows at the scale of the planning watershed. Silviculture methods are assumed to be similar among planning watersheds. As for the larger scale of the assessment area, continued uneven-aged high retention selection and selection in the riparian buffer zones (Watercourse and Lake Protection Zones) would further reduce the potential for increased peak flows from even-aged commercial thinning and clearcut silviculture at the scale of the planning watershed. Thus, although clearcut and commercial thinning would be expected to produce the greatest peak flow increases of any silviculture method, these increases would likely occur only in local channels draining the harvest area and would attenuate as water moves downstream through areas that are not harvested. The latter would include reserves, which are primarily located in a few key areas to benefit terrestrial species or present as narrow corridors connecting the larger patches, but also lands not located in the reserves that are not harvested in a particular decade. Thus, due to the overall low percentage of land harvested per decade, peak flow increases in local channels draining harvest areas are not likely to be measurable at the scale of the entire assessment area or the planning watershed. Under Alternative B, there would be a **less than significant effect** on hydrology due to increased peak flows occurring only in local channels draining clearcut areas and not at the scale of the planning watershed or the primary assessment area.



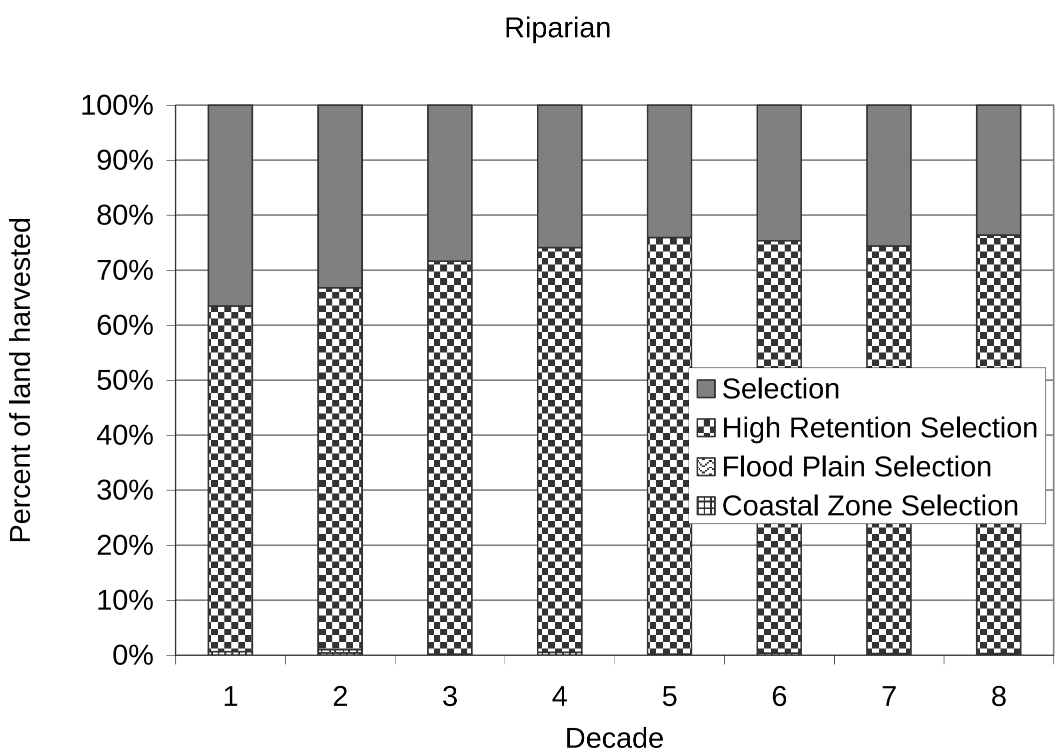


Figure 3.3-20. Percentage of harvest by silviculture method (defined in Appendix E) predicted under Alternative B in upland areas and Watercourse and Lake Protection Zones.

Low flows

Under Alternative B the percentage of land harvested per decade for the entire assessment area (Table 3.3-14 and Figure 3.3-16) never exceeds 23%, which is less than existing conditions (29%). However, outside of the reserves, silviculture methods (MRC 2008b) in upland areas are dominated by a combination of even-aged methods including seed tree removal, commercial thinning, and clearcut (Figure 3.3-20) throughout the analysis period. Clearcut upland areas outside of the reserves would produce the greatest increases in low flows and low flow variability of any silviculture method. While channels draining local clearcuts within small subwatersheds would experience localized effects on low flows, the overall low percentage harvested per decade should minimize effects at the scale of the assessment area. In Watercourse and Lake Protection Zones, uneven-aged high retention selection and selection are the primary harvest methods throughout the analysis period (Figure 3.3-20), which should also help to reduce potential increases to low flows from clearcuts (outside of the reserves). As described previously, studies in the nearby Caspar Creek watershed (Keppeler 1998, 2007) indicate that reduced fog precipitation is not likely to significantly decrease low flows in the primary assessment area. Due to the relatively low percentage of flow available for water drafting, the requirement for continuous bypass flows during drafting operations, and the episodic nature of water drafting (see Appendix T in MRC 2012), this forest management activity is expected to result in altered low flows only locally. However, if water drafting occurs in locations also impacted by clearcut, local effects on low flows would be exacerbated.

Overall, under Alternative B, there would be a **less than significant effect** on hydrology due to increases to low flows occurring only in local channels draining clearcut areas and not at the scale of the primary assessment area.

Flooding potential

As stated in Appendix E of MRC (2012), the use of skid trails can significantly alter natural drainage and flow paths. Flow paths in Class II and III watercourse channels can become constrained where tractor and skid trail crossings are diverting a watercourse, have a potential to divert a watercourse, or are not properly draining. This could increase flooding potential near skid trail crossings. Much of the skid trail network in the primary assessment area is associated with historical practices, and under Alternative B there are no requirements to correct current or impending problems.

While skid trail and tractor crossings may result in increased flooding potential, these features would primarily increase erosion potential and sediment delivery (see Section 3.2.2; Geology, Soils, and Geomorphology; Environmental effects and mitigation). Thus, under Alternative B, there would be a **less than significant effect** on hydrology due to continued or future flooding at locations near skid trail crossings in the primary assessment area outside of the reserves. Impacts related to sediment delivery are discussed separately in Section 3.2.2 (Geology, Soils, and Geomorphology; Environmental effects and mitigation).

Effects on beneficial uses and water quality

Suspended sediment and turbidity

Impact 3.3-3: Impairment of water quality and sediment-sensitive beneficial uses due to increased suspended sediment and turbidity. Silviculture methods under Alternative B (outside reserves) include commercial thinning and clearcut, methods which have the potential to substantially increase sediment delivery in watersheds where they occur. Substantial increases in management-related surface erosion and potentially significant road-related surface erosion under Alternative B would have a combined significant effect on sediment delivery outside of the reserves as compared with existing conditions (Section 3.2.2; Geology, Soils, and

Geomorphology; Environmental effects and mitigation). This would result in increased concentrations of suspended sediment and turbidity levels in watercourses outside of the reserves during peak flow periods. Several river basins in the primary assessment area are currently listed as impaired for sediment (Table 3.3-7), and additional sedimentation would further exacerbate poor water quality conditions with respect to suspended sediment and turbidity in these basins.

Effects of post-fire timber salvage on suspended sediment and turbidity under Alternative B outside the reserves would be the same as under the No Action alternative. There would be no timber salvage in the reserves. Because management measures for post-fire timber salvage would not differ substantially from current practices, there would be no effect on suspended sediment and turbidity compared with existing conditions.

Under Alternative B, increases in concentrations of suspended sediment and turbidity levels outside of the reserves would be **potentially significant effect** on water quality and sediment-sensitive beneficial uses (e.g., Cold Freshwater Habitat; Municipal and Domestic Supply; Water Contact Recreation, Spawning, Reproduction, and/or Early Development).

Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding. Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding by (1) reducing the amount and rate of clearcut timber harvest, and (2) using aerial yarding (i.e., helicopter) rather than ground-based yarding systems on potentially unstable slopes. Potentially unstable slopes include those in Terrain Stability Unit 1 (inner gorge and steep slopes along low-gradient watercourses), Terrain Stability Unit 2 (inner gorge and steep slopes adjacent to high-gradient watercourses), and Terrain Stability Unit 3 (dissected and convergent topography). This is the same mitigation measure described in Section 3.2.2 (Geology, Soils, and Geomorphology; Environmental effects and mitigation). This mitigation measure would reduce concentrations of suspended sediment and turbidity levels in watercourses outside of the reserves during peak flow periods by reducing potential management-related surface erosion effects to **less than significant**.

Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion. Reduce the potential for management-related surface erosion (e.g., sheetwash, rilling, and gullying) to stream channels by (1) reducing the amount and rate of clearcut timber harvest; (2) limiting equipment use in headwater streams and swales; and (3) using aerial rather than ground-based yarding systems. This is the same mitigation measure described in Section 3.2.2 (Geology, Soils, and Geomorphology; Environmental effects and mitigation).

Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach. A comprehensive road management approach ensures that sediment delivery to stream channels from the existing and future road network is minimized by (1) defining when and how road-related point sources of erosion and sediment delivery would be treated; (2) prioritizing removal of road segments that pose the greatest erosion hazards and risks to aquatic resources; (3) specifying best management practices for inventory, maintenance and upgrade of existing roads; (4) specifying when, where and how new roads would be constructed; and (5) regulating road use. A comprehensive road management approach would include a schedule for inventory and control of road-related point sources of sediment and removal of unnecessary road segments. As the majority of sediment delivery comes from road-related sources, this mitigation measure is the same as that presented in Section 3.2.2 (Geology, Soils, and Geomorphology; Environmental effects and mitigation).

Implementation of these mitigation measures would reduce potential effects on water quality and sediment-sensitive beneficial uses due to increased sediment and turbidity to **less than significant**.

Water temperature

The riparian canopy retention guidelines, large tree retention standards, and Watercourse and Lake Protection Zone widths implemented under Alternative B would increase stream shading relative to existing conditions, and correspondingly decrease water temperatures. Watercourse and Lake Protection Zones under Alternative B would range from 30–50 ft (9–15 m) for Class III streams outside of the reserves up to 100–150 ft (30–46 m) for Class I streams (Table 3.3-15) outside of the reserves, which would provide stream shading and support cooler water temperatures, as canopy cover within the Watercourse and Lake Protection Zones increases. There are no Watercourse and Lake Protection Zone widths stipulated within the reserves as no timber harvest would occur there. Timber modeling shows that riparian canopy closure for the assessment area would increase relative to existing conditions, with the fraction of riparian area in the densest cover class (> 60%) increasing from 70% under existing conditions to almost 90% by the end of decade 3 (Section 3.4 [Aquatic and Riparian Habitats and Species of Concern], Figure 3.4-9). The greatest increases in canopy closure would be experienced in decades 3–5, after which canopy closure would decrease again, but would still remain greater than existing conditions by the end of decade 8. The average number of large riparian (Watercourse and Lake Protection Zone) trees in the primary assessment area under Alternative B would also increase, from 10 trees per acre under existing conditions to just over 40 trees per acre by the end of decade 8 (Section 3.4 [Aquatic and Riparian Habitats and Species of Concern], Figure 3.4-8). The increase in canopy closure and number of large riparian trees would increase shading and would decrease stream water temperatures.

When analyzed at the scale of the watershed analysis unit (Appendix I, Figure I-6a-c), the Big River, Hollow Tree Creek, and Rockport Small Coastal Streams watershed analysis units exhibit the greatest increases in riparian cover, with the fraction of riparian area with the highest cover class (> 60% cover) increasing from roughly 60% at existing conditions to 80–90% by the end of decade 3. Three watershed analysis units—Albion River, Cottoneva Creek, and Greenwood Creek—would either maintain or decrease riparian cover by the end of the analysis period. Riparian cover in the Noyo River and Navarro River watershed analysis units would increase only slightly (10–15%) over the analysis period, which may not be sufficient to decrease water temperatures; this is particularly relevant for the Noyo River watershed analysis unit, which may be unfavorable to coldwater species during the summer under existing conditions (Section 3.3.1.4). Predicted increases in shading are also important for the Navarro River and Garcia watershed analysis units, in which mainstem reaches are currently included on the 303(d) list for water temperature exceedances (Table 3.3-7). Due to the inconsistent increase in canopy cover across the watershed analysis units, the benefical effects on water temperature under Alternative B would be limited.

Any decrease in shading potential under Alternative B is particularly important given anticipated increases in air temperature in the primary assessment area from climate change, as well as the increased incidence of wildfire and associated decreases in canopy cover (Section 3.8.2, Climate and Climate Change, Environmental effects and mitigation). While increased fog cover during summer months may cool water temperatures, an improved understanding of the likely effects of climate change on fog is needed before a definitive determination can be made (Section 3.8.2, Climate and Climate Change, Environmental effects and mitigation).

Overall under Alternative B, decreasing water temperatures would be a **beneficial effect** on water quality in the primary assessment area.

Dissolved oxygen

Impact 3.3-4: Impariment of water quality due to reduced dissolved oxygen during summer months. Alternative B would have a potentially significant effect on water quality with respect to suspended sediment and turbidity (see above) and nutrients (see below) and a beneficial (i.e., cooling) effect on water temperature (see above). Increases in suspended sediment, turbidity, and nutrients would likely decrease dissolved oxygen, and decreases in water temperature would likely increase dissolved oxygen. Since two of the three primary factors affecting dissolved oxygen in the primary assessment area would decrease dissolved oxygen and one would increase dissolved oxygen, overall there is likely to be a decrease in dissolved oxygen concentrations. This is particularly relevant for the Big River, Noyo River, Navarro River and Garcia watershed analysis units, where summertime exceedances of dissolved oxygen Basin Plan criteria have been observed under existing conditions (Table 3.3-12). Under Alternative B, decreased dissolved oxygen concentrations would be a **potentially significant effect** on water quality in the primary assessment area.

With the implementation of **Mitigation Measure 3.2-1** (reduce the potential for sediment delivery to stream channels from management-related shallow landsliding), **Mitigation Measure 3.2-2** (reduce the potential for sediment delivery to stream channels from management-related surface erosion), and **Mitigation Measure 3.2-3** (develop and implement a comprehensive road management approach) (see Section 3.2.2; Geology, Soils, and Geomorphology; Environmental effects and mitigation, for a description of the mitigation measures), concentrations of suspended sediment and turbidity and associated nutrients in watercourses outside of the reserves would likely decrease. As a result, potential effects on dissolved oxygen concentrations, particularly during summer low-flow conditions, would be reduced to **less than significant**.

Nutrients

Impact 3.3-5: Impairment of water quality due to increased sediment-associated nutrient input. Watercourse and Lake Protection Zone widths implemented under Alternative B would range from 30 to 50 ft (9 to 15 m) for Class III streams to 100–150 ft (30–46 m) for Class I streams. The lower limit of the Watercourse and Lake Protection Zone width under Alternative B would be 20–25 ft (6–8 m) greater than under current management practices for two of four stream classes (Large Class II and Class III streams), while the upper limit would be 10–90 ft (3–27 m) smaller than under existing conditions in two of four stream classes (Large Class II and Small Class II streams; see Table 3.3-15). There are no Watercourse and Lake Protection Zone widths stipulated within the reserves as no timber harvest would occur there.

While the nutrient analysis for the No Action alternative indicated that the differing buffer widths implemented under the No Action alternative would not significantly improve or adversely affect the level of nutrient interception and uptake across the different stream classes as compared with existing conditions, silviculture methods under Alternative B include commercial thinning and clearcut, methods which have the potential to substantially increase sediment delivery and phosphorus levels (since phosphorus is associated with fine sediments; see Section 3.3.1.4. Nutrients – Phosphorus) in the watersheds where they occur. Since nutrient interception and uptake in the Watercourse and Lake Protection Zones is primarily expected to occur within 35–50 ft (11–15 m) of the stream channel (Section 3.3.2.1), with the exception of Class III streams (30–50 ft [9–15 m]), the Watercourse and Lake Protection Zones under Alternative B may be sufficient to remove particle-associated phosphorus. However, because of the potential for increased sediment delivery under Alterative B (see analysis above for suspended sediment and turbidity), particularly in the more heavily harvested watershed analysis units (Cottoneva, Elk Creek, Garcia, Rockport Small Coastal Streams) from decades 3–8 of the analysis period, there would be a **potentially significant effect** on water quality in the primary assessment area due to increased nutrients.

With the implementation of **Mitigation Measure 3.2-1** (reduce the potential for sediment delivery to stream channels from management-related shallow landsliding), **Mitigation Measure 3.2-2** (reduce the potential for sediment delivery to stream channels from management-related surface erosion), and **Mitigation Measure 3.2-3** (develop and implement a comprehensive road management approach) (see Section 3.2.2; Geology, Soils, and Geomorphology; Environmental effects and mitigation, for a description of the mitigation measures), concentrations of suspended sediment and turbidity and associated nutrients in watercourses outside of the reserves would likely decrease. Potential effects of increased nutrients would be reduced to **less than significant**.

3.3.2.6 Alternative C

Effects on hydrology

Peak flows

Effects on peak flows under Alternative C would be the same as the Proposed Action for decades 1–4. The duration of Alternative C is four decades. Under Alternative C, the predicted percentage of land harvested per decade (32–39%, see Table 3.3-14 and Figure 3.3-16) is less than the presumptive threshold for increased peak flows (50–60%) for large watersheds (> 2,500 ac [>10 km^2]) during decades 1–4. The percentage of land harvested per decade under Alternative C (32–39%) would be greater than that under existing conditions (29%) during decades 1–4.

The combination of increasing amounts of uneven-aged silviculture (Figure 3.3-21) and percentage of land harvested substantially below 50–60% means that there would likely be no increase in peak flows under Alternative C. The lower limit of the Aquatic Management Zone width implemented under Alternative C would be 15–25 ft (5–8 m) greater than under existing conditions in two of four stream classes (Large Class II, and Class III streams; see Table 3.3-15), while the upper limit would be 10–40 ft (3–12 m) smaller than under existing conditions in two out of four stream classes (Large Class II and Small Class II streams). While this may reduce hydrologic connectivity between upland areas and streams in the primary assessment area and decrease peak flows relative to existing conditions, the effect would likely be small, since overall there would not be a large difference in typical Aquatic Management Zone width between Alternative C and existing conditions. When analyzed at the scale of the planning watershed (Appendix I), the percentage of land harvested per decade is generally less than 50% for any watershed analysis unit, indicating a low likelihood of increased peak flows resulting from Alternative C for decades 1–4.

The effects of post-fire timber salvage on hydrology and runoff under Alternative C would be the same as under the Proposed Action for the first four decades. Site-specific measures to reduce erosion and sediment delivery to streams would have little effect on peak flows (and low flows) from burned areas and there would be no effect compared with existing conditions.

There would be a low likelihood of increased peak flows under Alternative C and thus there would be **no effect** on hydrology in the primary assessment area for decades 1–4.

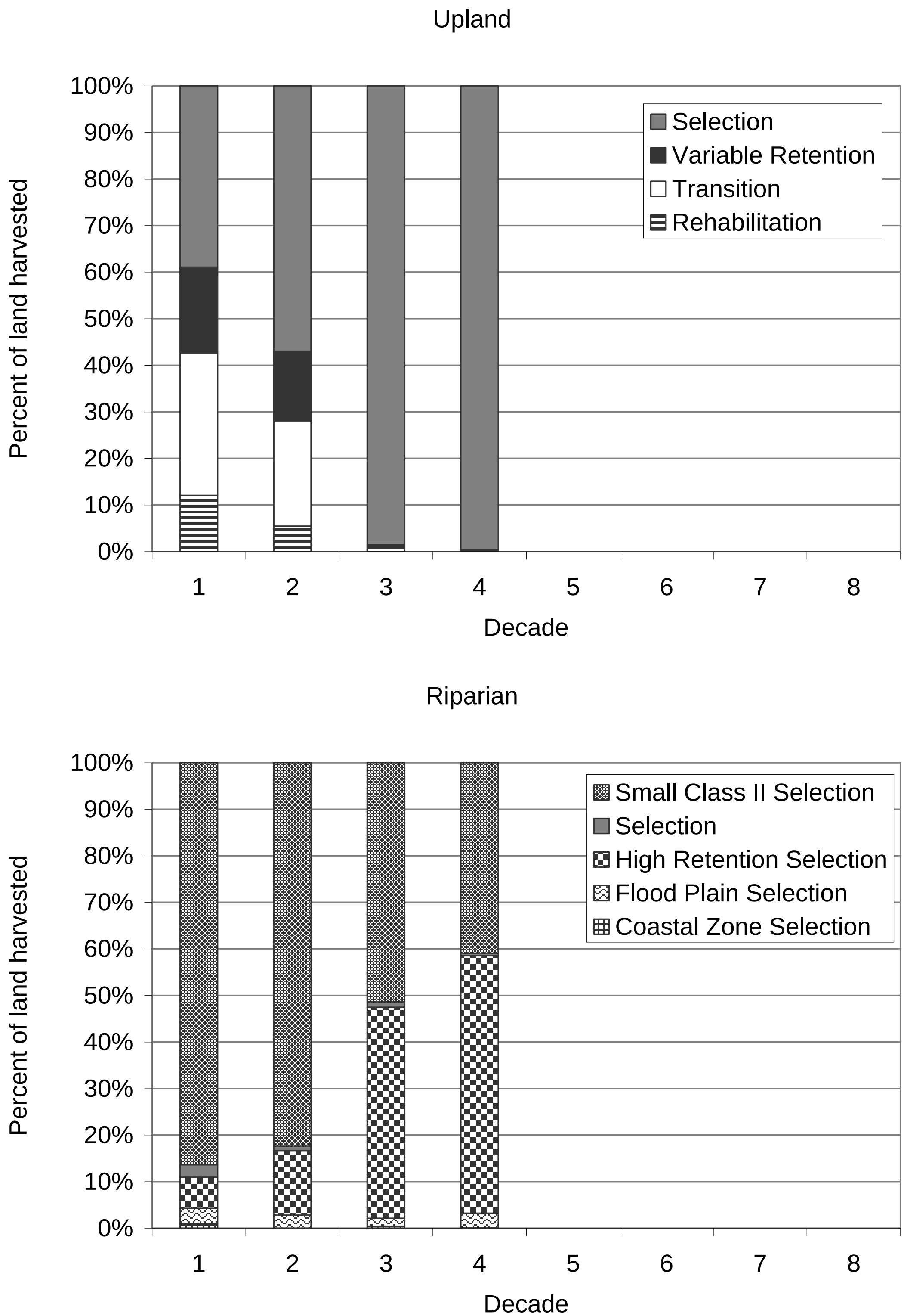


Figure 3.3-21. Percentage of harvest by silviculture method (defined in Appendix E) predicted under Alternative C in upland areas and Aquatic Management Zones.

Low flows

Effects on low flows under Alternative C would be the same as the Proposed Action for decades 1–4. The duration of Alternative C is four decades. Under Alternative C, the percentage of land harvested per decade in the primary assessment area (32–39%, see Table 3.3-14 and Figure 3.3-16) would be greater than existing conditions (29%). However, the increasing amount of uneven-aged silviculture in both uplands and the Aquatic Management Zones mean that low flow hydrology in the primary assessment area under Alternative C is not likely to be significantly altered due to harvest. While some studies have shown that timber harvest in fog-dominated areas of the Pacific Northwest may decrease low flows due to reduced interception of fog precipitation (Moore and Wondzell 2005), studies in the Caspar Creek watershed (Keppeler 1998, 2007) indicate that reduced fog precipitation is not likely to significantly decrease low flows in the primary assessment area. Due to the relatively low percentage of flow available for water drafting, the requirement for continuous bypass flows during drafting operations, and the episodic nature of water drafting (see Appendix T in MRC 2012), this forest management activity is expected to result in altered low flows only adjacent to water drafting sites.

Under Alternative C, there would be a **less than significant effect** on hydrology in the primary assessment area due to the potential for only slightly increased low flows and flow variability, which may be at least somewhat counteracted by increasing amounts of uneven-aged selection silviculture in uplands and the Aquatic Management Zones for decades 1–4.

Flooding potential

Allowances and directions in the Master Agreement for Timber Operations (see Appendix T of MRC 2012) would apply under Alternative C and would include re-establishment of flow paths in Class II and III watercourse channels where tractor and skid trail crossings are diverting a watercourse, have a potential to divert a watercourse, or are not properly draining. Allowances and directions would also include restoration of channel cross-sectional shape and longitudinal gradient to conditions as close as possible to the natural configuration or to that which existed prior to the disturbance. While these conditions would primarily affect erosion potential (see suspended sediment and turbidity analysis, below), watercourse diversions and alterations to channel cross-sectional shape and gradient could also increase flooding potential by constraining flow paths. Under Alternative C, MRC would repair current or impending problems such that the proposed correction would result in a net benefit to watercourse conditions.

Under Alternative C, there would be a **beneficial effect** on flooding potential due to correction of watercourse diversions and alterations to channel cross-sectional shape and gradient in the primary assessment area.

Effects on beneficial uses and water quality

Suspended sediment and turbidity

Effects on turbidity under Alternative C would be the same as the Proposed Action for decades 1–4. The duration Alternative C is four decades. Decreases in road-related surface erosion under Alternative C would have a beneficial effect on sediment delivery to stream channels in the primary assessment area relative to existing conditions (Section 3.2.2; Geology, Soils, and Geomorphology; Environmental effects and mitigation). This includes implementation of allowances and directions in the Master Agreement for Timber Operations (see Appendix T of MRC 2012) for re-establishment of flow paths and restoration of channel cross-sectional shape and longitudinal gradient. Decreases in road-related surface erosion would result in decreased concentrations of suspended sediment and turbidity levels in watercourses in the primary assessment area during peak flow periods. In addition, Alternative C is not expected to result in increased peak flows and consequently, there would be no increase in flooding and/or streambed scour.

Post-fire timber salvage under Alternative C would be the same as under the Proposed Action for the first four decades, with site-specific measures to reduce erosion and sediment delivery to streams from roads, stream crossings, and general forested areas. Timber salvage would be prohibited in Aquatic Management Zones unless approved by the wildlife agencies. These measures would provide additional erosion control in burned areas and would reduce the potential for suspended sediment and turbidity in streams compared with existing conditions.

Under Alternative C, decreases in concentrations of suspended sediment and turbidity levels during peak flow periods would be a **beneficial effect** on water quality sediment-sensitive beneficial uses (e.g., Cold Freshwater Habitat; Municipal and Domestic Supply; Water Contact Recreation; Spawning, Reproduction, and/or Early Development) in the primary assessment area for decades 1–4.

Water temperature

Effects on water temperature under Alternative C would be the same as the Proposed Action for decades 1–4. The duration of Alternative C is four decades. Under Alternative C, the canopy closure guidelines, large tree retention standards, and Aquatic Management Zone widths would slightly increase stream shading and decrease water temperatures relative to existing conditions. Aquatic Management Zones under Alternative C would range from 25–50 ft (8–15 m) for Class III streams to 130–190 ft (40–58 m) for Class I streams (Table 3.3-15), which would provide additional stream shading and result in cooler water temperatures relative to existing conditions, given a corresponding increase in canopy cover within the Aquatic Management Zone. The average number of large riparian trees under Alternative C would also increase, from 10 trees per acre under existing conditions to just over 50 trees per acre by the end of decade 8 (Section 3.4 [Aquatic and Riparian Habitats and Species of Concern], Figure 3.4-4). The increase in canopy closure and number of large riparian trees would result in slightly decreased water temperatures in primary assessment area streams relative to existing conditions.

Due to the inconsistent increase in canopy cover across the watershed analysis units (see Proposed Action), with most watershed analysis units achieving a greater than 80% portion of the riparian area in the highest cover class (> 60%, see Appendix I, Figure I-7a-c) by the end of decade 3 or 4, the anticipated decreases in summer water temperatures under Alternative C would be beneficial. There would be a **beneficial effect** on water temperature for decades 1–4.

Dissolved oxygen

Effects on dissolved oxygen under Alternative C would be the same as the Proposed Action for decades 1–4. The duration of Alternative C is four decades. Under Alternative C, there would be a beneficial effect on water quality with respect to suspended sediment and turbidity and water temperature (see above), and there would be less than significant effect on nutrients (see below). Decreases in suspended sediment, turbidity, and water temperature would likely increase dissolved oxygen. There would be no change in nutrient concentrations and thus no effect on dissolved oxygen. Since two of the three primary factors affecting dissolved oxygen in the primary assessment area would positively reinforce one another, there is likely to be a corresponding increase in dissolved oxygen concentrations. This is particularly relevant for the Big River, Noyo River, Navarro River and Garcia watershed analysis units, where summertime exceedances of dissolved oxygen Basin Plan criteria have been observed under existing conditions (Table 3.3-12). Under Alternative C, increased dissolved oxygen concentrations would be a **beneficial effect** on water quality in the primary assessment area for decades 1–4.

Nutrients

Effects on nutrients under Alternative C would be the same as the Proposed Action for decades 1–4. The duration of Alternative C is four decades. Differences in the range of Aquatic Management Zone widths under Alternative C relative to existing conditions are variable depending on stream class; the lower limit of the Aquatic Management Zone width implemented under Alternative C would be 15–25 ft (5–8 m) greater than that of existing conditions in two of four stream classes (Large Class II, and Class III streams; see Table 3.3-15), while the upper limit would be 10–40 ft (3–12 m) smaller than that of existing conditions in two of four stream classes (Large Class II and Small Class II streams). Since nutrient interception and uptake in the Aquatic Management Zones is primarily expected to occur within 35–50 ft (11–15 m) of the stream channel (Section 3.3.2.1), the differing buffer widths under Alternative C would not significantly improve or adversely effect the level of nutrient interception and uptake across the different stream classes as compared with existing conditions. The combination of only slightly changed buffer widths and no fertilizer application means that eutrophication potential under Alternative C is anticipated to be low. Under Alternative C, there would be a **less than significant effect** on water quality due to nutrients in the primary assessment area for decades 1–4.

3.3.2.7 Comparison of alternatives

Table 3.3-16 provides a summarized comparison of effects on hydrology, and beneficial uses and water quality under the alternatives.

Hydrology

The Proposed Action would improve hydrology conditions compared with existing conditions and the No Action alternative (Table 3.3-16). Under the Proposed Action, implementation of the HCP/NCCP's conservation and adaptive management measures would decrease acres harvested below the presumptive threshold for significant peak flow effects (50–60%) in both upland areas and riparian buffers (Aquatic Management Zones) in most planning watersheds, which would in turn provide benefits to peak flow and low flow conditions throughout the assessment area. Effects due to increases in peak flows and low flows would occur in more heavily harvested planning watersheds in decades 4 through 8, but at the scale of the primary assessment area these effects would be less than significant. The No Action alternative would not include the HCP/NCCP measures, and thus harvest and silviculture effects under the No Action alternative would be potentially significant relative to existing conditions. Under Alternative A, there would be further enhanced harvest limitations in both upland areas and Aquatic Management Zones, augmenting the proposed HCP/NCCP measures and providing added benefits primarily by accelerating the increase in canopy closure and the average number of large riparian trees in the Aquatic Management Zone and the associated benefits to peak flow and low flows. Under Alternative B, riparian forests within the reserves would not be harvested and canopy closure and the average number of large riparian trees in the Watercourse and Lake Protection Zone would be maximized. However, management outside the reserves would involve clearcut and commercial thinning silviculture methods, which would produce the greatest localized peak flow and low flow increases of any silviculture method. While increases in peak flows and low flows under Alternative B would likely occur in local channels draining clearcut areas, these increases would not be measurable at the scale of the primary assessment area or the planning watershed. Under Alternative C, the effects on hydrology would be similar to the Proposed Action for the first four decades. However, the long-term benefits of some conservation and adaptive management measures would not be realized during the four-decade implementation period of Alternative C.

Beneficial uses and water quality

Compared with existing conditions, improvements in beneficial uses and water quality are anticipated under each of the alternatives, with effects on water quality parameters experienced differently, depending on the alternative (Table 3.3-16). As described in Section 3.3.2.1, effects on beneficial uses are analyzed primarily for Cold Freshwater Habitat and all other beneficial uses are assumed to be supported if Cold Freshwater Habitat is supported. Exceptions include consideration of sediment-sensitive beneficial uses, as previously described.

Under the Proposed Action, implementation of the HCP/NCCP's conservation and adaptive management measures would promote benefits to water temperature, dissolved oxygen, and nutrients from increased shade and nutrient interception in the Aquatic Management Zone. Water temperature and dissolved oxygen effects are particularly important in watershed analysis units such as Big River and Noyo River that currently do not support the Cold Freshwater Habitat beneficial use in multiple locations during summer months. The No Action alternative, which does not include the HCP/NCCP measures, would provide a beneficial effect on water temperature due to increased shade in the Watercourse and Lake Protection Zone; however, relatively greater levels of harvest would result in greater fine sediment delivery and increases in nutrients and turbidity (there is insufficient information to assess dissolved oxygen under this alternative). Under Alternative A, there would be enhanced harvest limitations in both upland areas and Aquatic Management Zones, augmenting the proposed HCP/NCCP measures and providing added benefits by decreasing sediment and turbidity and water temperature, and increasing dissolved oxygen concentrations. Despite clearcut and commercial thinning silviculture outside of the reserves under Alternative B, effects on water temperature at the scale of the primary assessment area would be beneficial due to lower overall harvest levels (i.e., no harvest would occur inside the reserves). However, effects on sediment and turbidity, nutrients, and dissolved oxygen would be potentially significant, particularly in those planning watersheds that experience clearcuts. Combined, the effects on overall water quality under Alternative B would be similar to the No Action alternative. Under Alternative C, the effects on water quality would be similar to the Proposed Action for the first four decades. However, the long-term benefits of some conservation and adaptive management measures may not be realized during the four-decade implementation period of Alternative C.

1 **Table 3.3-16.** Comparison of alternatives for hydrology, beneficial uses of water, and water quality.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Hydrology	Compared with existing conditions, effects due to increases in peak flows, particularly in more heavily harvested planning watersheds in decades 4–8, would be **potentially significant.** Effects due to increases in low flows and increases in flooding potential from alteration of drainage and flow paths would be **less than significant.**	Compared with existing conditions, effects due to increases in peak flows and low flows, particularly in more heavily harvested planning watersheds in decades 4–8, would be **less than significant.** Effects due to decreases in flooding potential from alteration of drainage and flow paths would be **beneficial**. Compared with the No Action alternative, there would be fewer effects on hydrology due to lower overall harvest levels.	Compared with existing conditions, there would be **no effect** on hydrology due to peak flows, and effects due to increases in low flows would be **less than significant** because of relatively lower harvest levels. Effects due to decreases in flooding potential would be **beneficial.** Compared with the No Action alternative and the Proposed Action, there would be fewer (or no) effects on hydrology due to lower overall harvest levels.	Compared with existing conditions, effects due to increases in peak flows and low flows would be **less than significant** at the scale of the planning watershed and primary assessment area (due to an overall low percentage of land harvested per decade). Effects due to increases in flooding potential from alteration of drainage and flow paths would be **less than significant.** Compared with the No Action alternative and the Proposed Action, effects on hydrology due to increased peak flows would be less in reserves and less in the assessment area as a whole, but significantly greater in local areas experiencing clearcut.	Effects on hydrology would be similar to the Proposed Action except that many benefits may not be realized during the four-decade implementation period.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Beneficial Uses and Water Quality	Compared with existing conditions, effects on beneficial uses and water quality would be **beneficial** due to decreases in summer water temperatures, **less than significant** due to potential increases in nutrients, and **potentially significant** due to increases in sediment and turbidity. There would likely be no effect on dissolved oxygen.	Compared with existing conditions, effects on beneficial uses and water quality would be **beneficial** due to decreases in sediment and turbidity and summer water temperatures and increases in dissolved oxygen, and **less than significant** due to increases in nutrients. Compared with the No Action alternative, overall effects on beneficial uses and water quality would be **beneficial.**	Compared with existing conditions, effects on beneficial uses and water quality would be **beneficial** due to decreases in sediment and turbidity and summer water temperatures and increases in dissolved oxygen**,** and **less than significant** due to increases in nutrients. Compared with the No Action alternative, overall effects on beneficial uses and water quality would be **beneficial.** Compared with the Proposed Action, overall effects would be slightly better due to lower harvest.	Comparied with existing conditions, effects on beneficial uses and water quality would be **beneficial** due to decreases in summer water temperatures, **potentially significant** due to increases in sediment and turbidity and nutrients and decreases in dissolved oxygen. Compared with the No Action alternative and the Proposed Action, overall effects on beneficial uses and water quality would be **potentially significant.**	Effects on beneficial ues and water quality would be the same as the Proposed Action except that that many benefits may not be realized during the four-decade implementation period.

3.3.3 PTEIR alternate standard analysis for the Proposed Action, Alternative A, and Alternative C

In its TMP (Appendix A) and HCP/NCCP, MRC has proposed alternate standards to the current (2012) CFPRs, which would be implemented and included in PTHPs prepared under the Proposed Action, Alternative A, or Alternative C. Alternate standards are not proposed for the No Action alternative because no TMP, HCP, or NCCP would be implemented. Likewise, alternate standards are not proposed for Alternative B because no TMP or NCCP would be implemented. The 2012 CFPRs (14 CCR §1092[b]) authorize CAL FIRE to accept alternate standards in a PTHP where it has been demonstrated in a PTEIR that the alternate standard provides resource protections that are equal to or better than the standard operational rule and its implementation would have a less than significant impact on the environment. Also, where future changes in the CFPRs occur, the current operational standards (2012 CFPRs) may be accepted by CAL FIRE as alternate standards where the PTEIR has similarly demonstrated a less than significant impact.

The proposed alternate standards were reviewed by the lead agencies to determine the resource area(s) to which they apply (see Attachment D to Appendix A). For each alternate standard that applies to Hydrology, Beneficial Uses of Water, and Water Quality, the analysis in Sections 3.3.2.3, 3.3.2.4, and 3.3.2.6 and the cumulative effects analysis in Sections 4.3.2, 4.3.3, and 4.3.5 demonstrates that its implementation as part of the Proposed Action, Alternative A, or Alternative C would provide equal or better protection to Hydrology, Beneficial Uses of Water, and Water Quality than the 2012 CFPR standard and its implementation would either (1) not result in adverse environmental impacts or (2) result in impacts that are below the level of significant effect on the environment. This analysis considered the effects of implementing the proposed alternate standards as part of a suite of management and conservation measures contained in the HCP, NCCP, and TMP.

The following are the CFPRs for which alternate standards (or current operational standards, which due to a rule change could become an alternate standard) have been proposed by MRC in its TMP (Appendix A) and/or its HCP/NCCP and are applicable to Hydrology, Beneficial Uses of Water, and Water Quality:

895.1, 913.1(a)(2), 913.1(a)(2)(A-E), 913.6(b)(4), 913.6(e)(1), 914.2(d), 914.2(f-i), 914.6, 914.7(a), 914.7(b), 914.7(b)(3,4,5,7,9,10,11), 914.8(d-f), 915, 915.1, 915.2, 915.3(a), 915.4, 916.2(b-c), 916.3, 916.3(a), 916.3(c-f), 916.4(b-f), 916.5, 916.6(a), 916.7, 916.11(a), 923(d-f), 923.1(a), 923.1(c-h), 923.1(j), 923.2(b-c), 923.2(f-t), 923.2(v), 923.3, 923.4(a-d), 923.4(f-i), 923.4(l-o), 923.5, 923.8, and 923.9(a-e).

The EIS/PTEIR analysis demonstrates that these alternate standards would provide equal or better protection to Hydrology, Beneficial Uses of Water, and Water Quality than the 2012 CFPR standard. Implementation of these alternate standards would have a less than significant impact and would not contribute to cumulative effects on Hydrology, Beneficial Uses of Water, and Water Quality, and may be proposed in PTHPs by MRC and approved by CAL FIRE (14 CCR §1092[c]).

A complete list of MRC's proposed alternate standards is included in the TMP (Appendix A) as Attachment D. Attachment D of the TMP also includes a reference to the location of each alternate standard in the TMP and/or HCP/NCCP, and the CFPR standard (rule) it would replace.

3.4 Aquatic and Riparian Habitats and Species of Concern

This section describes the aquatic and riparian habitats and associated aquatic and riparian species of concern within the assessment area, as well as the potential effects of implementing the alternatives on these species. The assessment area for aquatic and riparian habitats and species of concern includes the primary assessment area and the secondary assessment area (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1), and is generally organized by the watershed analysis units that overlap these areas. Watershed analysis units correspond in many cases to river basins, which reflect the natural distribution of aquatic and riparian species and define the natural bounds of unique physical processes such as sedimentation patterns and hydrology.

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is of a similar forest type, geology, climate, and hydrology and has been subject to similar management (i.e., commercial timber harvest) as the primary assessment area. The affected environment and potential effects in the secondary assessment area are therefore expected to be similar to those in the primary assessment area.

3.4.1 Affected environment/Environmental setting

The primary focus of the following sections is to describe the existing condition of key habitat features for anadromous salmonids. This focus is due to the availability of aquatic habitat data in the primary and secondary assessment areas, most of which has been collected specifically to assess habitat conditions for anadromous salmonids. In many cases, these data also provide useful information to describe habitat conditions for the other aquatic species of concern addressed in this EIS/PTEIR. Five anadromous salmonid species occur in the primary assessment area—the Central California Coast and Southern Oregon/Northern California Coast Evolutionarily Significant Units of coho salmon (*Oncorhynchus kisutch*), the California Coastal Evolutionarily Significant Unit of Chinook salmon (*Oncorhynchus tshawytscha*), and the Central California Coast and Northern California Distinct Population Segments of steelhead (*Oncorhynchus mykiss*). These five species are of particular ecological and economic importance in coastal California and have undergone declines in abundance. Habitat requirements for these five species include clear, cool water, with generally low rates of fine sediment input and a healthy riparian corridor that provides for shade and nutrient input. All are sensitive to impacts on the freshwater aquatic and riparian habitats required for their reproduction and rearing.

The other aquatic and riparian species of concern potentially occurring in the primary and secondary assessment areas are Navarro roach (*Lavinia symmetricus navarroensis*), Gualala roach (*Lavinia symmetricus parvipinnis*), river lamprey (*Lampetra ayresi*), tidewater goby (*Eucyclogobius newberryi*), southern torrent salamander (*Rhyacotriton variegatus*), coastal tailed frog (*Ascaphus truei*), California and northern red-legged frogs (*Rana draytonii* and *Rana aurora*, respectively), foothill yellow-legged frog (*Rana boylii*), and Pacific pond turtle (*Actinemys marmorata*).

The ecology and current distribution within the primary and secondary assessment areas of the anadromous salmonids and the three other aquatic and riparian species for which MRC is seeking coverage under the proposed incidental take authorization (the coastal tailed frog, California red-legged frog, and northern red-legged frog) are described in Section 3.4.1.5. More detailed information on the life history and habitat requirements of these and the other aquatic and riparian species of concern can be found in Appendix B.

Information in this section describing the existing condition of the habitats and species populations, and their respective distributions in the primary and secondary assessment areas, was compiled from a variety of sources representing the best and most recent data available. Some of the information on habitat conditions presented in this section is derived from Sections 3.2 (Geology, Soils, and Geomorphology) and 3.3 (Hydrology, Beneficial Uses of Water, and Water Quality). The existing conditions of MRC's aquatic and riparian habitats and species of concern have been assessed as part of MRC's ongoing watershed analysis efforts as described in Chapter 3 of MRC's HCP/NCCP (MRC 2012). The lead agencies used data describing recent and existing conditions from surveys conducted on MRC property by MRC and the previous landowner (Louisiana-Pacific), with additional information from surveys and reports by CDFG, NMFS, CAL FIRE, and other published and unpublished sources. In particular, MRC's watershed analyses focus on identification of sensitive biological resources and potential hazards affecting those resources. The watershed analysis reports can be found on MRC's website at http://www.mendocinoredwoodcompany.com/Reports-WatershedAnalysis.aspx.

3.4.1.1 Streams and stream classification

Approximately 2,054 mi (3,306 km) of Class I, II, and III streams[30] run throughout the 12 watershed analysis units that completely or partially overlap the primary assessment area (Table 3.4-1).

Table 3.4-1. Stream length in the primary assessment area watershed analysis units.

Watershed analysis unit	Class I streams (mi)	Large Class II streams (mi)	Small Class II streams (mi)	Class III streams (mi)	Total (mi)
Albion River	31.1	8.5	29.4	88	157
Alder Creek/Schooner Gulch	21.5	13.7	21.7	65	121.9
Big River	72.1	23.8	44.1	159	299
Cottaneva Creek	11.9	6.2	14	40.1	72.2
Elk Creek	20.3	19.9	32.1	72.9	145.2
Garcia River[a]	20.8	11.2	21.2	56.7	109.9
Greenwood Creek	19.9	6	19.5	60.4	105.8
Hollow Tree Creek	44.8	9.7	28.9	87.5	170.9
Navarro River	106.6	35.9	103.3	297.6	543.4
Noyo River	34.8	10.8	28.9	130.9	205.4

[30] Streams are classified in the CFPRs according to their ability to support aquatic life (CAL FIRE 2011). MRC also uses this stream classification scheme, and thus data pertaining to streams and riparian buffer zones are reported and analyzed in this EIS/PTEIR by stream class. Class I streams have fish present or seasonally present on-site. Class I streams include habitat to sustain fish migration and spawning. Class II streams do not support fish but provide habitat for non-fish aquatic species. Similar to the 2011 CFPRs for watersheds with listed anadromous salmonids (14 CCR §916.9[g]), MRC has further subdivided Class II watercourses into "large" and "small" categories based on watershed size (i.e., contributing drainage area). Small Class II streams are those with watersheds less than 100 ac (40 ha). Class III streams do not support aquatic life but do transport sediment and organic material downstream to Class I and Class II streams.

Watershed analysis unit	Class I streams (mi)	Large Class II streams (mi)	Small Class II streams (mi)	Class III streams (mi)	Total (mi)
Rockport Small Coastal Streams	17.3	6.2	16.9	45.4	85.8
Upper Russian River	8.5	4.1	8.9	15.8	37.3
Total	**410**	**156**	**369**	**1,119**	**2,054**

[a] Includes portions of the Gualala River basin.

In the primary assessment area, there are approximately 410 Class I stream miles (20%) suitable to sustain fish, 525 Class II stream miles (26%) suitable only as non-fish aquatic habitat, and 1,119 Class III stream miles (54%) that primarily transport sediment and nutrients to Class I and II streams (Table 3.4-1). All 12 watershed analysis units in the primary assessment area have Class I reaches that are capable of sustaining fish. Within the primary assessment area, the Navarro River and Big River watershed analysis units have the most Class I stream habitat to sustain fish migration and spawning (107 and 72 mi [172 and 116 km], respectively). Streams in the Navarro River basin compose just over a quarter of the total stream miles in the primary assessment area, and they represent the greatest extent of stream mileage in each watercourse class in any single basin.

3.4.1.2 Aquatic habitat conditions

Aquatic habitat conditions have been assessed in over 140 streams throughout the primary assessment area and in portions of the secondary assessment area and are summarized below (Table 3.4-2). More detailed information on aquatic habitat data for streams in the primary assessment area, derived from MRC's watershed analyses, can be found in Section 3.3 of MRC's proposed HCP/NCCP.

Some of the physical habitat attributes of streams in watershed analysis units in the primary assessment area (e.g., median sediment particle diameter [D_{50}], residual pool depth) are described in Section 3.2.1 (Geology, Soils, and Geomorphology; Affected environment/Environmental setting) and also discussed here. Likewise, selected water temperature metrics (e.g., maximum weekly average temperature and maximum weekly maximum temperature) are described in Section 3.3.1 (Hydrology, Beneficial Uses of Water, and Water Quality; Affected environment/Environmental setting) and also discussed here.

Table 3.4-2. Average aquatic habitat conditions in watershed analysis units in the primary assessment area, 1998-2005.

Watershed analysis unit	Total surveyed length[a]	Maximum temperature[b]	MWAT[b,c]	MWMT[b,c]	Gravel permeability[b]	Key large woody debris[a]	Mean shade canopy[a]	D_{50} min[a,d]	D_{50} max[a,d]	Residual pool depth[a,d]
	(ft)	(°F)	(°F)	(°F)	(cm/hr)	(pieces/ 100 m)	(%)	(mm)	(mm)	(ft)
Albion River	13,780	63.5	59.3	62.4	2,096	2.4	82	22	29	2.1
Alder Creek/ Schooner Gulch	ND	60.9	58.4	60.0	ND	ND	ND	ND	ND	ND
Big River	25,222	69.2	64.9	67.8	1,225	3.1	77	50	50	1.7
Cottaneva Creek	21,080	60.0	57.7	59.0	928	ND	89	46	46	1.8
Elk Creek	ND	60.4	57.9	59.5	11,616	ND	ND	ND	ND	ND
Garcia River[e]	31,153	60.9	58.6	60.8	2,910	3.8	75	31	48	ND
Greenwood Creek	9,660	65.3	61.5	64.2	357	4.9	78	59	59	2.2
Hollow Tree Creek	18,976	65.4	62.4	64.2	328	2.1	84	42	42	2.2
Navarro River	43,440	65.1	62.0	64.2	7,214	3.7	72	39	39	2
Noyo River	18,178	67.1	63.6	65.8	2,662	2.7	82	53	75	2
Rockport Small Coastal Streams	ND	59.9	57.0	59.0	ND	ND	ND	ND	ND	ND

Watershed analysis unit	Total surveyed length[a]	Maximum temperature[b]	MWAT[b,c]	MWMT[b,c]	Gravel permeability[b]	Key large woody debris[a]	Mean shade canopy[a]	D_{50} min[a,d]	D_{50} max[a,d]	Residual pool depth[a,d]
	(ft)	(°F)	(°F)	(°F)	(cm/hr)	(pieces/ 100 m)	(%)	(mm)	(mm)	(ft)
Upper Russian River	4,755	72.9	66.4	71.2	3,453	0.8	49.9	63	63	1.4

[a] Source: MRC watershed analyses (MRC 2000c, 2003a–e, 2004a–d, 2005a)
[b] Source: MRC HCP/NCCP (2012)
[c] Water temperature data are also presented and discussed in the context of water quality in Section 3.3 (Hydrology, Water Quality, and Beneficial Uses of Water).
[d] Median sediment particle diameter (D_{50}) and residual pool depth are also presented and discussed in the context of stream channel form and function in Section 3.2 (Geology, Soils, and Geomorphology).
[e] Includes portions of the Gualala River basin.
MWAT = maximum weekly average temperature
MWMT = maximum weekly maximum temperature
D_{50} = median sediment particle diameter
ND = No data

Qualitative indices are used in this EIS/PTEIR to rank current aquatic habitat conditions relative to published information on functional habitat conditions for anadromous salmonids (Table 3.4-3). The qualitative indices were developed by MRC and are used by the lead agencies for this EIS/PTEIR.

Table 3.4-3. Qualitative indices for stream function.

Index	Description
On target)	Habitat meets published targets for well functioning conditions.
Marginal	Habitat meets functional, not optimal conditions.
Deficient	Habitat is functioning at a low level and needs improvement.
No data)	There are no data on the condition of the aquatic habitat.
To be determined	There are currently no data but MRC intends to collect data in the future.

Residual pool depth is a flow-independent measure of pool depth. Changes in residual pool depth can reflect the volume of relatively fine, mobile sediment (e.g., sand and gravel) deposited in the pool and the influence of pool-forming features such as large woody debris. Low relative residual pool depth (i.e., a shallow pool) typically indicates reduced availability of aquatic habitat. Deeper pools generally provide increased aquatic habitat quality (Flosi et al. 1998). Average residual pool depth in the primary assessment area ranges from a low of 1.4 ft (0.4 m) in the Upper Russian River watershed analysis unit to a high of 2.2 ft (0.7 m) in the Greenwood Creek and Hollow Tree Creek watershed analysis units. A depth of at least 2–3 ft (0.6–0.9 m) (depending on stream size) is a key component of pools that provide critical summer habitat for coho salmon and steelhead ("primary pools") (Flosi et al. 1998). Residual pool depth for salmonids is considered on target (Table 3.4-3) if at least 50% of pools have a residual depth ≥ 3 ft (0.9 m), and marginal if 25–50% of pools meet this residual depth criterion (MRC 2012).

Additional baseline attributes of aquatic habitat include the amount of large woody debris in the channel, streambed sediment diameter, streambed permeability, stream temperature, and riparian tree canopy cover (i.e., shade). Average values for measures of these additional attributes in the primary assessment area are shown in Table 3.4-2. The number of key pieces of large woody debris per 328 ft (100 m) of stream channel gives an indication of aquatic habitat heterogeneity and the availability of cover for fish. The large woody debris frequency ranges from 0.8 pieces per 328 ft (100 m) in the Upper Russian River watershed analysis unit to 4.9 pieces per 328 ft (100 m) in the Greenwood Creek watershed analysis unit. Most streams in MRC's watershed analysis units are rated as being of either deficient (< 4 key pieces per 328 ft [100 m]) or marginal (4–6.5 key pieces per 328 ft [100 m]) for large woody debris, with only three stream segments rated as on target (> 6.6 key pieces per 328 ft [100 m]) (out of a total of 107 segments surveyed).

Excessive inputs of fine sediment to streams can be detrimental to salmonids and other aquatic species. Increased supply of fine sediments can fill pools, reducing aquatic habitat area, and infiltrate into streambed substrate, impeding the free flow of well-oxygenated water to incubating salmonid eggs. The size of streambed sediment is a broad indicator of habitat quality because it determines the success of spawning salmonids in constructing their nests and incubating their eggs. Finer sediment is more easily mobilized than coarser material and thus may scour to unearth incubating eggs during high flows. Sediment can also be transported downstream to fill in pools and other habitat. The Albion River watershed analysis unit has the finest streambed sediment, with a range in median particle diameter from 0.9 to 1.4 in (22 mm to 29 mm), whereas the Noyo River watershed analysis unit has the coarsest streambed, with a range in median particle diameter from 2.1 in to 3.0 in (53 mm to 75 mm) (Table 3.4-2). The permeability of streambed gravels is closely related to the distribution of sediment sizes in the bed and defines the basic conditions for incubating eggs. Mean gravel permeability in the Hollow Tree Creek watershed analysis unit is the lowest with a value of 328 cm/hr, while the Elk Creek watershed analysis unit has the highest gravel permeability at 11,616 cm/hr (Table 3.4-2). Higher gravel permeability is typically associated with higher success rates for salmonid egg incubation and embryo survival (Tagart 1976, McCuddin 1977). Rubin and Glimsater (1996) observed > 50% salmonid egg-to-fry survival where the geometric mean diameter of spawning substrate was at least 15 mm and spawning gravel permeability was at least 2,000 cm/hr. In MRC's watershed analysis units, salmonid egg incubation conditions are considered on target (Table 3.4-3) where stream gravel permeability is at least 10,000 cm/hr (considered to represent ≥ 55% egg-to-fry survival), marginal where permeability is 2,000–10,000 cm/hr (considered to represent ≥ 30% egg-to-fry survival), and deficient where permeability is less than 2,000 cm/hr (considered to represent < 30% egg-to-fry survival) (MRC 2012). Based on mean permeability values (Table 3.4-2), one watershed analysis unit, Elk Creek, has average conditions that are on target. Five of the 12 watershed analysis units have average conditions that are marginal or better, and five watershed analysis units have average conditions that are deficient. One watershed analysis unit has no data available. Additional information on fine sediment delivery to streams can be found in Section 3.2 (Geology, Soils, and Geomorphology).

The maximum water temperature in each watershed analysis unit and the maximum weekly average and maximum weekly maximum temperatures averaged for the period from 1998 through 2005 are reported in Table 3.4-2. The maximum weekly average temperature is the threshold most commonly used for establishing temperature standards for salmonids (Armour 1991, NMFS and USFWS 1997, Sullivan et al. 2000). The lowest average water temperatures in the primary assessment area from 1998 through 2005 were in the Rockport Small Coastal Streams, Cottaneva Creek, Elk Creek, Alder Creek/Schooner Gulch, and Garcia River watershed analysis units, each of which had an average maximum weekly average temperature below 59°F (15°C). Water temperatures during the monitoring period were highest in the Big River and Noyo River watershed analysis units, where average maximum weekly average temperatures were 64.9°F (18.3°C) and 63.6°F (17.6°C), respectively (Table 3.4-2). Water temperature has a strong influence on almost every life history stage of salmonids and other cold-water species, including metabolism, growth, and survival of salmonid eggs, juveniles, and adults (Sullivan et al. 2000). Welsh et al. (2001) found that coho salmon were present in all streams in the Mattole River watershed that had a maximum weekly average temperature lower than 58.1°F (14.5°C) but were absent from streams with a maximum weekly average temperature greater than 62.1°F (16.7°C). Sullivan et al. (2000) found that juvenile steelhead growth opportunities were maximized when maximum weekly water temperatures were between 14.5 and 21°C (58 and 70°F). More detailed discussion of water quality attributes, including water temperature, can be found in Section 3.3 (Hydrology, Beneficial Uses of Water, and Water Quality). Mean riparian canopy shade, averaged for the period 1998–2005, ranged from a low of 72% in the Navarro River watershed analysis unit to a high of 89% in the Cottaneva Creek watershed analysis unit (Table 3.4-2). Stream temperature and riparian tree canopy cover are often related. Streams with less canopy cover receive more solar radiation and may have warmer water temperatures than those with more riparian canopy shading, potentially resulting in reduced habitat suitability for salmonids and other aquatic species that require cold water.

The information described above provides a basis for evaluating the overall existing condition of stream habitat for salmonids in the primary assessment area. The quality of salmonid spawning habitat is primarily related to measures of fine sediment and gravel permeability. Rearing habitat quality for salmonids is dependent on water temperature, stream shading, and cover complexity (large woody debris, pools). Over-wintering habitat quality is related to the availability of deep pools, the prevalence of coarse stream substrates (cobbles, boulders) and the quality of cover (e.g., large woody debris). Using data collected during watershed analyses, it was found that salmonid spawning habitat is on target in about 15% of streams in the primary assessment area, marginal in about 35% of streams, and deficient in about 3% of streams (Figure 3.4-1). No data are available for the remaining 47% of streams in the primary assessment area. Rearing habitat is on target in about 1% of streams, marginal in about 39% of streams, and deficient in about 13% of streams. Over-wintering conditions were reported to be on target in about 3% of streams, marginal in about 37% of streams, and deficient in about 13% of streams (MRC 2012).

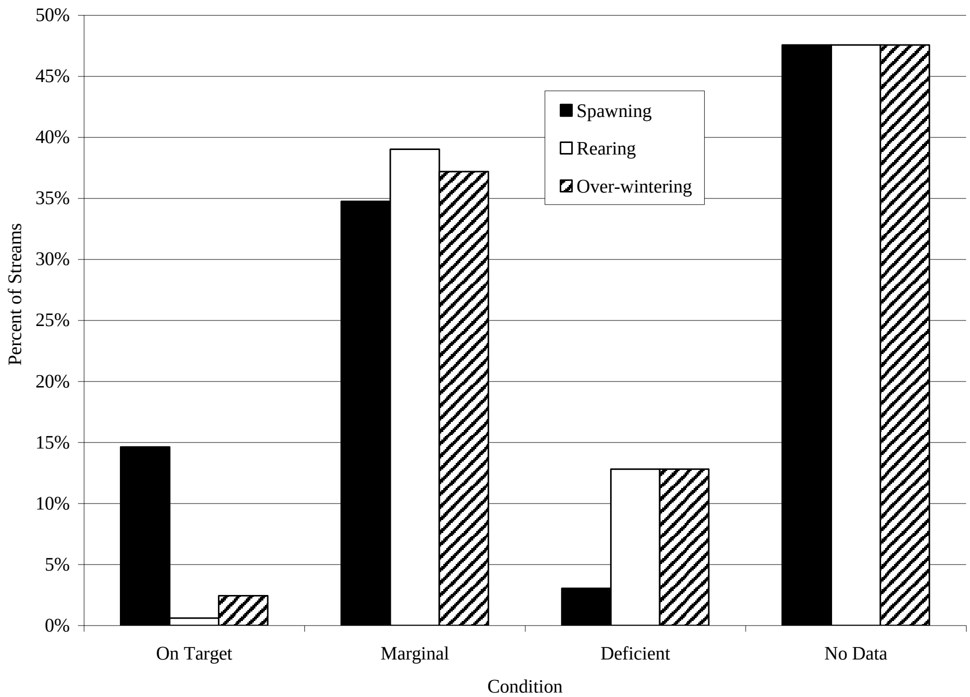


Figure 3.4-1. Anadromous salmonid habitat condition in primary assessment area streams by life stage (source: MRC 2012).

Aquatic habitat conditions in the primary assessment area currently support several species of amphibians, aquatic reptiles, and other aquatic species.

Salmonid habitat conditions throughout the secondary assessment area are similar to those in the primary assessment area. Historical timber and land management practices in the secondary assessment area were fundamentally the same those in the primary assessment area. Descriptive information about existing aquatic habitat conditions in all of the major drainage basins in the primary and secondary assessment areas can be found in a number of sources, the most recent and comprehensive of which is the Draft Recovery Plan for Central California Coast coho salmon (NMFS 2010). A summary of the condition of key habitat attributes for all life stages of coho salmon in the major river basins of the primary and secondary assessment areas from the Draft Recovery Plan (NMFS 2010) is provided in Table 3.4-4.

Table 3.4-4. Condition of key habitat attributes for Central California Coast coho salmon in major drainage basins coinciding with the primary and secondary assessment areas.

Watershed	Miles of stream with species present			Barriers		Watershed ratings for coho salmon[a]						
	Steelhead	Coho salmon	Chinook salmon	Dams	Natural barrier	Spawning quantity & quality	Summer water temperatures	Depth & shelter of pools	Large wood frequency	Riparian canopy	Off channel/ floodplain quality	Estuary function
Albion River	29	41	13	4	0	VG	F	P	P	F to G	P to F	F
Big River	147	111	35	4	0	VG	P	P	P	P to F	P to F	F
Big Salmon Creek	12	9	0	0	0	F to VG	F	P to F	F	P	F	G
Caspar Creek	10	10	0	0	0	ND	ND	ND	ND	ND	ND	ND
Cottaneva Creek	14	10	0	0	5	F to G	F	P	P	G	P	G
Garcia River	70	33	25	0	5	F to VG	P	P	P	F	P	F
Gualala River	208	72	0	5	13	F to VG	P	P to G	G	P to F	P to G	G
Navarro River	184	110	42	6	16	F to VG	P	P to G	P	P to F	P to F	F
Noyo River	91	79	41	2	8	G to VG	P	P	P	F	P to F	F
Pudding Creek	ND	ND	ND	ND	ND	G	F	P	P	P	F	G
Russian River	713	138	160	146	56	F to G	P	P	F to P	P to F	P	F
Ten Mile River	95	71	49	0	8	G	P	P	P	P	P to G	G
Usal Creek	18	4	0	0	3	G to VG	G	F	F	G to VG	F	P
Wages Creek	ND	ND	ND	ND	ND	F	VG	P to F	P to F	F to G	F	F

[a] VG=Very Good; G=Good; F=Fair; P=Poor
ND = No Data
Source: Draft Recovery Plan for Central California Coast coho salmon (NMFS 2010).

While the Draft Recovery Plan for Central California Coast coho salmon (NMFS 2010) is specific to coho salmon recovery, many of the analyses of the status of key habitat attributes are broadly applicable to all salmonid species within the primary and secondary assessment areas. The detailed watershed conditions reports include current and estimated historical distribution of all salmonids that occur in the major drainage basins of both the primary and secondary assessment areas.

Additional information regarding summarized conditions in the secondary assessment area can be found in recovery outlines for the Southern Oregon/Northern California Coast coho Evolutionarily Significant Unit (NMFS 2007a), the California Coastal Chinook salmon Evolutionarily Significant Unit (NMFS 2007b), the Central California Coast steelhead Distinct Population Segment (NMFS 2007c), and the Northern California steelhead Distinct Population Segment (NMFS 2007d) and the Recovery Stratetgy for California Coho Salmon (CDFG 2004). These recovery planning documents place both the primary and secondary assessment areas in a unified habitat recovery context, describing existing conditions that occur in the major river basins composing the range of the listed population segments or units.

3.4.1.3 Riparian habitat conditions

Riparian corridors represent the transition zones for the land-water interface, and they support both physical and biological functions of stream ecosystems. From the headwaters to reaches downstream, these functions proliferate with increasing stream size (i.e., watercourse class). Riparian processes initiated in the headwaters are transferred downstream and have direct effects on water and habitat conditions, as well as aquatic organisms using the various reaches (Vannote et al. 1980, Naiman et al. 1992, Montgomery 1999).

Riparian lands include stream banks, adjacent floodplains, and wetlands. Riparian systems have long, linear shapes and high edge-to-area ratios with microclimates distinct from those of adjacent upland areas (Raedeke et al. 1988, Naiman et al. 1998, Chen et al. 1999). Water is present at or near the soil surface during all or part of the year, typically resulting in variable soil moisture conditions and distinct plant communities. Periodic flooding causes habitat disturbances that often result in greater natural plant diversity than is present in the surrounding upland areas. The area adjacent to streams also contributes substantially to the quality of aquatic habitat.

Riparian zones form a critical link between stream channels and the hillslope processes that deliver material to the channels (Murphy and Meehan 1991, Pacific et al. 2008). Riparian vegetation provides shade, contributes organic matter and nutrients to streams, helps stabilize stream banks, and provides habitat for a variety of plants and animals (Gregory et al. 1991, Naiman et al. 1999). Riparian zones provide important habitat for many terrestrial and semi-aquatic species, including invertebrates, amphibians, birds, and mammals (Raedeke et al. 1988, Cross 1988, Beschta et al. 1995), and are often used as migratory or dispersal corridors by wildlife.

The majority of riparian zones along Class I and Class II waterways in the primary assessment area support conifer, hardwood, and mixed conifer-hardwood vegetation types. Riparian forests provide habitats for threatened and endangered aquatic species, as well as some rare plants. In the primary assessment area, the Navarro River watershed analysis unit contains the most Class I and Class II riparian and floodplain acreage and the Cottaneva Creek watershed analysis unit the least (Table 3.4-5).

Table 3.4-5. Riparian and floodplain acreage[a] along Class I and Class II streams in the primary assessment area watershed analysis units.

Watershed analysis unit	Class I	Class II	Total
Albion River	1,496	1,029	2,525
Alder Creek/Schooner Gulch	1,060	979	2,039
Big River	2,289	2,681	4,970
Cottaneva Creek	570	564	1,134
Elk Creek	1,279	1,009	2,288
Garcia River[b]	683	1,097	1,780
Greenwood Creek	867	700	1,567
Hollow Tree Creek	1,897	1,307	3,204
Navarro River	3,735	4,004	7,739
Noyo River	1,514	1,161	2,675
Rockport Small Coastal Streams	640	609	1,249
Upper Russian River	526	844	1,370
Total	**16,556**	**15,984**	**32,540**

[a] Calculated as the area in riparian and floodplain forest stands (i.e., polygons) in MRC's landscape planning geographic information system.
[b] Includes portions of the Gualala River basin.

Within the primary assessment area, riparian communities along lower gradient stream reaches typically support conifers, primarily redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseudotsuga menziesii*), and various hardwoods such as red alder (*Alnus rubra*), black cottonwood (*Populus trichocarpa)*, California bay laurel (*Umbellularia californica*), and willow species (*Salix* spp.). Other non-riverine wetland plant communities within the primary assessment area include the bog and fen, marsh and swamp, vernal pool, meadow, and seep communities (Holland 1986). Refer to Section 3.5.1, Vegetation and Plant Species of Concern, Affected environment/Environmental setting, for additional information regarding the composition and distribution of riparian vegetation occurring on MRC's forestlands.

Within riparian stands, forest age varies widely from early successional to late successional. Canopy closure is closely related to successional stage and species composition. For example, high-density stands of large conifers tend to have greater canopy cover than open to low density stands of small hardwoods. In the primary assessment area, the most prominent successional stage in the riparian stands along both Class I and Class II streams is mid-successional, with little or no pioneer or early-successional stage riparian forest in most basins. The Albion River watershed analysis unit contains the most late-successional stage riparian forest of any basin in the primary assessment area.

MRC's riparian forests are currently dominated by relatively small trees. Conifer densities (trees per acre) in riparian stands along Class I and II streams in the primary assessment area are greatest in the 0–8 in (0–20 cm) and 8–16 in (20–41 cm) diameter at breast height categories (Table 3.4-6). Typically, riparian forests with larger trees provide the highest quality riparian functions, serving as important sources of stream shading, large woody debris recruitment, bank stability, and wildlife habitat. Large trees are defined here as those with a diameter at breast height of 24 in (61 cm) or greater. The current density of large conifer trees in Class I and II stands in the primary assessment area varies widely. The Navarro River watershed analysis unit has the greatest density of large riparian trees, while the Upper Russian River and Cottaneva Creek watershed analysis units have the least (Table 3.4-6).

Table 3.4-6. Density (trees per acre) of conifer trees in Class I and II riparian forest stands, by size class, in primary assessment area watershed analysis units.

Watershed analysis unit	Riparian conifer tree density by diameter at breast height range				
	0–8 in	8–16 in	16–24 in	24–32 in	> 32 in
Albion River	77	292	94	56	15
Alder Creek/Schooner Gulch	120	349	89	26	6
Big River	155	666	156	55	12
Cottaneva Creek	21	93	0	7	2
Elk Creek	51	231	67	15	3
Garcia River[a]	116	375	100	25	5
Greenwood Creek	206	165	59	16	4
Hollow Tree Creek	92	361	89	20	2
Navarro River	608	1454	375	113	40
Noyo River	164	605	153	34	6
Rockport Small Coastal Streams	52	286	79	21	5
Upper Russian River	30	102	25	7	1

Source: Timber model results (2011).
[a] Includes portions of the Gualala River basin.

Shade provided by the riparian forest canopy can be important in regulating stream water temperature. The temperature of water entering headwater streams in forested ecosystems is typically close to that of the subsoil environment. As this water flows through the stream system, water temperature becomes increasingly influenced by solar radiation and ambient air temperature (Burns 1972, Beschta et al. 1987). Warm water temperatures that occur during the summer low-flow period because of increased solar radiation are of particular concern: above specific thresholds, higher stream temperatures may limit the survival and growth of salmonid fishes (Bjornn and Reiser 1991), some amphibians (Claussen 1973, Nussbaum et al. 1983, Leonard et al. 1993, Hayes 1996), and other aquatic species. The amount of streamside shade provided by riparian vegetation can be a major factor affecting the amount of solar radiation reaching the stream surface. Water temperature is also discussed in Section 3.3 (Hydrology, Beneficial Uses of Water, and Water Quality) in the context of water quality.

Based on data collected by MRC through 2005, stream shade was found to be on target for 3% of the stream segments, marginal in 67%, and deficient in 30% of the stream segments surveyed (Table 3.4-7).

Table 3.4-7. Stream shade conditions in primary assessment area watershed analysis units.

Watershed analysis unit	Stream shade			
	Segments surveyed	On target	Marginal	Deficient
Albion River	19	0	19	0
Alder Creek	0	NA	NA	NA
Big River	43	0	18	25
Cottaneva Creek	34	0	34	0
Elk Creek	0	NA	NA	NA
Garcia River [a]	23	4	16	3
Greenwood Creek	13	0	13	0
Hollow Tree Creek	22	0	20	2
Navarro River	43	0	17	26
Noyo River	24	3	16	5
Rockport Coastal Streams	0	NA	NA	NA
Upper Russian River	8	0	0	8
Total	**229**	**7**	**153**	**69**

Source: MRC HCP/NCCP (2012)

NA = not applicable

[a] Includes portions of the Gualala River basin.

3.4.1.4 Wetlands, seeps, and springs

Freshwater wetlands, seeps, and springs represent aquatic elements that provide highly productive wildlife habitat for many species. Seeps and springs provide a source of moisture and cover, predominantly for amphibian species. Southern torrent salamanders are associated with cold springs, seeps, and small streams. California red-legged frogs and northern red-legged frogs frequently use seeps and springs when dispersing or migrating through upland habitats. Post-metamorphic coastal tailed frogs may occasionally be found in seeps (Adams and Bury 2000); the first observation of coastal tailed frogs using seeps for oviposition was documented in the primary assessment area (Goldsworthy 2007).

3.4.1.5 Aquatic and riparian animal species of concern

For the purposes of this EIS/PTEIR, aquatic and riparian species of concern are fishes, amphibians, and aquatic or semi-aquatic reptiles that are:

- Covered species under MRC's HCP/NCCP (MRC 2012);
- Listed as endangered or threatened under the federal ESA;
- Listed as endangered or threatened under the California ESA; and/or
- Designated as Species of Special Concern by CDFG (Moyle et al. 1995).

A variety of sources were searched to generate a list of aquatic and riparian species with the potential to occur in the assessment area. Primary data sources include:

- NMFS's (Northwest Regional Office) online ESA Salmon Listings (accessed January 2012).
- The Draft Central California Coast Coho Salmon Recovery Plan (NMFS 2010).
- Special-status species lists generated by USFWS (2009a).

- CDFG's California Natural Diversity Database (CDFG 2009a, CDFG 2010a).
- CDFG's Special Animals List, January 2011 (CDFG 2011a).
- Inland Fishes of California, Revised edition (Moyle 2002).
- Fish species of special concern in California (Moyle et al. 1995).
- Amphibian and reptile species of special concern in California (Jennings and Hayes 1994).
- Surveys conducted by MRC in the primary assessment area.

The process used to search databases for information on aquatic and riparian animal species of concern, including the list of United States Geological Survey quadrangles that were included in the search area and the initial species' scoping list, is described in Appendix J.

Thirty aquatic and riparian animal species of concern (aquatic invertebrates, fish, amphibians, aquatic reptiles, and fully aquatic mammals) were identified from database queries and literature searches as having potential to occur in the primary and secondary assessment areas (Appendices B and J). Seventeen of these species were eliminated from further consideration because the assessment area is outside of the species' range or no suitable habitat is present. Thirteen aquatic and riparian animal species of concern occur, or have the potential to occur, within the assessment area. Distribution (including documented occurrences in or near the assessment area), legal status, life history, habitat associations, potential threats, and sensitivity to forest management activities are described in detail in Appendix B and summarized in a table in Appendix J.

Of the 13 identified aquatic and riparian animal species of concern, the following 8 would be covered under incidental take authorization for the proposed HCP/NCCP:

- Coho salmon (*Oncorhynchus kisutch*), Southern Oregon/Northern California Coast Evolutionarily Significant Unit—covered by NMFS incidental take permit and CDFG take permit
- Coho salmon (*Oncorhynchus kisutch*), Central California Coast Evolutionarily Significant Unit—covered by NMFS incidental take permit and CDFG take permit
- Chinook salmon, California Coastal Evolutionarily Significant Unit (*Onchorhynchus tshawytscha*)—covered by NMFS incidental take permit and CDFG take permit
- Steelhead (*Oncorhynchus mykiss*), Northern California Distinct Population Segment—covered by NMFS incidental take permit and CDFG take permit
- Steelhead (*Oncorhynchus mykiss*), Central California Coast Distinct Population Segment—covered by NMFS incidental take permit and CDFG take permit
- Coastal tailed frog (*Ascaphus truei*)—covered by CDFG take permit
- California red-legged frog (*Rana draytonii*)—covered by USFWS incidental take permit and CDFG take permit
- Northern red-legged frog (*Rana aurora*)—covered by CDFG take permit

Five aquatic and riparian animal species of concern that would not be covered under the HCP/NCCP have high or moderate potential to occur within the primary assessment area. These species were also considered in the analysis of effects:

- Navarro roach (*Lavinia symmetricus navarroensis*)
- Tidewater goby (*Eucyclogobius newberryi*)
- Southern torrent (=southern seep) salamander (*Rhyacotriton variegatus*)

- Foothill yellow-legged frog (*Rana boylii*)
- Pacific pond turtle (*Actinemys marmorata*)

The remaining two aquatic species of concern were identified as having low potential to occur in the primary assessment area and were not considered in the analysis of effects:

- River lamprey (*Lampetra ayresi*)
- Gualala roach (*Lavinia symmetricus parvipinnis*)

There are no documented occurrences of river lamprey within the primary or the secondary assessment areas. While Gualala roach is found in the secondary assessment area near the border with Sonoma County, it has not been documented in the primary assessment area.

Below are brief summaries of the habitat associations, occurrence, and distribution of the six aquatic and riparian species of concern that are covered by the proposed incidental take authorizations and MRC's proposed HCP/NCCP.

Coho salmon, Central California Coast Evoluntionary Significant Unit

Coho salmon belonging to the Central California Coast Evoluntionary Significant Unit are federally and state-listed as endangered. The population extends from Punta Gorda (Humboldt County, California) to the San Lorenzo River (Santa Cruz County, California) (NMFS 2005a) (Appendix F, Figure F-2). Surveys conducted in the primary assessment area since 1994 have documented coho salmon in creeks and rivers within the primary assessment area (Table 3.4-8). All of the coho observations listed in Table 3.4-8 are from streams within the Central California Coast coho salmon Evoluntionary Significant Unit range, except for those in the Hollow Tree Creek watershed analysis unit. The lead agencies and MRC have also documented coho salmon presence in streams and rivers in the secondary assessment area. Primary habitat requirements include well-oxygenated water, permeable gravel for egg development, and winter refuge habitat for juvenile rearing. Numerous studies have shown that deep pools with substantial cover in the form of large woody debris are the most important habitat elements used by juvenile coho in the winter (Bustard and Narver 1975a, 1975b; Bisson et al. 1985, et al. 1988; Tschaplinski and Hartman 1983; Murphy et al. 1984; Everest et al. 1986). Fry tend to aggregate in backwaters, side channels, stream margins, and other low velocity locations, especially areas with low light intensity and overhead cover (Nickelson et al. 1992, Ruggles 1966). Coho salmon require cool water temperatures during all freshwater life stages. Suitable water temperatures for egg incubation are 4 to 13.3°C (39.2 to 55.9°F), with a slightly narrower range of 6 to 10°C (43 to 50°F) considered optimal (Davidson and Hutchinson 1938, Bell 1973; Reiser and Bjornn 1979). Juvenile coho appear to prefer temperatures of 10 to 15°C (50 to 59°F) (Hassler 1987). Field research by Hines and Ambrose (1998) indicated that the number of days a site exceeded a maximum weekly average temperature of 17.6°C (63.7°F) was one of the most influential variables predicting coho presence/absence. Welsh et al. (2001) conducted a similar study in the Mattole River watershed, where they found that coho salmon were not present in any streams which had a maximum weekly average temperature greater than 16.7°C (62.1°F) or a maximum weekly maximum temperature greater than 18.0°C (64.4°F). Likewise, coho were present in all streams with a maximum weekly average temperature lower than 14.5°C (58.1°F) and a maximum weekly maximum temperature less than 16.3°C (61.3°F). Increased peak flows, reduction in the amount of large woody debris, increased fine and coarse sediment input to the watershed, and removal of riparian vegetation can reduce coho salmon spawning success, degrade rearing habitat, and lead to reduced fitness and survival. See Appendix B for more information on coho salmon life history, habitat associations, potential threats, and sensitivity to forest management activities.

Critical habitat for coho salmon (Central California Coast Evoluntionary Significant Unit)

Critical habitat for this Evoluntionary Significant Unit extends from Punta Gorda (Humboldt County, California) to the San Lorenzo River in central California and includes the water, substrate, and adjacent riparian zones in all accessible reaches of the rivers and estuaries. Within the primary and secondary assessment areas, all accessible rivers and adjacent riparian habitat in watersheds south of Punta Gorda are considered to be critical habitat (NMFS 1999).

Coho salmon, Southern Oregon/Northern California Coast Evoluntionary Significant Unit

Coho salmon in the Southern Oregon/Northern California Coast Evolutionarily Significant Unit are federally and state-listed as threatened. The population extends from Cape Blanco (Curry County, Oregon) to Punta Gorda (NMFS 2005a) (Appendix F, Figure F-2). Surveys conducted in the primary assessment area since 1994 have documented coho salmon in Hollow Tree Creek (Table 3.4-8), which lies within the range of the Southern Oregon/Northern California Coast coho salmon Evolutionarily Significant Unit. MRC and other resource agencies also have also documented coho salmon presence in streams and rivers in the secondary assessment area. Primary habitat requirements are the same as those for coho salmon belonging to the Central California Coast Evolutionarily Significant Unit.

Critical habitat for coho salmon (Southern Oregon/Northern California Coast Evoluntionary Significant Unit)

Critical habitat for this Evolutionarily Significant Unit extends from Cape Blanco in Oregon to Punta Gorda in northern California and includes all includes the water, substrate, and adjacent riparian zones in all accessible reaches of the rivers and estuaries. Within the primary and secondary assessment areas, all accessible rivers and adjacent riparian habitat in watersheds north of Punta Gorda (i.e., those within the South Fork Eel Basin, including Hollow Tree Creek) are considered to be critical habitat area (NMFS 1999).

Chinook salmon, California Coastal Evoluntionary Significant Unit

Chinook salmon belonging to the California Coastal Evolutionarily Significant Unit are federally listed as threatened. The California Coastal Evolutionarily Significant Unit includes all naturally spawned fish from the Klamath River south to the Russian River (NMFS 2005a) (Appendix F, Figure F-2). Since 1994, Chinook salmon have been document during summer fish distribution surveys by MRC only in the Albion River during 2002 surveys (Table 3.4-9). Juvenile Chinook salmon have also been captured in outmigrant traps in Hollow Tree Creek in 2001, 2002, and 2003, and observed incidentally in Hayworth Creek (Noyo River basin) and the Navarro River (J. Ramaley, MRC, pers. comm., 17 October 2011). Requirements for survival include spawning habitat consisting of well-oxygenated water, permeable gravel located in pool tailouts and juvenile rearing habitat in low-velocity areas with instream cover. Chinook salmon typically spawn in the mainstem of large rivers and lower reaches of tributaries, near pool tailouts (i.e., heads of riffles) where intragravel dissolved oxygen concentrations are high. Following emergence, fry occupy low-velocity, shallow areas near stream margins, including backwater eddies and areas associated with bank (Lister and Genoe 1970, Everest and Chapman 1972, McCain 1992). Juvenile Chinook salmon appear to prefer pools that have cover provided by banks, overhanging vegetation, large substrates, or large woody debris. Water temperatures for Chinook salmon spawning are reportedly best when < 16ºC (60ºF), and potentially lethal when > 23ºC (73 ºF) (Moyle et al. 1995). Egg incubation requires water temperatures below about 14.4 ºC (58ºF) (Combs and Burrows 1957, Combs 1965, Healey 1979). Rearing juvenile Chinook salmon have been found to grow fastest when water temperatures range from 18.3º to 21.1ºC (65º to 70ºF) in the presence of unlimited food (Clarke and Shelbourn 1985, Banks et al. 1971, Brett et al. 1982, Rich 1987), but decrease at higher temperatures, with temperatures > 23.3º C (74º F) being potentially lethal (Hanson 1990).

Chinook salmon are sensitive to similar habitat changes as those described above for coho salmon. Increased peak flows, reduction in the amount of large woody debris, increased fine sediment input to streams, and removal of riparian vegetation can reduce Chinook salmon spawning success, degrade rearing habitat, and lead to reduced fitness and survival. See Appendix B for more information on Chinook salmon life history, habitat associations, potential threats, and sensitivity to forest management activities.

Critical habitat for Chinook salmon (California Coastal Evoluntionary Significant Unit)

Critical habitat for the Central California Coast Chinook salmon Evolutionarily Significant Unit includes selected rivers located between Redwood Creek in Humboldt County, California south to the Russian River in Sonoma County, California. The critical habitat area is defined as stream channels bounded by the ordinary high water line within specified stream or river reaches. Critical habitat within the primary assessment area includes the South Fork Eel River, Noyo River, Big River, Albion River, and Garcia River. In the secondary assessment area, critical habitat is located in the Mattole River, Wages Creek, and Ten Mile River (NMFS 2005b).

Table 3.4-8. Number of streams where summer surveys have documented presence and absence of coho salmon in streams within the primary assessment area, by survey year.

Watershed analysis unit	Drainage basin	Total streams	1994		1995		1996		2000		2001		2002		2003		2004		2005		2006		2007		Data sources
			Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	
Albion River	Albion River	20	3	4	6	3	10	7	12	6	7	9	14	2	7	1	2	0	4	0	2	0	1	1	1
	Buckhorn Creek	2	0	0	0	0	0	1	0	2	0	2	0	2	0	0	0	0	0	0	0	0	0	0	
Alder Creek/Schooner Gulch	Alder Creek	10	0	1	0	6	0	9	0	10	0	9	0	6	0	0	0	0	0	1	0	1	0	1	1, 2, 3
	Elk Creek	12	0	5	1	6	0	8	0	12	0	12	1	11	0	0	0	0	0	1	0	1	0	1	
	Greenwood Creek	6	0	4	0	4	0	5	0	6	0	6	0	4	0	0	0	0	0	1	0	1	0	1	
	Mallo Pass Creek	1	0	1	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0	1	0	1	0	1	
	Mills Creek	1	0	0	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	
Big River	Big River	29	0	18	3	17	8	18	2	25	4	22	14	10	2	4	2	1	2	0	2	1	2	1	1, 2, 3
Garcia River	Garcia River	8	1	3	0	6	1	7	0	8	0	8	2	4	0	0	0	0	0	2	1	1	1	0	1, 2, 3
	Moat Creek	2	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
	Point Arena Creek	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
	Schooner Creek	4	0	1	0	4	0	1	0	4	0	4	0	4	0	0	0	0	0	0	0	0	0	0	
Hollow Tree Creek	S.F. Eel River	29	9	7	9	11	11	15	13	13	9	14	13	12	0	0	0	0	1	0	0	0	1	1	1, 2, 3, 6, 7
Navarro River	Navarro River	54	2	23	7	35	10	39	8	44	8	45	20	26	0	0	1	6	2	0	1	2	3	0	1, 2, 3
Noyo River	Doyle Creek	2	0	0	0	1	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1, 3, 4, 5
	Noyo River	27	5	7	3	11	11	16	2	25	9	17	10	13	0	0	0	0	1	0	3	0	1	0	
Rockport Coastal Streams	Cottaneva Creek	11	4	4	1	7	4	6	3	7	1	8	6	5	2	2	0	0	1	0	1	0	1	0	1, 2, 3, 6
	Hardy Creek	4	0	3	0	3	0	4	0	4	0	4	0	4	0	0	0	0	0	0	1	0	0	1	
	Howard Creek	2	0	2	0	2	0	2	0	2	0	2	0	2	0	0	0	0	0	0	0	1	0	1	
	Juan Creek	2	0	2	0	2	0	2	0	2	0	2	0	2	0	0	0	0	0	1	0	1	0	1	

Note that extensive fish distribution surveys were conducted throughout the ownership in 1994–1996 and 2000–2002, while surveys from 2003–2007 were more limited and generally focused on amphibian distribution. (Pres=present, Abs=absent).

Sources:

1 MRC (2002, unpublished data)
2 Hassler et al. (1991)
3 NMFS (2000)
4 Brown et al. (1994)
5 KRIS (2000)
6 NMFS (2001)
7 Brownell et al. (1999)

Table 3.4-9. Number of streams where summer surveys have documented presence and absence of Chinook salmon in streams within the primary assessment area, by survey year.

Watershed analysis unit	Drainage basin	Total streams	1994		1995		1996		2000		2001		2002		2003		2004		2005		2006		2007	
			Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs
Albion River	Albion River	20	0	7	0	9	0	17	0	18	0	16	1	15	0	8	0	2	0	4	0	2	0	2
	Buckhorn Creek	2	0	0	0	0	0	1	0	2	0	2	0	2	0	0	0	0	0	0	0	0	0	0
Alder Creek/Schooner Gulch	Alder Creek	10	0	1	0	6	0	9	0	10	0	9	0	6	0	0	0	0	0	1	0	1	0	1
	Elk Creek	12	0	5	0	7	0	8	0	12	0	12	0	12	0	0	0	0	0	1	0	1	0	1
	Greenwood Creek	6	0	4	0	4	0	5	0	6	0	6	0	4	0	0	0	0	0	1	0	1	0	1
	Mallo Pass Creek	1	0	1	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0	1	0	1	0	1
	Mills Creek	1	0	0	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Big River	Big River	29	0	18	0	20	0	26	0	27	0	26	0	24	0	6	0	3	0	2	0	3	0	3
Garcia River	Garcia River	8	0	4	0	6	0	8	0	8	0	8	0	6	0	0	0	0	0	2	0	2	0	1
	Moat Creek	2	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Point Arena Creek	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Schooner Creek	4	0	1	0	4	0	1	0	4	0	4	0	4	0	0	0	0	0	0	0	0	0	0
Hollow Tree Creek	S.F. Eel River	29	0	16	0	20	0	26	0	26	0	23	0	25	0	0	0	0	0	1	0	0	0	2
Navarro River	Navarro River	54	0	25	0	42	0	49	0	52	0	53	0	46	0	0	0	7	0	2	0	3	0	3
Noyo River	Doyle Creek	2	0	0	0	1	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0
	Noyo River	27	0	12	0	14	0	27	0	27	0	26	0	23	0	0	0	0	0	1	0	3	0	1
Rockport Coastal	Cottaneva Creek	11	0	8	0	8	0	10	0	10	0	9	0	11	0	4	0	0	0	1	0	1	0	1
	Hardy Creek	4	0	3	0	3	0	4	0	4	0	4	0	4	0	0	0	0	0	0	0	1	0	1
	Howard Creek	2	0	2	0	2	0	2	0	2	0	2	0	2	0	0	0	0	0	0	0	1	0	1
	Juan Creek	2	0	2	0	2	0	2	0	2	0	2	0	2	0	0	0	0	0	1	0	1	0	1

Note that extensive fish distribution surveys were conducted throughout the ownership in 1994–1996 and 2000–2002, while surveys from 2003–2007 were more limited and generally focused on amphibian distribution. (Pres=present, Abs=absent).
Source: MRC (2002, unpublished data)

Steelhead, Northern California Distinct Population Segment

Steelhead belonging to the Northern California Distinct Population Segment are federally listed as threatened and are a California Species of Special Concern. This Distinct Population Segment includes all naturally spawned populations found below impassable barriers from Redwood Creek (Humboldt County) south to, but not including, the Russian River (NMFS 2006) (Appendix F, Figure F-2). Since 1994, steelhead belonging to the Northern California Distinct Population Segment have been observed in creeks and rivers throughout the primary assessment area (Table 3.4-10). With the exception of those from the Ukiah watershed analysis unit in the upper Russian River drainage basin, all of these observations occurred within the range of the Northern California Distinct Population Segment. Primary habitat requirements include well-oxygenated water, permeable gravel for spawning, and deep, low velocity pools with large woody debris or large rocky substrate used for juvenile winter refuge habitat. During their upstream migration, adult steelhead require deep pools for resting and holding (Puckett 1975; Roelofs 1983, as cited in Moyle et al. 1989). Incubating eggs require high dissolved oxygen concentrations, with optimal concentrations at or near saturation. Steelhead fry typically rear in shallow-water, low-velocity habitats such as stream margins and low-gradient riffles (Hartman 1965, Everest et al. 1986, Fontaine 1988). Older juveniles use areas with cover and show a preference for higher-velocity, deeper mid-channel waters (Hartman 1965, Everest and Chapman 1972, Fontaine 1988). Steelhead overwinter in pools, especially low-velocity deep pools with large rocky substrate or woody debris for cover (Hartman 1965, Swales et al. 1986, Raleigh et al. 1984, Fontaine 1988). Like other salmonids, steelhead require cool water temperatures during all freshwater life stages. Preferred temperatures for steelhead spawning range from 3.9° to 9.4°C (39° to 48.9°F) (Bell 1986), and preferred incubation temperatures range from 9° to 11°C (48° to 52°F) (McEwan and Jackson 1996, FERC 1993).

Steelhead are sensitive to similar habitat changes as those described above for coho salmon and Chinook salmon. Increased peak flows, reduction in the amount of large woody debris, increased fine sediment input to streams, and removal of riparian vegetation can reduce steelhead spawning success, degrade rearing habitat, and lead to reduced fitness and survival. See Appendix B for more information on steelhead life history, habitat associations, potential threats, and sensitivity to forest management activities.

Critical habitat for steelhead (Northern California Distinct Population Segment)

The critical habitat area for the Northern California Distinct Population Segment includes specified watersheds from Redwood Creek (Humboldt County) south to, but not including, the Russian River. The critical habitat area is defined as stream channels bounded by the ordinary high water line within specified reaches of rivers and streams. Within the primary assessment area, critical habitat is located in the Albion River, Alder Creek, Big River, Buckhorn Creek, Cottaneva Creek, Doyle Creek, Elk Creek, Garcia River, Greenwood Creek, Gualala River, Hardy Creek, Howard Creek, Juan Creek, Mallo Pass Creek, Navarro River, Point Arena Creek, and South Fork Eel River drainage basins. Critical habitat is found in 21 more drainage basins in the secondary assessment area (NMFS 2005b).

Steelhead, Central California Coast Distinct Population Segment

Steelhead in the Central California Coast Distinct Population Segment are listed as threatened under the ESA. This Distinct Population Segment includes all naturally spawned populations found below impassable barriers from the Russian River south to Aptos Creek in Santa Cruz County (NMFS 2006) (Appendix F, Figure F-2). In the primary assessment area, only those steelhead occupying streams in the Ackerman Creek planning watershed in the upper Russian River drainage belong to the Central California Coast Distinct Population Segment. Habitat requirements are the same as those for steelhead belonging to the Northern California Distinct

Population Segment.

Critical habitat for steelhead (Central California Coast Distinct Population Segment)

The critical habitat for the Central California Coast steelhead Distinct Population Segment occurs in specified watersheds from the Russian River south to Aptos Creek in Santa Cruz County. The critical habitat area is defined as stream channels bounded by the ordinary high water line within specified reaches of rivers and streams. Although the critical habitat area includes MRC property located in the upper Russian River basin (Jack Smith Creek planning watershed; see Appendix F, Figure F-1b), this property is not part of the HCP/NCCP plan area and there is no critical habitat for this Distinct Population Segment within the primary or the secondary assessment area (NMFS 2005b).

Table 3.4-10. Number of streams where summer surveys have documented presence and absence of steelhead in streams within the primary assessment area, by survey year.

Watershed analysis unit	Drainage basin	Total streams	1994		1995		1996		2000		2001		2002		2003		2004		2005		2006		2007		Data sources
			Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	Pres	Abs	
Albion River	Albion River	20	7	0	7	2	13	4	13	5	11	5	10	6	2	6	1	1	2	2	1	1	1	1	1, 2
	Buckhorn Creek	2	0	0	0	0	1	0	1	1	2	0	1	1	0	0	0	0	0	0	0	0	0	0	
Alder Creek/Schooner Gulch	Alder Creek	10	1	0	5	1	6	3	7	3	6	3	6	0	0	0	0	0	1	0	1	0	1	0	1, 2
	Elk Creek	12	5	0	7	0	7	1	9	3	8	4	8	4	0	0	0	0	1	0	1	0	1	0	
	Greenwood Creek	6	4	0	4	0	5	0	6	0	6	0	4	0	0	0	0	0	1	0	1	0	1	0	
	Mallo Pass Creek	1	1	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0	0	1	1	0	1	0	
	Mills Creek	1	0	0	0	1	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	
Big River	Big River	29	18	0	18	2	19	7	16	11	16	10	20	4	6	0	3	0	2	0	2	1	2	1	1, 2
Garcia River	Garcia River	8	3	0	5	1	6	2	7	1	7	1	6	0	0	0	0	0	1	1	2	0	1	0	1, 2
	Moat Creek	2	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
	Point Arena Creek	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
	Schooner Creek	4	0	1	2	2	0	1	2	2	2	2	1	3	0	0	0	0	0	0	0	0	0	0	
Hollow Tree Creek	S.F. Eel River	29	14	2	15	5	19	7	20	6	19	4	18	7	0	0	0	0	1	0	0	0	1	1	1, 2
Navarro River	Navarro River	54	21	4	35	7	43	6	38	14	40	13	35	11	0	0	6	1	2	0	3	0	3	0	1, 2
Noyo River	Doyle Creek	2	0	0	1	0	1	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1, 2
	Noyo River	27	12	0	13	1	25	2	25	2	24	2	21	2	0	0	0	0	1	0	3	0	1	0	
Rockport Coastal	Cottaneva Creek	11	8	0	8	0	6	4	8	2	8	1	9	2	4	0	0	0	1	0	1	0	1	0	1, 2
	Hardy Creek	4	2	1	2	1	3	1	4	0	4	0	4	0	0	0	0	0	0	0	1	0	1	0	
	Howard Creek	2	2	0	2	0	2	0	2	0	2	0	2	0	0	0	0	0	0	0	1	0	1	0	
	Juan Creek	2	2	0	2	0	2	0	2	0	2	0	2	0	0	0	0	0	1	0	1	0	1	0	
Upper Russian River	Ackerman Creek	3	0	0	3	0	3	0	3	0	3	0	3	0	0	0	0	0	1	0	1	0	1	0	1, 2

Note that extensive fish distribution surveys were conducted throughout the ownership in 1994–1996 and 2000–2002, while surveys from 2003–2007 were more limited and generally focused on amphibian distribution. (Pres=present, Abs=absent).

Sources:

1 MRC (2002, unpublished data)

2 NMFS (2000)

Coastal tailed frog

Coastal tailed frog is a California Species of Special Concern and would be covered under MRC's proposed HCP/NCCP. The current distribution of coastal tailed frogs in California extends from the Oregon border to approximately Anchor Bay, Mendocino County and about as far east as near Big Bend, Shasta County (Stebbins 2003, Jones et. al. 2005). In the primary assessment area, coastal tailed frogs are generally distributed throughout the following western river basins: Albion River, Alder Creek, Cottaneva Creek, Elk Creek, Greenwood Creek, Hardy Creek, Juan Creek, Mallo Pass Creek, Navarro River, and Point Arena Creek river basins (Appendices B and F) (CDFG 2009a, MRC 2012).

Coastal tailed frogs inhabit cold (41–65°F [5–18.5°C]) (Brown 1975), fast-flowing, high gradient, perennial streams that flow through Douglas-fir, coast redwood, Sitka spruce, western hemlock, and ponderosa pine stands from sea level to near timber line (Stebbins 2003). Tailed frogs forage along streams and in adjacent forest stands at night and rest during the day in interstitial spaces of large submerged substrate of high gradient riffles or on moist stream banks (Daugherty and Sheldon 1982, Leonard et al. 1993). Inland, higher-elevation, or higher-latitude populations may seek cover under large downed logs and boulders for overwintering sites during cold periods (Daugherty and Sheldon 1982). In milder, coastal climates, coastal tailed frogs may remain active year-round. Coastal tailed frogs—particularly the larval stage, which is restricted to streams—are sensitive to elevated stream temperatures, increases in fine sediment input to stream habitats, and reduction in the amount of large woody debris. See Appendix B for more information on coastal tailed frog life history, habitat associations, potential threats, and sensitivity to forest management activities.

California red-legged frog

The California red-legged frog, federally listed as threatened and a California Species of Special Concern, would be covered under MRC's HCP/NCCP. Its range extends along the coast from Mendocino south to northwestern Baja California, Mexico, and inland through the northern Sacramento Valley (Stebbins 2003, Shaffer et al. 2004). Genetic analyses conducted by Shaffer et al. (2004) on larval red-legged frogs in Mendocino County showed that a narrow range of overlap with its congener, the northern red-legged frog (*Rana aurora*), occurs in Mendocino County. Genetically "pure" northern red-legged frogs were found around and north of Big River, genetically "pure" California red-legged frogs were found around and south of Mills Creek, and hybrids occurred between those two regions (Shaffer et al. 2004). California red-legged frogs (or hybrids, where applicable) have been detected within the primary assessment area in the following river basins: Big River, Albion River, Navarro River, Greenwood Creek, Elk Creek, and Mallo Pass Creek (Appendix F, Figure F-3).

California red-legged frog habitat is generally characterized by still or slow-moving water with deep pools (usually at least 2.2 ft [0.7 m], though frogs have been known to breed in shallower pools) and emergent and overhanging vegetation (though frogs have also been documented in habitats devoid of riparian cover) (Jennings and Hayes 1994). Suitable habitats include wetlands, wet meadows, ponds, lakes, and low-gradient, slow-moving stream reaches with permanent pools. Although some adults may remain resident year-round at favorable breeding sites, others may disperse up to a mile or more, either along riparian corridors or directly from one site to another without apparent regard for topography or watershed corridors (Bulger et al. 2003, Fellers and Kleeman 2007). See Appendix B for more information on California red-legged frog life history, habitat associations, potential threats, and sensitivity to forest management activities.

Critical habitat for California red-legged frog

After several revisions, critical habitat for California red-legged frog was finalized on 16 April 2010 (75FR51:12815-12864). The distribution of final revised critical habitat designation for California red-legged frog includes 1,636,609 ac (662,312 ha) in 27 counties, including Mendocino County. In the primary assessment area, critical habitat is located in the Alder Creek and Brush Creek drainage basins. In the secondary assessment area, critical habitat is in part of the Garcia River drainage basin.

Northern red-legged frog

Northern red-legged frog, a California Species of Special Concern, would be covered under MRC's proposed HCP/NCCP. Its range extends along the coast from Mendocino County north to southwestern British Columbia. The description for California red-legged frog, above, explains the narrow range of overlap between the two species.

Northern red-legged frogs (or hybrids, where applicable) are documented within the primary assessment area in the Albion River, Big River, Elk Creek, Greenwood Creek, Navarro River, Hollow Tree Creek, and Rockport Small Coastal Streams watershed analysis units[31] (MRC 2012). The species has also been documented about 20 mi (32 km) south of the Rockport coastal area, near both Caspar Creek and the South Fork Noyo River in the secondary assessment area (CDFG 2009a).

Northern red-legged frogs utilize a variety of habitats throughout their various life stages. Aquatic sites such as coastal lagoons, pools, marshes, ponds, or backwater areas are used for breeding, while upland habitats such as open grasslands with seeps and springs may be used for oversummering and for foraging. Deep pools are an important breeding habitat feature for northern red-legged frogs and California red-legged frogs, especially for evading predators. Other sources of cover include emergent vegetation, undercut banks, and root-wads. In northwestern California, northern red-legged frogs have been observed in dense understory vegetation such as ferns and sedges in streamside flats and stands of redwoods. See Appendix B for more information on northern red-legged frog life history, habitat associations, potential threats, and sensitivity to forest management activities.

3.4.2 Environmental effects and mitigation

Effects on aquatic and riparian species of concern are considered significant if the Proposed Action or alternatives would:

- Have substantial adverse effects, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFG, NMFS, or USFWS.
- Have substantial adverse effects on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFG or USFWS.
- Interfere substantially with the movement of any native resident or migratory fish species of concern or other aquatic or riparian animal species of concern.

[31] While MRC was not able to detect northern red-legged frogs during surveys for potential red-legged frog breeding sites in the northern third of the primary assessment area, this species was observed in the Hollow Tree Creek and Rockport Small Coastal Streams watershed analysis units during tailed-frog survey efforts there (J. Ramaley, MRC, pers. comm., 2011).

- Substantially reduce the habitat of an aquatic or riparian animal species of concern, cause a population to drop below self-sustaining levels, threaten to eliminate an aquatic or riparian animal community, or substantially reduce the number or restrict the range of an endangered, rare, or threatened aquatic or riparian animal species of concern.
- Conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.

The first four criteria above, which pertain to aquatic and riparian species and their habitat, are considered in detail in the analysis presented in this section. However, the last criterion is not applicable for the reasons described below and it is therefore not considered further.

There are two small HCPs in the secondary assessment area: *The Habitat Conservation Plan for the Point Arena Mountain Beaver and Behren's Silverspot Butterfly at the Fisher Property* (Fisher and Fisher 2007), and the *Low Effect Habitat Conservation Plan for the Point Arena Mountain Beaver at the AT&T Manchester Cable Station* (Galea Wildlife Consulting 2002). The covered activities under each of these two HCPs are residential construction and fiber optic line installation, respectively, and include no forest management-related activities. Both of these plans are in the Point Arena area and cover an area surrounded by primarily coastal scrub habitats. The provisions of these two HCPs present no known conflict with the Proposed Action or the other alternatives, since the area covered by these HCPs is not directly adjacent to the primary assessment area and does not include forest habitat that would be subject to future acquisition by MRC and addition to the HCP/NCCP plan area. CDFG has determined that there are no NCCPs in the secondary assessment area, and the lead agencies are aware of no other HCPs in the secondary assessment area.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.4.2.7.

3.4.2.1 Analysis approach and impact mechanisms

The lead agencies analyzed effects based on the likely response of aquatic and riparian species of concern to changes in environmental conditions projected to occur under each alternative. The analysis relied on projected future habitat conditions from the timber model (Appendix E), when applicable, and an evaluation of the likely effects on the species and their habitat as a result of implementing the conservation and management measures under each alternative. The habitat analysis is based on anticipated changes in sediment delivery, hydrology, riparian conditions and processes, aquatic habitat, and other factors that may be affected by forest management activities. The riparian conditions and processes evaluated here are large woody debris recruitment, microclimate regulation (e.g., stream shading), bank stability, and nutrient input. The analysis of effects on species of concern is based primarily on the potential for indirect effects that could occur as a result of alterations to these key habitat conditions and processes. The most likely mechanisms by which forest management activities could affect each aquatic and riparian resource condition are described in the sections below.

Effects were determined by comparing conditions that would occur under each alternative to the existing conditions, as described in Section 3.4.1. A comparative evaluation of effects among the alternatives is included at the end of this section.

Analyses of climate change and cumulative effects are discussed separately in Section 3.8, Climate and Climate Change, and Section 4, Cumulative Effects, respectively.

Sediment delivery

Forest management can result in increased fine sediment delivery to streams through surface erosion from hillslopes and roads, mass soil movement (i.e., landslides), and bank erosion. Elevated levels of fine sediment can degrade habitat for salmonids and other aquatic species of concern by reducing the quality of spawning gravel, scouring or smothering incubating eggs, and filling pools and spaces between coarse substrates used for rearing and foraging. Increased sediment delivery to streams can also lead to aggradation of the channel bed, which may reduce the availability of complex rearing habitat and increase the potential for bank erosion and channel widening. Wider, shallower stream channels are more susceptible to water temperature increases due to the greater amount of solar radiation reaching the water's surface (due to the greater stream surface area) and increased heating of the shallower water.

Roads within the riparian zone can contribute substantial amounts of sediment to the channel network and alter patterns of surface runoff (Chamberlin et al. 1991, Hicks et al. 1991), and may fragment important movement corridors for wildlife. Road/stream crossings in particular create locations where surface runoff and sediment can be directly deposited into streams (Furniss et al. 1991). Forest management activities, including road construction and use, can also increase sediment delivery to seeps, springs, and wetlands, and cause degradation of these types of aquatic habitats. The potential effects of roads and other forest management activities on sediment production and delivery under each alternative are discussed in Section 3.2 (Geology, Soils, and Geomorphology). Implications of sediment delivery on aquatic habitat and species of concern under each alternative are discussed below in Sections 3.4.2.2 through 3.4.2.6.

The analysis of sediment delivery effects in Sections 3.4.2.2 through 3.4.2.6 focuses on the potential for effects on aquatic habitat and indirect effects on aquatic species of concern that may result from delivery of sediment to streams and other aquatic habitats via mass wasting and surface erosion processes described in Section 3.2 (Geology, Soils, and Geomorphology), as well as associated potential effects on suspended sediment and turbidity (Section 3.3; Hydrology, Beneficial Uses of Water, and Water Quality). The analysis is based on the likely effects of the conservation and management measures that would be implemented under each alternative on the potential for sediment delivery to stream channels.

Flow patterns

Hydrology has an important bearing on aquatic habitat conditions and on the sensitivity of stream channels to changes in sediment inputs. Forest management activities (e.g., construction of roads, compaction of surfaces, and canopy removal) have the potential to alter the hydrology and flow patterns of a watershed, affecting the flow routes, timing, volume, and maximum rate of runoff and stream flows. Effects on hydrology are assessed in detail in Section 3.3.2 (Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation) using timber model output data and the likely effects of the conservation and management measures that would be implemented under each alternative. Potential effects of hydrological changes on aquatic species and habitats are discussed in this section, with reference to the hydrology analysis in Section 3.3.2 (Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation) as appropriate.

Other effects of timber operations on hydrology may result from developing and using water drafting sites. Water drafting could result in direct effects on aquatic species of concern via entrainment and removal of aquatic organisms from their habitat, or indirect effects on aquatic habitat via reduction in habitat quantity and quality. MRC's TMP (Appendix A) and selected HCP/NCCP conservation strategies specify that water may be taken from Class I and Class II streams for timber operations, under the stipulations of a master streambed alteration agreement

(Master Agreement for Timber Operations; Appendix T of MRC 2012) with CDFG. The frequency, volume, and location of water drafting is driven primarily by the need for road dust abatement in association with timber operations. Although the Master Agreement for Timber Operations would not be implemented under the No Action alternative or Alternative B, MRC would presumably enter into a similar agreement with CDFG under these alternatives. Therefore, for purposes of analysis in this EIS/PTEIR the lead agencies assume that water drafting guidelines would be similar under all alternatives. Although the need for dust abatement could differ somewhat among alternatives, prediction of actual water drafting needs would be highly speculative and the lead agencies assume that differences among alternatives would not likely influence the analysis or conclusions. Because of the relatively low volume and episodic nature of water drafting, as well as drafting restrictions in the MATO, this activity is not expected to result in substantially altered low flows under any of the alternatives (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation).

Riparian conditions

The ecological functions of riparian zones can be significantly altered by timber harvesting activities. Changes in the amount of riparian vegetation can have a direct influence on the amount and quality of habitat for most life stages of special-status fish and other aquatic and riparian species of concern. The removal of riparian vegetation and physical disturbance in the riparian zone can reduce the supply of large woody debris, produce changes in stream shading that affects temperature, humidity, and wind regimes, accelerate bank erosion, and alter the supply of nutrients to streams and other aquatic habitats such as springs, seeps, and wetlands (Hicks et al. 1991). Potential effect mechanisms and the approach to analyzing effects on each of these riparian conditions are described below.

Riparan forest structure

The species composition and physical structure of riparian vegetation affect ecological processes and functions in the riparian zone. Timber harvesting and related activities, including road construction and maintenance, can significantly alter species composition and riparian forest structure. For example, timber harvesting and related activities can affect the relative abundance of conifers versus hardwoods, which in turn can affect riparian stand height, microclimate (relative humidity, and air and soil temperatures), and large woody debris recruitment potential (including recruitment rate, size distribution, and decay rate) (Welsh et al. 2000).

Large woody debris

Large woody debris is widely recognized as an important part of the aquatic ecosystem (Swanson and Lienkaemper 1978, Bilby and Likens 1980, Bisson et al. 1987) and a vital component of high quality habitat for salmonids and other aquatic organisms (Bisson et al. 1987, Beechie and Sibley 1997). Reduction of large woody debris in stream channels has been one of the most important long-term effects of forest management on salmonids in North America (Hicks et al. 1991). Removal of large woody debris generally leads to loss of those habitat features important to many salmonid species and a decline in salmonid abundance (Bryant 1980, Toews and Moore 1982, Lestelle and Cederholm 1984, Dolloff 1986, Elliott 1986, Fausch and Northcote 1992). Large woody debris reductions cause decreased frequency, depth, and complexity of pool habitats used by rearing juvenile and resting adult anadromous salmonids, and result in overall decreases in pool area and increases in riffle area (Bryant 1980, Everest and Meehan 1981, Bisson and Sedell 1984). Loss of large woody debris may especially reduce carrying capacity for the older age classes of juvenile salmonids, which typically prefer deeper habitats (Bisson et al. 1988). Stream channels tend to become simpler and less stable after the removal of large woody debris, and the structural complexity that provides substrate diversity, low velocity refugia during high flows, and cover from predation is also lost (McMahon and Reeves 1989). Other effects may include increased bank and bed erosion, reduced retention of spawning gravels, and reduced retention of organic materials important for maintaining the macroinvertebrates that are eaten by juvenile salmonids.

The potential effects of management under each alternative on riparian forests in the primary assessment area and the input of large woody debris to stream channels were evaluated using a modeling approach (Appendix K). The model uses a published relationship between the density of old-growth riparian trees (Keller et al. 1995) and large woody debris density in the stream channel (large woody debris "loading") to derive an index of large woody debris loading potential based on modeled riparian stand density. Using this relationship, an estimate of large woody debris loading in Class I and II stream channels was developed based on the density of large conifer trees (> 24 in [61 cm] diameter at breast height) in riparian zones predicted by the timber model. See Appendix E for a description of the timber model and the modeling methodology. Because the rate of large woody debris recruitment to the stream is related to the width of the riparian buffer (Reid and Hilton 1998), the large woody debris loading estimate was then scaled by a source-distance curve to account for the modeled buffer widths under each alternative. This approach is consistent with the approach used for large woody debris recruitment modeling in MRC's proposed HCP/NCCP. To "normalize" the estimates relative to the likely maximum large woody debris loading potential, the modeled values were then divided by the maximum large woody debris density reported by Keller et al. (1995) for Prairie Creek, a stream in an unmanaged coastal redwood forest located in Humboldt County, just north of the secondary assessment area. The potential effects of each alternative on large woody debris loading in Class I and II streams in the primary assessment area are evaluated using this modeling approach. Because this approach is based partly on old-growth riparian conditions and the riparian stands in the primary assessment area are generally second growth, the index is used strictly to compare potential large woody debris loading among alternatives, not to predict actual amounts of stream large woody debris. The analysis also considers the effects of the proposed aquatic and riparian conservation and management measures, including proposed additions of large woody debris under some alternatives, on large woody debris recruitment and loading.

Stream shading

Riparian vegetation is important in regulating stream water temperature. Above specific thresholds, higher stream temperatures limit the survival and growth of salmonid fishes (Bjornn and Reiser 1991), amphibians (Claussen 1973, Nussbaum et al. 1983, Leonard et al. 1993, Hayes 1996), and other aquatic species. The amount of streamside shade provided by riparian vegetation is an important factor affecting the amount of solar radiation reaching the stream surface.

The riparian zone also functions as an important regulator of microclimate, affecting both terrestrial and aquatic environments. The most substantial microclimate controls provided by the riparian corridor include regulation of humidity, interruption of wind velocity, and modification of both soil and air temperature. Alteration of these conditions due to riparian forest management may affect species that rely on riparian corridors as movement pathways during critical life stages (e.g., amphibians).

The effects of changes in stream shading on water temperature under each alternative are assessed in Section 3.3.2 (Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). The potential effects of water temperature changes on aquatic and riparian species of concern are assessed below by comparing anticipated stream temperature regimes under each alternative with water temperature tolerances of the analysis species.

Bank stability

Riparian vegetation can protect stream banks from erosion (Simon et al. 2000), because the roots help bind soil together. Riparian vegetation also provides hydraulic roughness that dissipates stream energy during overbank flows, further reducing bank erosion potential. Forest management adjacent to streams can lead to a loss of root strength and make streambanks more susceptible to erosion. Unstable banks can deliver sediment directly to channels that can adversely affect habitat quality and reduce habitat complexity. Aggradation of the stream bed can also cause lateral movement of the channel and exacerbate bank erosion.

Effects of forest management activities on bank erosion and stability are assessed based on the projected intensity of riparian harvest, the potential for stream bed aggradation (Section 3.2, Geology, Soils and Geomorphology), and the likely effects of the riparian conservation and management measures that would be implemented under the alternatives.

Nutrient input

Nutrients and organic matter introduced to the stream from adjacent uplands and the riparian zone are transferred in the stream through food webs to supply energy and nutrients for aquatic organisms (Gregory et al. 1991, Power 1995, Power and Rainey 2000). Aquatic macroinvertebrates rely heavily on organic matter production originating outside the stream (allochthonous input). This production fuels growth of the macroinvertebrate population, and benefits salmonids and amphibians by providing an important prey base. As organic material moves downstream, species abundance and composition are affected according to levels of allochthonous input versus in-stream primary production (algal growth) and the degree of nutrient processing (Vannote et al. 1980, Power 1995, Power and Rainey 2000).

Forest management in riparian buffer zones can lead to changes in the distribution and dynamics of leaf litter and other organic inputs, which in turn affect availability of nutrients in streams. Management intensity affects the rate of nutrient removal from the system (Beschta et al. 1995). Changes in the riparian tree canopy or other vegetation can alter the input of organic nutrients to the stream and the production of algae and invertebrates, resulting in alterations to the prey base used by rearing juvenile salmonids and other aquatic species of concern.

Effects of riparian management activities on nutrient input are assessed based on projected riparian forest conditions from the timber model and the likely effects of the riparian conservation and management measures that would be implemented under the alternatives. Potential effects of forest management activities on nutrients associated with fine sediment transport (phosphorus) and soil leaching (nitrate) are discussed in Section 3.3.2 (Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation).

Other factors

Other factors, such as wildfires, herbicides, the operation of rock pits and non-commercial quarries, non-native invasive species, recreational fishing, illegal fishing, and illegal marijuana cultivation have the potential to affect aquatic and riparian habitats and species of concern in the primary and secondary assessment areas. Fires tend to increase hillside erosion and sediment loading to streams because they strip the ground of protective cover, exposing the soil to more erosional forces and increasing the potential for overland flow and surface erosion. Fire may also alter the hydrologic response of watersheds due to its effects on interception, infiltration, soil moisture storage, overland flow, and erosion (Wondzell and King 2003). In addition to increased surface erosion, accelerated mass wasting may occur following fire, due largely to alterations in soil and hydrologic characteristics (Booker et al. 1993, Spittler 1993). Under each of the alternatives, MRC's response to wildfire would follow its current (2011) Fire Suppression Plan or future updates to this plan (Section 3.10, Hazards and Hazardous Substances). Because the potential effects of wildfire on aquatic and riparian habitats and species of concern are varied and unpredictable due to the stochastic nature of wildfires, an analysis of the effects would be speculative in nature. Accordingly, effects of wildfire on aquatic and riparian habitats and species of concern are not analyzed in this EIS/PTEIR. However, post-fire timber salvage may occur in burned areas to salvage trees that are likely to die or that are not viable for timber production. The effects of post-fire timber salvage on aquatic and riparian habitats and species of concern may differ by alternative based on the conservation and management measures that would be implemented under each alternative. The EIS/PTEIR therefore includes a qualitative analysis of the effects of post-fire timber salvage.

The use of herbicides is not an activity covered by the USFWS and NMFS incidental take permits or the CDFG take permit. However, herbicide use is a reasonably foreseeable forest management activity that may take place in association with MRC's future timber operations under each of the alternatives. The potential effects of herbicides on animals and plants, including aquatic and riparian species of concern, are analyzed in Section 3.10 (Hazards and Hazardous Substances). The effects analyses for aquatic and riparian species of concern in Sections 3.4.2.2 through 3.4.2.6 below refer to the herbicide effects analysis in Section 3.10 (Hazards and Hazardous Substances).

MRC operates approximately 90 rock pits and quarries on its forestlands, ranging in size from 0.25 to 2.5 ac (0.1 to 1 ha), for purposes of obtaining road surfacing and erosion control materials. The potential effects of these activities on aquatic and riparian habitats and species of concern are assessed qualitatively by comparing the likely effects of management and conservation measures that would be implemented under the Proposed Action and the other alternatives.

Non-native aquatic invertebrates such as the New Zealand mudsnail can alter aquatic communities by disrupting food web dynamics and altering the prey base for native fishes and other sensitive aquatic species. The New Zealand mudsnail has not been documented in streams or rivers in the primary or secondary assessment area, nor have other invasive non-native aquatic invertebrates (USGS 2010a). Introduced fishes such as predatory centrarchids (e.g., largemouth and smallmouth bass, sunfish) can have detrimental effects on juvenile salmonids and other native fishes through predation or competition for food and freshwater habitat. It is likely that introduced centrarchid fishes are present in some rivers and streams in the primary and secondary assessment areas, but the lack of current and comprehensive information on their distribution and abundance precludes an assessment of the potential for effects.

Recreational fishing is regulated by state law and is allowed on MRC's covered lands in the primary assessment area only by special permit. Illegal fishing could occur throughout the primary and secondary assessment areas. Both types of fishing have the potential to adversely affect salmonids through the direct harvest (i.e., mortality) of reproductive-aged individuals, though the potential for significant effects is difficult to determine due to lack of available harvest or poaching data. Marijuana cultivation has the potential to contribute to cumulative effects on aquatic and other resources and is addressed separately in Section 4 (Cumulative Effects).

MRC's policies and practices for dealing with invasive species and illegal fishing and marijuana cultivation would not differ among alternatives. Under all alternatives, it is expected that MRC's policies and practices would ensure that there is no effect of illegal fishing or introduction of invasive species on aquatic and riparian habitats and species of concern compared with existing conditions.

Aquatic and riparian species of concern

The effects of the alternatives on aquatic and riparian species of concern were analyzed based on predicted changes in the quality of aquatic and riparian habitats in the assessment area. The analysis relies on the habitat-specific effects analyses described above plus those for sediment, hydrology, and water temperature described in Sections 3.2.2 (Geology, Soils, and Geomorphology; Environmental effects and mitigation) and 3.3.2 (Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). For federally listed species with recovery plans, the effects analysis considered recovery objectives. Available data support a detailed analysis only in the primary assessment area, though assessment and comparison among alternatives was made in consideration of the full distribution of each species. For other aquatic and riparian species of concern (Navarro roach, tidewater goby, southern torrent salamander, foothill yellow-legged frog, and Pacific pond turtle), site-specific effects would be assessed and appropriate mitigation measures developed through the completion of individual THPs or PTHPs (depending on alternative), subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with the CFPRs and other applicable mitigation requirements.

3.4.2.2 No Action alternative

Effects on sediment delivery

As described in Section 3.2.2 (Geology, Soils, and Geomorphology; Environmental effects and mitigation), management-related sediment delivery to stream channels under the No Action alternative would be similar to existing conditions for the first 3–4 decades, but then would likely increase in decades 5–8 as the proportion of watershed area harvested increases substantially and concurrent road use increases. In concert with potentially increased peak flows during decades 5–8 (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation), sediment delivery to aquatic habitat in the primary assessment area streams (particularly related to delivery of fine sediments from shallow landslides and road-related erosion) would be expected to increase under the No Action alternative relative to existing conditions. Suspended sediment and turbidity levels would also be similar to existing conditions initially, but the increased sediment loading mentioned above would likely increase sediment and turbidity levels from decades 5–8, which could degrade spawning and rearing habitat quality for salmonids and other aquatic species. Sedimentation effects may be especially pronounced in Class I streams, which contain the largest proportion of low-gradient reaches where sediment routed through higher gradient portions of the channel is deposited. Class I streams are by definition fish-bearing and support spawning and rearing by salmonids and other fish and aquatic species of concern. An increasing trend in riparian tree density over time (Figure 3.4-2) and restrictions on equipment usage and ground disturbance in riparian buffer zones (i.e., Watercourse and Lake Protection Zones) would likely help to moderate sedimentation effects via partial filtration of sediment inputs to aquatic habitats.

Effects on stream flow patterns

As discussed in Section 3.3.2 (Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation), implementation of the No Action alternative is expected to increase the magnitude and frequency of peak stream flows in some planning watersheds in the primary assessment area, particularly in more heavily harvested watersheds in decades 4–8. These changes to stream flow patterns could affect aquatic habitat in both the primary and secondary assessment areas, likely by increasing bed scour and bank erosion during peak flows and reducing habitat complexity. Such peak flow effects are most likely to occur in sand- and gravel-bedded channels with gradients less than about 2%, though effects on transport and deposition of fine sediment may also occur in steeper channels such as those with step-pool morphology (Grant et al. 2008). In the primary and secondary assessment areas, low-gradient channels provide the majority of the spawning, rearing, and foraging habitat for anadromous salmonids and other special-status fish and aquatic species. Some species, such as steelhead, may also use higher-gradient channels. However, peak flow effects may only be discernible in small watersheds when > 29% of the watershed is harvested by clearcut and for flows with a return period of 6 years or less (Grant et al. 2008). Clearcut would not be used in the primary assessment area under the No Action alternative. In contrast, increased magnitude of low flow during the summer in watersheds subject to higher proportion of area harvested (Section 3.3, Hydrology, Beneficial Uses of Water, and Water Quality) could have potentially beneficial effects on aquatic habitat by increasing the length and area of perennial stream habitat and helping to maintain suitable water quality (including cool stream temperatures). Although such effects on low flows may occur in some smaller watersheds, they are not likely to be substantial at the scale of watershed analysis units or river basins (Section 3.3.2, Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation).

The forest management guidelines and conservation measures that would be implemented under the No Action alternative should partially mitigate the potential effects of altered hydrologic conditions on aquatic habitat; however, increased peak flows (especially in later decades in small watersheds with > 29% harvest) could still cause mortality or reduced survival of salmonid eggs and juveniles, and could cause displacement and mortality of other fish and aquatic species—primarily in sand- and gravel-bedded channels with gradients less than about 2%. Enhanced large woody debris loading (see "Large woody debris loading," below) would increase channel roughness and provide low-velocity refugia for aquatic organisms and may help moderate detrimental effects of increased peak flows.

Effects on riparian conditions

Forest management practices and riparian conservation measures under the No Action alternative would provide modestly enhanced protection of riparian functions such as large woody debris recruitment, stream shading, sediment filtration, bank stability, and input of leaf litter and other organic material, and would likely result in a trend towards improved riparian conditions relative to existing conditions. These practices and measures would benefit habitat used by the freshwater life stages of the special-status fish species and contribute to maintenance and development of microclimate conditions suitable for amphibians and other species that use habitats along streams throughout the primary assessment area.

Riparian forest structure

Under the No Action alternative, there would be a general trend towards more advanced-successional forest habitat and less early- and/or mid-successional habitat (Section 3.6.2, Terrestrial Habitat and Wildlife Species of Concern, Environmental effects and mitigation), and a trend toward more redwood-dominated habitat and less hardwood-dominated habitat in riparian buffer zones (Section 3.5.2, Vegetation and Plant Species of Concern, Environmental effects and mitigation). Successional stage composition in riparian buffer zones is predicted to change noticeably over 80 years, with advanced-successional habitat increasing from approximately 7% to 77% over the 80-year analysis period (Section 3.6.2, Terrestrial Habitat and Wildlife Species of Concern, Environmental effects and mitigation). This shift towards more advanced-successional forest structure in riparian stands is also reflected in predicted changes in the density of large riparian trees. In riparian buffer zones, timber modeling results indicate that trees with a diameter at breast height > 32 in (81 cm) are predicted to increase from an estimated 2 trees per acre under existing conditions to approximately 12 trees per acre by year 80; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 8 trees per acre to approximately 23 trees per acre (Figure 3.4-2). See Appendix E for a description of the methods used to model predicted riparian tree density.

Large woody debris loading

Guidelines for riparian buffer widths, silvicultural treatments (e.g., basal area retention and large tree retention), and large woody debris retention under the No Action alternative should all have a positive effect on large woody debris recruitment over time compared with existing conditions. large woody debris may also be added opportunistically as part of stream habitat improvement activities that could occur under some THPs. The amount of high-retention selection harvest in riparian buffers would increase over time (Section 3.3 [Hydrology, Beneficial Uses of Water, and Water Quality], Figure 3.3-16), as would the density of large riparian trees (i.e., trees > 24 in [61 cm] diameter at breast height) (Figure 3.4-2).

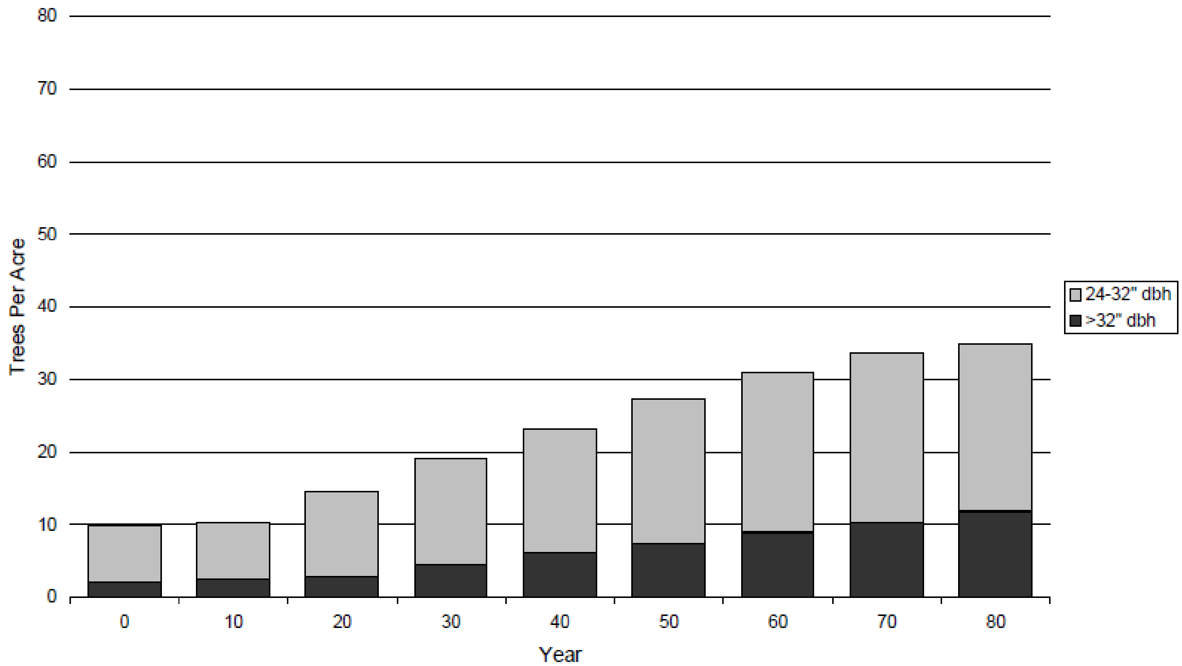


Figure 3.4-2. Large riparian (Aquatic Management Zone) tree density (average trees per acre) predicted under the No Action alternative.

The index of large woody debris loading in Class I and II streams would increase from a range of 0.01–0.02 under existing conditions to 0.16–0.28 by year 80 (Table 3.4-11) (see Appendix K for large woody debris modeling methods). Potential large woody debris loading is expected to increase in proportion to the modeled trend of the number of large trees in the riparian buffer zone over time (Figure 3.4-2).

Table 3.4-11. Large woody debris loading index predicted for Class I and II streams in the primary assessment area under the No Action alternative.

Stream class		Minimum and maximum index of mean large woody debris loading (m^3/ha) by year[a]								
		0	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**
Class I	Minimum	0.02	0.02	0.04	0.07	0.10	0.14	0.18	0.21	0.23
	Maximum	0.02	0.02	0.05	0.09	0.12	0.17	0.22	0.27	0.28
Class II	Minimum	0.01	0.01	0.03	0.05	0.07	0.09	0.13	0.15	0.16
	Maximum	0.02	0.02	0.04	0.07	0.09	0.13	0.17	0.20	0.22

[a] An index value of 1 equals the assumed reference level of large woody debris loading (Appendix K).

Compared with existing conditions, implementation of the No Action alternative would increase aquatic and riparian habitat quality by promoting growth and retention of large trees in the riparian buffer zone, leading to increased levels of in-channel large woody debris loading during the 80-year analysis period. The predicted overall increase in the rate and volume of large woody debris loading compared with existing conditions would increase aquatic habitat heterogeneity and available aquatic habitat for all life stages of salmonid fishes as well as other aquatic organisms including amphibians and aquatic reptiles.

Stream shading

Under the No Action alternative the canopy closure guidelines, basal area retention, and large tree retention standards included in MRC's Management Plan (MRC 2000a) and the 2012 CFPRs would likely help maintain and increase stream shading and maintain or improve suitability of stream water temperatures for salmonids and other sensitive aquatic species. Timber modeling results provided by MRC and used by the lead agencies show that canopy closure would likely increase relative to existing conditions in riparian stands. Riparian canopy closure along Class I and II streams is expected to increase relative to existing conditions, with the fraction of riparian area experiencing the highest cover class (i.e., > 60%) increasing from 70% at existing conditions to greater than or equal to 90% during years 20–80 (Figure 3.4-3). As discussed in Section 3.3 (Hydrology, Beneficial Uses of Water, and Water Quality), increased canopy closure combined with increased average tree heights associated with development of more advanced-successional forest conditions and increased density of larger trees should provide increased steam shading and result in lower water temperatures in primary assessment area streams. Riparian microclimate effects associated with increased riparian forest cover would have the greatest potential to benefit anadromous salmonids and cold water-associated amphibians via reductions in water temperature; moderated air and soil temperature and relative humidity in the riparian buffer zone may also improve microhabitat conditions for many amphibians.

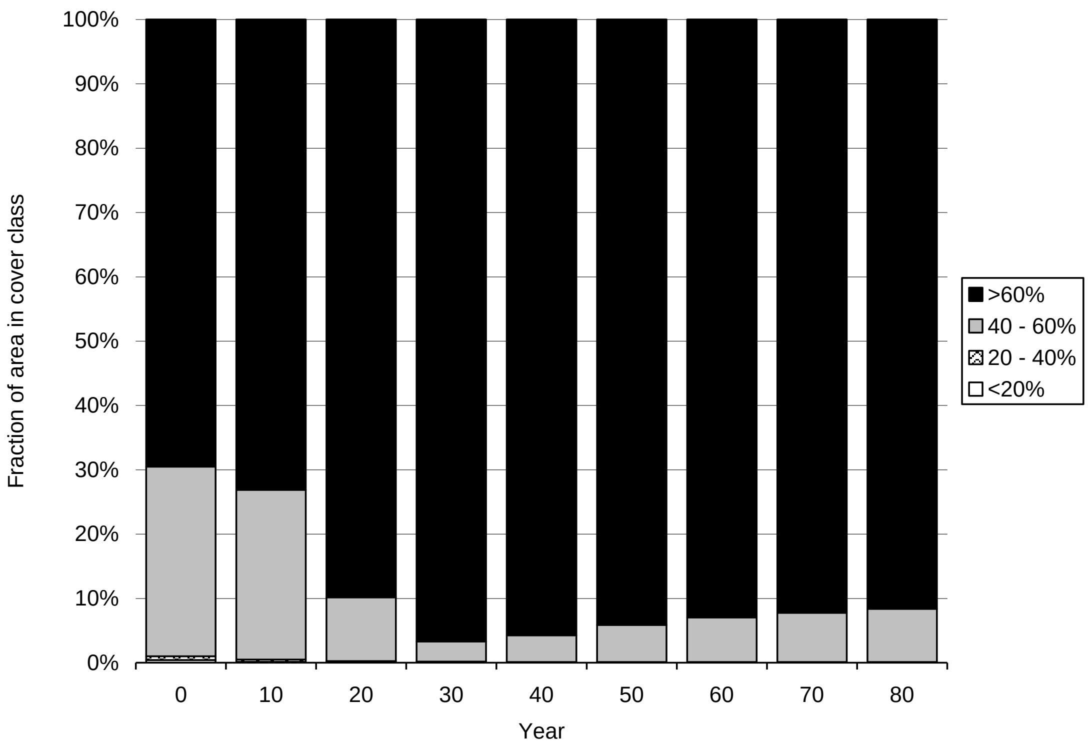


Figure 3.4-3. Canopy closure predicted in Class I and II riparian buffers under the No Action alternative.

Water temperatures are expected to decrease as riparian shade increases. Under the No Action alternative, sediment delivery to streams in later decades (decades 4–8) may cause increased width-to-depth ratios, especially in low-gradient reaches of Class I and Class II streams, and has the potential to contribute to higher water temperatures over time due to increased insolation of shallower water (i.e., when same volume of water is distributed over a wider area because of an increase in width-to-depth ratio, the proportion of stream surface shaded by riparian vegetation decreases and heat loading from insolation increases). This effect might be countered by a potential increase in summer low flow discharge in some smaller streams in heavily-harvested smaller watersheds under the No Action alternative, but any low flow increases are not likely to be substantial in larger streams at the larger watershed or watershed analysis unit scale (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). Increased riparian canopy cover and the overall basal area of riparian vegetation is expected to lead to improved riparian microhabitat conditions (more moderated relative humidity and air and soil temperatures), increased stream shading, and moderation of stream temperatures under the No Action alternative compared with existing conditions.

Bank stability

With implementation of riparian vegetation and management activities under the No Action alternative, bank stability would remain the same or potentially increase relative to existing conditions. The riparian conservation measures under this alternative include large tree and basal area retention standards, and limits on site disturbance within in riparian buffer zones along Class I and II streams in the primary assessment area. Specific bank protection measures at water drafting sites should also limit point-source erosion. In addition, the predicted long-term trend of increasing recruitment of large woody debris should provide a net benefit of increasing bank stability. In contrast, the trend towards increased peak flows under this alternative, especially in later decades, could potentially increase bank erosion. However, the various riparian conservation measures and road and harvest unit management measures, coupled with the overall trend towards improved riparian forest condition, should ensure that any effects on bank stability under the No Action alternative would be minor.

Nutrient input

Under the No Action alternative, conifers would supplant hardwoods over time. Forest management in riparian buffer zones under MRC's Management Plan (2000c) and the 2012 CFPRs would maintain the overstory canopy and allow longer-lived conifers to eventually replace the short-lived hardwoods. Over the long term, this pattern of succession is likely to reduce the level of allochthonous (i.e., external) nutrient inputs (primarily leaf litter) relative to current levels, though this process would be incremental and would not result in complete elimination of hardwoods or nutrient input from riparian buffer zones. Effects from this successional pattern on aquatic species and their habitats would likely be minimal and mitigated by the benefit of increased large woody debris recruitment, which would increase habitat complexity and promote greater retention of leaf litter and increase effectiveness of instream nutrient cycling. Overall, effects on nutrient inputs and cycling are likely to be minor under the No Action alternative compared with existing conditions.

Summary of effects on aquatic habitat

The combined effects of increases in sediment delivery, peak flows, suspended sediment, and turbidity would have the potential to cause a loss in quality and quantity of aquatic habitat after decade 4 under the No Action alternative compared with existing conditions. In particular, increased sediment delivery would likely decrease overall stream habitat heterogeneity by reducing pool depth and frequency, thereby reducing the quantity and quality of habitat for many aquatic species. The potential increases in sediment delivery after decade 4 are also likely to degrade aquatic habitat in springs, seeps, and wetlands. In addition, fine sediment infiltration in spawning gravels plus episodes of elevated turbidity and suspended sediment associated with high flow events would reduce habitat quality for spawning salmonids and for benthic macroinvertebrate communities. Despite increases in large woody debris recruitment and the volume of in-channel large woody debris, an overall loss of usable aquatic habitat and reduction in habitat quality would likely occur under the No Action alternative.

Other factors

Under the No Action alternative, post-fire timber salvage would be conducted in accordance with the CFPRs and the measures included in MRC's 2000 Management Plan (MRC 2000a). Per the CFPRs, timber salvage would continue to be restricted in Watercourse and Lake Protection Zones in order to minimize sediment delivery to streams. Because management measures for post-fire timber salvage would not differ substantially from current practices, there would be no effect on aquatic and riparian habitats compared with existing conditions.

Under the No Action alternative, herbicides and adjuvants would continue to be used by MRC, under regulation by the California Department of Agriculture and the Environmental Protection Agency. As described in Section 3.10.2 (Hazards and Hazardous Substances, Environmental effects and mitigation), there would be little to no change in the application method and type of herbicide and adjuvant for control of vegetation compared with existing conditions. Total herbicide use under the No Action alternative would decrease compared with existing conditions. Due to the overall decreasing use of herbicides, the low relative rate of application in riparian buffer zones (< 1% of total acreage of land treated; Section 3.10 [Hazards and Hazardous Substances], Table 3.10-3), and the use of solely ground-based application methods (i.e., no aerial spraying), the use of herbicides under the No Action alternative is not expected to result in mortality (acute effects) or changes in reproductive success (chronic effects) on fish, aquatic invertebrates, or amphibian species of concern. There is insufficient information to determine potential effects on reptile species of concern (i.e., Pacific pond turtle) (Section 3.10.2, Hazards and Hazardous Substances, Environmental effects and mitigation).

Rock pit operations under the No Action alternative would continue under the same management prescriptions currently in place and would, therefore, have no effect compared with existing conditions. Likewise, it is expected that MRC's policies and practices under the No Action alternative would ensure that there is no effect of illegal fishing or introduction of invasive species on aquatic and riparian habitats and species of concern compared with existing conditions.

Effects on aquatic and riparian species of concern

In addition to the analysis presented here, site-specific effects on aquatic and riparian species of concern under the No Action alternative would be assessed through the completion of individual THPs, subject to input and review by CAL FIRE, CDFG, and review team agencies to ensure compliance with the CFPRs and other applicable species protection and mitigation requirements.

MRC would continue to conduct certain research and monitoring activities on its forestlands under the No Action alternative, which may include surveys for salmonids and California red-legged frog. Surveys may include the capture and handling of salmonids and California red-legged frogs. The No Action alternative does not include any authorization for this type of take of any listed species; a separate research or recovery permit issued under Section 10(a)(1)(A) of the federal ESA would be issued to MRC to authorize any take associated with such surveys.

Salmonids (coho salmon, Chinook salmon, steelhead)

Effects on salmonids are expected under the No Action alternative due to overall reductions in aquatic habitat quantity and quality compared with existing conditions. Despite increases in large woody debris recruitment and the volume of in-channel large woody debris, an overall loss of usable aquatic habitat and reduction in habitat quality would likely occur under the No Action alternative due to long-term increases in fine sediment delivery to aquatic habitats relative to existing conditions. Increased peak flows in some watersheds could increase the frequency of redd scour and cause displacement of fish during these high flow events. Peak flow increases could also lead to formation of a shallower and more fine-grained channel bed compared with existing conditions, potentially degrading spawning gravel quality and reducing egg survival. The 2012 CFPRs include measures designed to protect listed anadromous salmonids and their habitat, and MRC would consult with NMFS and CDFG on a THP-by-THP basis to ensure take avoidance for these species. These measures would likely avoid or minimize detrimental effects on these species in primary assessment area streams.

Under the No Action alternative, management measures for post-fire timber salvage would not differ substantially from current practices, and there would be no effect on salmonids or other aquatic and riparian species of concern compared with existing conditions. As discussed in Section 3.10.2 (Hazards and Hazardous Substances, Environmental effects and mitigation), total herbicide use under the No Action alternative would likely decrease compared with existing conditions and no acute or chronic effects on salmonids are expected due to the use of forest chemicals. The effects of illegal fishing and invasive species on anadromous salmonids are expected to be the same as existing conditions.

It is possible that the trend toward reduced habitat quality and quantity could be countered to some degree by several mitigating beneficial changes, including increased summer low flows in some watersheds and increased retention of large riparian trees, with a commensurate increase in large woody debris recruitment and riparian tree canopy cover. Increased summer low flows could help maintain cool water temperatures needed by rearing salmonids and increase the amount of available rearing habitat. Improved riparian forest conditions would likely increase stream shading and also help maintain cool water temperatures, particularly in the summer. Increased large woody debris loading would provide increased levels of aquatic cover from predators and velocity refuge during high flows and would increase channel complexity as in-channel large woody debris levels increase over time. Large woody debris-driven increases in channel complexity would also help retain spawning gravel and increase the amount of spawning and rearing habitat for salmonids.

Impact 3.4-1: Effects on anadromous salmonids from reduced aquatic habitat quality and quantity. Implementation of the No Action alternative would likely result in long-term reductions in the quality and quantity of anadromous salmonid habitat compared with existing conditions. Although THP-specific measures to protect anadromous salmonids would minimize project-specific effects, the overall effects on coho salmon (in both the Central California Coast and Southern Oregon/Northern California Coast Evolutionarily Significant Unit), Chinook salmon (California Coastal Evolutionarily Significant Unit), and steelhead (both Northern California and Central California Coast Distinct Population Segments) would be **potentially significant**.

Coastal tailed frog

Impact 3.4-2: Effects on coastal-tailed frog from reduced aquatic habitat quality and quantity. Under the No Action alternative, sediment delivery to stream channels would tend to reduce habitat quality and quantity for coastal tailed frogs compared with existing conditions, since tadpoles attach to and feed on rock substrates. These effects include road-related production and deposition of fine sediment and increasing and possibly sustained turbidity in streams. Increased sediment loads in streams used for breeding may fill interstitial spaces available to tadpoles, and may reduce potential food sources for both tadpoles and adults by reducing algal and macroinvertebrate production. The analysis presented in Section 3.10.2 (Hazards and Hazardous Substances, Environmental effects and mitigation) indicates that total herbicide use under the No Action alternative would likely decrease compared with existing conditions. Longer-term increases in large riparian tree density and stream large woody debris loading should lead to increased habitat complexity as well as increased stream shading, an increase in riparian foraging areas, and a decrease in water temperatures. This predicted decrease in water temperatures may benefit the coastal tailed frog since the species inhabits cold (41–65°F [5–18.5°C]) (Brown 1975) streams. There are no species-specific protection measures for coastal tailed frog under the CFPRs or MRC's 2000 Management Plan. While an improvement in riparian habitat conditions would have some beneficial effects, it is unknown if they would be sufficient to offset the effects of road-related fine sediment delivery to stream channels throughout the primary assessment area. These effects on coastal tailed frog would be **potentially significant**.

California red-legged frog and northern red-legged frog

Impact 3.4-3: Effects on California red-legged frog and northern red-legged frog from reduced aquatic habitat quality and quantity. Under the No Action alternative, sediment delivery to stream channels may reduce habitat quality and quantity for California red-legged frogs and northern red-legged frogs compared with existing conditions. These effects include deposition of fine-grained sediment and increasing and possibly sustained turbidity in watercourses of the primary and secondary assessment areas. Increased sediment loads in streams used for breeding may fill interstitial spaces that tadpoles use as cover, and may reduce potential food sources for both tadpoles and adults by reducing algal and macroinvertebrate production. Increased turbidity may affect egg survival to hatching and attachment of egg masses may be weak where substrates are covered with sediment. In addition, changes to the hydrology and runoff patterns may affect red-legged frog habitat, particularly during winter runoff when California red-legged and northern red-legged frogs breed and adults, larvae, or eggs may be susceptible to dislocation. Infilling of pools may reduce available habitat quality and quantity important for all life-stages of red-legged frogs, though the longer-term trends in in-channel large woody debris loading may counteract these changes by leading to increased habitat complexity including deeper pools. Under the No Action alternative, water temperatures are predicted to decrease slightly due to increased stream shading, large tree retention standards, and Watercourse and Lake Protection Zone widths; however, temperature reductions would not likely be great enough to preclude successful breeding and tadpole development. There are no species-specific protection measures for red-legged frogs under the CFPRs or MRC's 2000 Management Plan. While MRC would consult with USFWS and CDFG on a THP-by-THP basis to ensure take avoidance for California red-legged frogs, take avoidance standards may not address the overall effects of road-related fine sediment delivery to stream channels and changes in peak flows and runoff patterns. The analysis presented in Section 3.10.2 (Hazards and Hazardous Substances, Environmental effects and mitigation) indicates that total herbicide use under the No Action alternative would likely decrease compared with existing conditions. While take avoidance measures and modest improvements in riparian habitat conditions described above would have some beneficial effects, it is unknown if these beneficial effects would be sufficient to offset the effects of road-related fine sediment delivery to stream channels and changes in peak flows and runoff patterns. The No Action alternative would therefore have **potentially significant effects** on California red-legged frogs and northern red-legged frogs.

Navarro roach

The general decrease in water temperatures expected under the No Action alternative might alter the amount or location of rearing and foraging habitat for Navarro roach, since this species generally requires warm water temperatures. This would be a concern in the Navarro River basin, which is where Navarro Roach is found in the primary assessment area. However, stream networks naturally provide a range of water temperatures and it is likely that suitable thermal habitat would still exist for this species in the Navarro River basin, although the location of preferred habitat might change over time. Furthermore, it is likely that the increased stream shading and reduced water temperatures would more closely resemble the pre-European conditions under which this species evolved. Although the amount and/or location of habitat in the preferred thermal range could change relative to existing conditions, such change would not likely reduce the potential for successful rearing and foraging by this species throughout its range. In the secondary assessment area, the Navarro Roach is also found in the Russian River. Therefore, the effects of the No Action alternative on Navarro roach would be **less than significant**.

Tidewater goby

Increases in peak flows, suspended sediment, and turbidity after decade 4 under the No Action alternative have the potential to increase sedimentation of estuarine habitat used by tidewater gobies compared with existing conditions. Although this species requires sandy substrate to construct breeding burrows (and sand input from streams is required for formation and maintenance of coastal barrier sandbars and lagoons that form tidewater goby habitat), excessive sedimentation may degrade conditions needed for breeding burrows, thereby reducing reproductive success. The effects of sediment on estuarine habitat depend on the rate of input relative to the rate of output; inputs from managed watersheds may be greater than, less than, or equivalent to output. However, estuarine sediment input and output cannot be adequately quantified for purposes of this analysis. Increased sedimentation of tidewater goby habitat in currently known occupied tidewater goby localities due to forest management activities under the No Action alternative is extremely unlikely because none of these localities is fed by streams draining the primary assessment area (USFWS 2005). However, sedimentation of potential (but currently unoccupied) tidewater goby habitat in the primary and secondary assessment areas is possible. Because effects on known populations of tidewater gobies are unlikely, the effects of the No Action alternative on tidewater gobies would be **less than significant**.

Southern torrent salamander

Impact 3.4-4: Effects on southern torrent salamander from reduced aquatic habitat quality and quantity. Under the No Action alternative, sediment delivery to seeps and springs would tend to reduce habitat quality and quantity for southern torrent salamander compared with existing conditions. These effects include road-related production and deposition of fine sediment and increasing and possibly sustained turbidity in watercourses of the primary and secondary assessment areas that would reduce aquatic habitat quality for this species. Increased canopy closure along with development of more advanced-successional forest, especially in headwater streams and around seeps and springs, would improve habitat conditions for southern torrent salamanders under the No Action alternative through increases in stream shading, which would subsequently help to maintain lower stream temperatures, and regulate relative humidity, air, and soil temperatures. Longer-term trends in stream large woody debris loading would also lead to beneficial increases in habitat complexity. However, since it is unknown if these beneficial effects would be sufficient to offset the effects of road-related fine sediment delivery to seeps and springs, the effects of the No Action alternative on southern torrent salamander would be **potentially significant**.

Foothill yellow-legged frog

Impact 3.4-5. Effects on foothill yellow-legged frog from reduced aquatic habitat quality and quantity. While changes to hydrology and runoff patterns may affect foothill yellow-legged frogs due to scour associated with higher peak flows, such changes in the watercourses of the primary and secondary assessment area are unlikely since the change in hydrology would not occur between April and August when egg masses or larvae may be present and susceptible to dislocation. Based on precipitation and runoff records for the assessment area, the highest flows occur between December and February (see Section 3.3.1, Hydrology, Beneficial Uses of Water, and Water Quality, Affected environment/Environmental setting). Predicted slight decreases in stream water temperatures under the No Action alternative could adversely affect foothill yellow-legged frogs by delaying oviposition or slowing the development of eggs and/or tadpoles. However, temperatures are not expected to be low enough to preclude successful breeding and tadpole development. Increases in riparian canopy may reduce habitat suitability by reducing opportunities for thermoregulation (i.e., basking). Sediment delivery to stream channels under the No Action alternative would tend to reduce habitat quality and quantity for foothill yellow-legged frog compared with existing conditions. These effects include road-related production and deposition of fine sediment and increasing and possibly sustained turbidity in watercourses of the primary and secondary assessment areas that would reduce aquatic habitat quality and quantity for this species. Increased sediment loads in streams used for breeding may fill interstitial spaces available to tadpoles as cover, and may reduce potential food sources for both tadpoles and adults by reducing algal and macroinvertebrate production. In addition, turbidity may affect egg survival to hatching and attachment of egg masses may be weak where substrates are embedded with sediment. The effects of road-related fine sediment delivery to stream channels coupled with generally lower water temperatures under the No Action alternative on foothill yellow-legged frog would be **potentially significant** due to substantial reduction in the quality of habitat for the species.

Pacific pond turtle

Infilling of pools may reduce the quantity of available habitat for adult and juvenile Pacific pond turtles, though longer-term trends in in-channel large woody debris loading may counteract such changes by leading to increased habitat complexity, deeper pools, and additional basking opportunities. There is no documented evidence that Pacific pond turtles are particularly sensitive to the increases in turbidity that are expected under the No Action alternative. An increase in the amount of riparian canopy cover and the overall basal area of riparian trees may reduce the amount of suitable terrestrial nesting habitat, and subsequent increases in stream shading may reduce solar insolation and thus the effectiveness of terrestrial basking sites. Therefore, the changes predicted under the No Action alternative would likely result in **less than significant effects** on Pacific pond turtle.

3.4.2.3 Proposed Action

Effects on sediment delivery

As described in Section 3.2.2 (Geology, Soils, and Geomorphology; Environmental effects and mitigation), sediment delivery to streams and other aquatic habitats would be reduced over time under the Proposed Action and would be less than under existing conditions. Implementation of the forest management practices and road management measures proposed in MRC's HCP/NCCP and TMP (Appendix A) are expected to reduce road-related mass wasting, surface erosion, and delivery of coarse and fine sediment to streams in the primary assessment area relative to existing conditions. Reductions in sediment delivery would be achieved by implementing a comprehensive road management approach, a program for treating current and future controllable point-sources of erosion, and standards for canopy retention and measures to avoid unstable slopes, minimize ground disturbance related to harvest activities, and avoid or minimize effects of management activities on erosion in aquatic and riparian buffer strips. Also, wider riparian buffers under the Proposed Action compared with current standards may reduce hydrologic connectivity between upland areas and streams in the primary assessment area, thus reducing delivery of fine sediment to streams.

Reduced road-related fine sediment delivery would reduce chronic turbidity and suspended sediment concentrations and the amount of fine sediment deposited on the channel bed surface and within spawning gravel substrates. Reduced coarse sediment delivery (mainly via reduced mass wasting) would reduce pool filling and channel simplification. Accordingly, habitat conditions for aquatic and riparian species of concern are expected to improve over time as sediment-related effects are reduced. Potential benefits to salmonids and other aquatic species could include increased spawning gravel quality and incubation success, deeper pools, increased rearing habitat area, and increased production of benthic macroinvertebrate food organisms.

Effects on stream flow patterns

Under the Proposed Action the amount of land harvested per decade would be less than existing conditions and the proportion of selection harvest would be greater, likely resulting in slightly reduced peak flows and no appreciable change in summer low flows relative to existing conditions (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). Wider riparian buffers under the Proposed Action compared with current standards may reduce hydrologic connectivity between upland areas and streams in the primary assessment area, further contributing to peak flow decreases. Implementation of a comprehensive road management program under the Proposed Action, including crossing upgrades and decommissioning of unused roads in the primary assessment area, would reduce the hydrologic connectivity between roads and streams, also contributing to peak flow decreases. Compared with existing conditions, reduced peak flows may help reduce detrimental scour of salmonid eggs and displacement and mortality of rearing juvenile salmonids, and could also reduce the potential for displacement and mortality of other fish and aquatic species during these high flow events. Reduced peak flow effects would be most likely in sand- and gravel-bedded channels with gradients less than about 2% (Grant et al. 2008), which provide important spawning, rearing, and foraging habitat for anadromous salmonids and other special-status fish and aquatic species in the primary and secondary assessment areas. Effects of reduced peak flows may also include reduced transport and deposition of fine sediment in sand- and gravel-bedded channels and possibly in steeper step-pool channels (Grant et al. 2008), potentially improving spawning, rearing, and foraging conditions for salmonids and other aquatic species compared with existing conditions.

Effects on riparian conditions

Forest management practices and riparian conservation measures under the Proposed Action would provide enhanced protection of riparian functions such as large woody debris recruitment, stream shading, sediment filtration, and bank stability compared with existing conditions. These practices and measures would contribute to maintenance and development of more advanced-successional forest habitat which would provide a more suitable microclimate (e.g., increased relative humidity, and lower air and soil temperatures) for many amphibians and other native species that use habitats along streams, and would improve habitat used by the various life stages of the fish species of concern in primary assessment area drainage basins.

Riparian forest structure

Under the Proposed Action (as under the No Action and all other alternatives) there would be a trend towards more advanced-successional forest habitat and less early- and/or mid-successional habitat; and a trend toward more redwood-dominated habitat and less hardwood-dominated habitat in riparian zones. Similar to the No Action alternative, successional stage composition in riparian zones is predicted to change noticeably over 80 years, with advanced-successional habitat increasing from approximately 7% to 80% over the 80-year analysis period (Section 3.6.2, Terrestrial Habitat and Wildlife Species of Concern, Environmental effects and mitigation). This shift towards more advanced-successional forest structure in riparian buffer zones is also reflected in predicted changes in the density of large riparian trees. In riparian buffer zones, timber modeling results indicate that trees with a diameter at breast height > 32 in (81 cm) are predicted to increase from an estimated 2 trees per acre under existing conditions to approximately 20 trees per acre by year 80; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 8 trees per acre to approximately 30 trees per acre (Figure 3.4-4). See Appendix E for a description of the methods used to model predicted riparian tree density.

Large woody debris loading

Guidelines for riparian buffer widths, silvicultural treatments (e.g., basal area retention and large tree retention), and large woody debris retention under the Proposed Action alternative would all have a positive effect on large woody debris recruitment and in-channel large woody debris loading over time compared with existing conditions. MRC's stream habitat improvement program would add large woody debris in priority coho salmon watersheds and other streams in the primary assessment area and would more rapidly increase the benefits of large woody debris recruitment under the Proposed Action compared with existing conditions and the No Action alternative. The amount of high-retention selection harvest in riparian buffers would increase over time (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation), as would the density of large riparian trees (i.e., trees > 24 in [10 cm] diameter at breast height) (Figure 3.4-4).

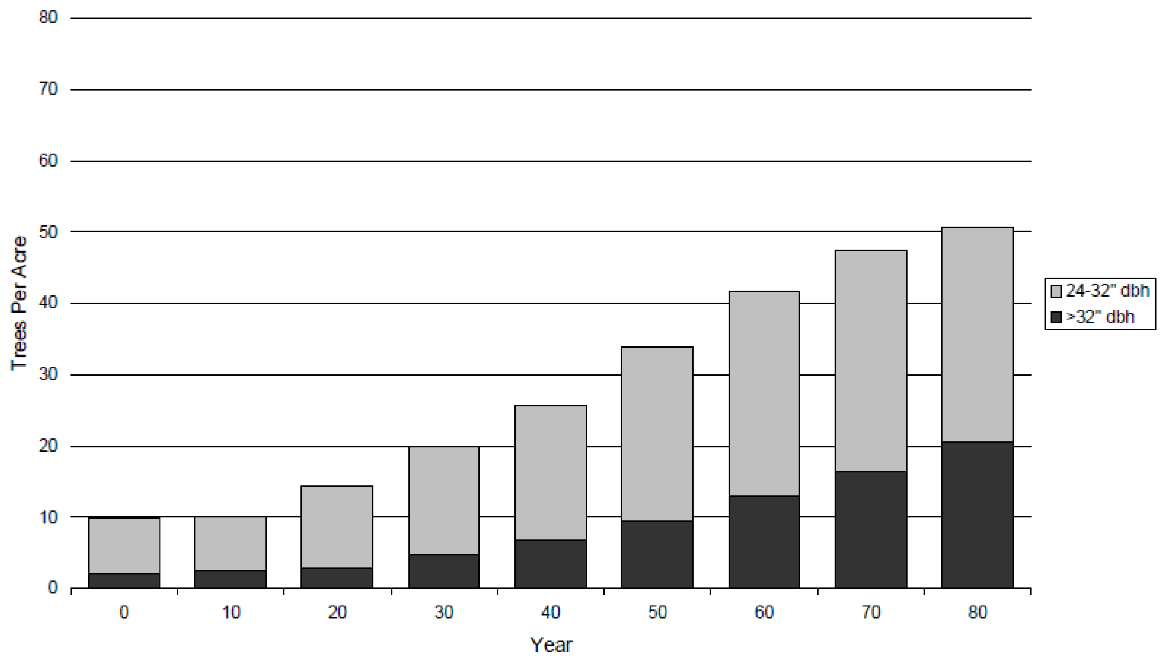


Figure 3.4-4. Large riparian (Aquatic Management Zone) tree density (average trees per acre) predicted under the Proposed Action.

The index of large woody debris loading in Class I and II streams would increase from a range of 0.01–0.02 under existing conditions to 0.73–1.00 or greater by year 80 (Table 3.4-12) (see Appendix K for description of methods). Potential large woody debris loading is generally expected to correspond to the modeled trend of the number large trees in the riparian buffer zone over time.

Table 3.4-12. Large woody debris loading index predicted for Class I and II streams in the primary assessment area under the Proposed Action.

Stream class		Minimum and maximum index of mean large woody debris loading (m^3/ha) by year[a]								
		0	10	20	30	40	50	60	70	80
Class I	Minimum	0.02	0.02	0.05	0.10	0.17	0.32	0.49	0.69	0.87
	Maximum	0.02	0.03	0.07	0.14	0.24	0.43	0.67	0.94	> 1
Class II	Minimum	0.01	0.02	0.04	0.09	0.15	0.27	0.41	0.58	0.73
	Maximum	0.02	0.03	0.07	0.14	0.24	0.43	0.67	0.93	> 1

[a] An index value of 1 equals the assumed reference level of large woody debris loading (Appendix K).

The predicted overall increase in the rate and volume of large woody debris loading would increase aquatic habitat heterogeneity and available aquatic habitat for all life stages of salmonid fishes as well as other aquatic organisms including amphibians and aquatic reptiles. Increases in large woody debris loading would add roughness to the channel network, providing cover and velocity refuge for fish and other aquatic species and promoting retention of spawning gravel used by salmonids.

Stream shading

The canopy closure guidelines and standards for basal area retention and large tree retention that would be implemented under the Proposed Action are expected to help maintain or increase stream shading and maintain or improve suitability of stream water temperatures for salmonids and other sensitive aquatic species. Increased riparian shade would also help maintain or enhance riparian microclimate conditions favorable to amphibians and aquatic reptiles. Timber modeling shows that riparian canopy closure along Class I and II streams is predicted to increase slightly relative to existing conditions, with the fraction of riparian area in the densest cover class (i.e., > 60%) increasing from 70% at existing conditions to 80–85% starting in year 20 (Figure 3.4-5). Although the predicted increase in canopy closure is not as large as the increase predicted under the No Action alternative, aspects of MRC's proposed riparian conservation and management measures under the Proposed Action which cannot accurately be modeled are expected to result in improved stream shading relative to the No Action alternative. Additional standards for basal area and canopy retention within the inner and middle bands of the Aquatic Management Zone are not reflected in the model results due to limitations on the spatial resolution of the riparian stands in the timber model (see Section 2.1.2, Alternatives, Modeling forest conditions under each alternative). Also, the wider riparian buffers and greater long-term increases in large tree retention under the Proposed Action would result in greater benefits to other riparian functions (e.g., microclimate, large woody debris recruitment) compared with existing conditions and the No Action alternative. A denser riparian canopy combined with increased average tree heights associated with development of more advanced-successional forest conditions and increased density of larger trees should increase stream shading and result in decreased water temperatures in primary assessment area streams. Although these changes would have the greatest potential to benefit salmonids and cold water-associated amphibian species via maintenance or reduction of stream water temperature, enhanced riparian forest structure would also help moderate air and soil temperature and relative humidity in the riparian buffer zone, providing improved microhabitat conditions for amphibians relative to existing conditions.

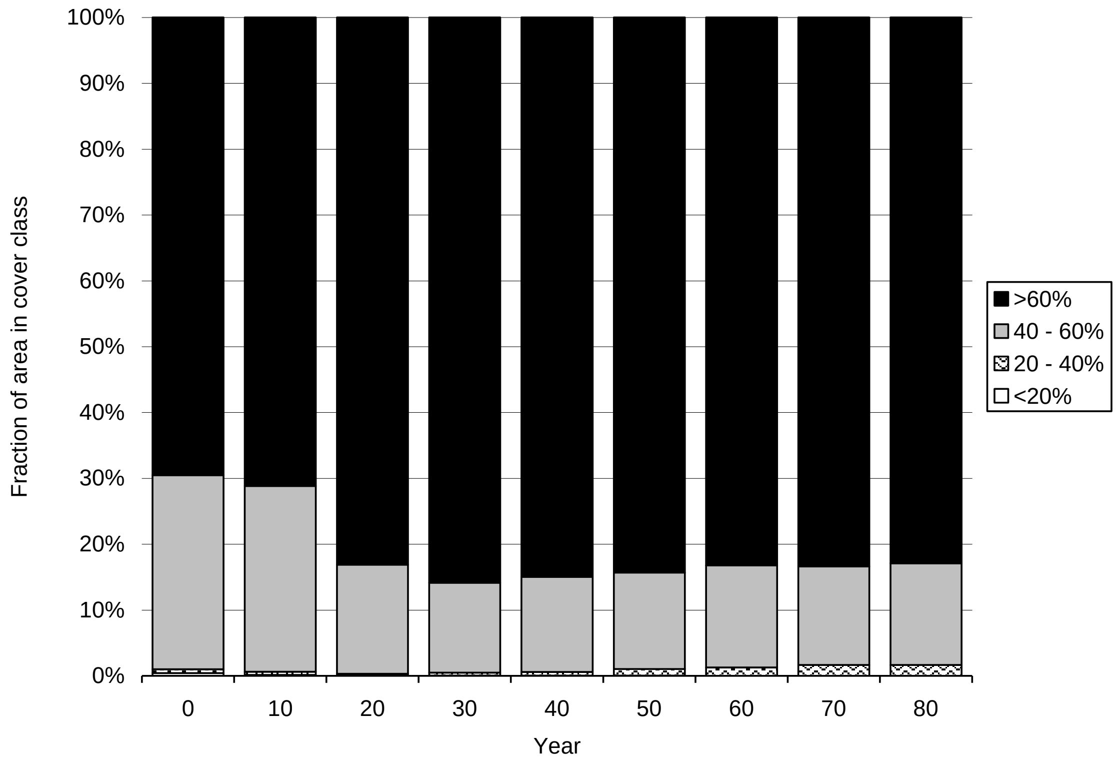


Figure 3.4-5. Canopy closure predicted in Class I and II riparian buffers under the Proposed Action.

Improved riparian microhabitat conditions (more moderated relative humidity, air and soil temperatures), increased stream shading, and cooling and moderation of stream temperatures would contribute to a strong positive improving trend in aquatic and riparian habitat conditions over time in the Proposed Action relative to existing conditions.

Bank stability

Bank stability is expected to increase under the Proposed Action relative to existing conditions. Bank stability measures and guidelines under the Proposed Action would be similar to the No Action alternative. However, compared with the No Action alternative the Proposed Action includes enhanced measures for increased large tree and basal area retention, and limits on ground disturbance within riparian buffer zones in the primary assessment area. Specific bank protection measures should also limit point-source erosion. Combined with a long-term trend of reduced sediment delivery to stream channels, a comprehensive road and crossing management plan, reduced peak flows, and increasing recruitment of large woody debris, bank instability and erosion rates should be reduced over time compared with existing conditions.

The effects of the Proposed Action on inputs of leaf litter and other organic material, and the cycling of such material, would be the same as under the No Action alternative. These forms of nutrient input and cycling under the Proposed Action would not differ appreciably from existing conditions.

Summary of effects on aquatic habitat

Aquatic habitat conditions in the primary assessment area are expected to improve under the Proposed Action compared with existing conditions. Reductions in sediment delivery to stream channels and peak flows relative to existing conditions, combined with riparian forest recovery under the Proposed Action, would contribute to improvements in habitat used by aquatic and riparian species of concern. Stream substrate conditions and fine sediment effects should improve due to improved road management and forest management in riparian buffer zones, leading to reduced sediment loading. Stream water temperature should decrease slightly because of increased canopy cover as a consequence of increased riparian protection measures. Measures for large tree retention, basal area retention, and large woody debris retention would maintain or enhance in-channel large woody debris and provide increased large woody debris recruitment potential compared with existing conditions, aiding pool formation, improving spawning gravel quality and quantity, providing refugia from peak flows, and providing overwintering habitat for anadromous and resident salmonids and other fishes. Aquatic habitat enhancement projects, including additions of large woody debris in salmonid streams, would contribute to additional, more rapid improvement to aquatic habitat compared with existing conditions and the No Action alternative. Stream-crossing improvements should increase aquatic habitat connectivity and in turn potentially increase overall available habitat, particularly for migratory fish.

Other factors

Under the Proposed Action, post-fire timber salvage would follow the prescriptions in MRC's proposed HCP/NCCP, which include site-specific measures to reduce erosion and sediment delivery to streams from roads, stream crossings, and general forested areas. Timber salvage would be prohibited in Aquatic Management Zones unless approved by the wildlife agencies. With concurrence of the wildlife agencies, MRC would restore damaged red-legged frog breeding sites or create new sites in adjacent, unaffected areas. The HCP/NCCP measures would provide additional erosion control in burned areas and would reduce the potential for sediment delivery to streams and other aquatic habitats compared with existing conditions and the No Action alternative.

Under the Proposed Action, herbicides and adjuvants would continue to be used by MRC, under regulation by the California Department of Agriculture and the Environmental Protection Agency. As described in Section 3.10.2 (Hazards and Hazardous Substances, Environmental effects and mitigation), there would be little to no change in the application method, frequency, and type of herbicide and adjuvant for control of vegetation compared with existing conditions. As described for the No Action alternative, total herbicide use under the Proposed Action would decrease compared with existing conditions. Due to the overall decreasing use of herbicides, the low relative rate of application in riparian buffer zones (< 1% of total acreage of land treated; Section 3.10 [Hazards and Hazardous Substances], Table 3.10-3), and the use of solely ground-based application methods (i.e., no aerial spraying), the use of herbicides under the Proposed Action is not expected to result in mortality (acute effects) or changes in reproductive success (chronic effects) on fish, aquatic invertebrates, or amphibian species of concern. There is insufficient information to determine potential effects on reptile species of concern (i.e., Pacific pond turtle) (Section 3.10.2, Hazards and Hazardous Substances, Environmental effects and mitigation).

Under the Proposed Action, MRC's proposed HCP/NCCP includes management practices to avoid creating rock pits within the Aquatic Management Zone (riparian zone) of Class I and II streams, and sediment routing measures to minimize delivery of sediment from rock pits to streams. These measures should somewhat reduce the risk of sediment delivery from rock pit activities compared with existing conditions.

It is expected that MRC's policies and practices under the Proposed Action would ensure that there is no effect of illegal fishing or introduction of invasive species on aquatic and riparian habitats and species of concern compared with existing conditions.

Effects on aquatic and riparian species of concern

In addition to the analysis presented here, site-specific effects on aquatic and riparian species of concern under the Proposed Action would be assessed and appropriate mitigation measures developed through completion of individual PTHPs, subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with applicable species protection and mitigation requirements. Site-specific effects analysis and mitigation measures developed through the PTHP process would not change or supersede measures contained in the HCP/NCCP unless specifically allowed in the HCP/NCCP.

Salmonids (coho salmon, Chinook salmon, steelhead)

MRC's monitoring and adaptive management under the Proposed Action includes surveys for anadromous salmonid presence, distribution, and smolt abundance. Monitoring would include out-migrant trapping, single-pass electrofishing, and snorkeling surveys. Surveys and monitoring would have effects on listed salmonids that would likely include harassment, harm, and occasional mortality during the capture, anesthetization, handling, fin clipping, and release of fish. The capture and/or handling of fish through electrofishing, trapping, and netting may also affect the growth or survival of juvenile salmonids. Stream surveys could interfere with migration and spawning of salmonids, and could also result in physical disturbance or crushing of fry beneath surface particles or eggs in redds. Beyond physical disturbance of habitat during ingress and egress, snorkeling can alter fish behavior (Brignon et al. 2011), although such disturbance is expected to be much less consequential to salmonids than methods requiring capture.

Estimates of the maximum number of anadromous salmonids that would be captured per decade, shown in Table 3.4-13, are derived from recent efforts and adjusted for possible population increases. These estimates reflect the maximum numbers of fish that would be captured and handled, based on MRC's current federal and state permit allowances prior to implementation of the HCP/NCCP. Protocols would ensure that mortality and sublethal effects would be minimized; MRC's current permits include a provision that incidental mortality of salmonids cannot exceed 2% of the total captured, based on the estimates in Table 3.4-13 (MRC 2012). These estimates do not include effects on species that may occur through modification of habitat during forest management activities, which are described elsewhere in this section.

Table 3.4-13. Estimated maximum number of salmonids captured and handled per decade during monitoring activities over the 80-year proposed HCP/NCCP permit term. Mortality would not exceed 2% of these totals.

Species and ESU or DPS[a]	Life stage	Activity	Estimated number captured/handled per decade
Coho salmon (CCC)	juveniles	Out-migrant trapping[b]	45,000–60,000
Coho salmon (CCC)	juveniles	Electrofishing surveys[c]	10,000
Coho salmon (CCC)	juveniles	Fish relocation operations	7,250
Coho salmon (CCC)	adults	Out-migrant trapping (incidental)[b,d]	20–30
Coho salmon (SONCC)[e]	juveniles	Out-migrant trapping[e]	22,500–30,000
Coho salmon (SONCC)	juveniles	Electrofishing surveys[c]	10,000
Coho salmon (SONCC)	juveniles	Fish relocation operations	625
Chinook salmon (CC)	juveniles	Out-migrant trapping[b]	500–2,000
Chinook salmon (CC)	juveniles	Electrofishing surveys[c]	2,000–5,000

Species and ESU or DPS[a]	Life stage	Activity	Estimated number captured/handled per decade
Chinook salmon (CC)	juveniles	Fish relocation operations[f]	0
Steelhead (NC)	juveniles	Out-migrant trapping[b]	50,000–65,000
Steelhead (NC)	juveniles	Electrofishing surveys[c]	30,000
Steelhead (NC)	adult	Out-migrant trapping (incidental)[b,d]	50–120
Steelhead (NC)	juveniles	Fish relocation operations	7,500
Steelhead (CCC)	juveniles	Electrofishing surveys[c]	2,000
Steelhead (CCC)	juveniles	Fish relocation operations	625

[a] CCC = Central California Coast Evolutionarily Significant Unit (coho) or Distinct Population Segment (steelhead); SONCC = Southern Oregon/Northern California Coast Evolutionarily Significant Unit; CC = California Coastal Evolutionarily Significant Unit; NC = Northern California Distinct Population Segment.
[b] Out-migrant trapping in the Little North Fork Navarro River and South Fork Albion River.
[c] Includes presence surveys in MRC's 18 Annual Salmonid Monitoring Basins and distribution surveys throughout MRC's ownership in the primary assessment area.
[d] Adults captured incidentally during juvenile out-migrant trapping
[e] Coho salmon in the SONCC Evolutionarily Significant Unit may be included in future outmigrant trapping efforts if future land acquisitions by MRC include watersheds within the Evolutionarily Significant Unit.
[f] Unlikely to be present during instream construction; the summer construction window occurs after juvenile outmigration and before adult spawners enter streams.

Effects on salmonids due to monitoring activities are expected to be minimal, as such efforts are unlikely to reduce the number of returning spawners in any given year by amounts detectable within the variations caused by natural conditions, or restrict the range of any species, Distinct Population Segment, or Evolutionarily Significant Unit. Of the 410 mi (660 km) of Class I streams throughout the 12 watershed analysis units that completely or partially overlap the primary assessment area, only 0.1% to 2.2% (by length) of those streams have been electrofished per year between 1997 and 2010 (MRC unpublished data); these yearly percentages would be similar throughout the proposed HCP/NCCP permit term. From 2001–2010, MRC captured and handled relatively small numbers of listed salmonids during annual electrofishing surveys (Table 3.4-14).

Table 3.4-14. Number of juvenile salmonids captured and handled annually during electrofishing surveys conducted from 2001–2010 by MRC in the primary assessment area.

Species and ESU/DPS[a]	Annual Minimum (2001–2010)	Annual Maximum (2001–2010)
Coho salmon (CCC)	9	369
Coho salmon (SONCC)	0	277
Steelhead (NC)	87	2,232
Steelhead (CCC)	0	118

Source: MRC unpublished data.
[a] CCC = Central California Coast Evolutionarily Significant Unit (coho) or Distinct Population Segment (steelhead); SONCC = Southern Oregon/Northern California Coast Evolutionarily Significant Unit; NC = Northern California Distinct Population Segment.

Additional out-migrant trapping of coho salmon could occur in the future if MRC acquires additional commercial timberland within the Southern Oregon/Northern California Coast Evolutionarily Significant Unit. Potential expansion of out-migrant trapping of coho salmon in the Central California Coast Evolutionarily Significant Unit would be limited to the Little North Fork Navarro River or South Fork Albion River. Out-migrant trapping could be undertaken in the

Southern Oregon/Northern California Coast Evolutionarily Significant Unit if additional commercial timberland in the secondary assessment area is acquired in that Evolutionarily Significant Unit. MRC has historically captured and handled between 72 and 1,750 Central California Coast Evolutionarily Significant Unit coho salmon, between one and 757 Northern California Distinct Population Segment steelhead, and no Central California Coastal Evolutionarily Significant Unit Chinook salmon per year during out-migrant trapping in the Little North Fork Navarro River (MRC unpublished data).

In addition to the monitoring described above, MRC would relocate (i.e., salvage) salmonids from aquatic sites during certain road construction activities (e.g., dewatering or diverting the stream, culvert replacements, stream crossings) as part of the measures outlined in a master streambed alteration agreement, called the Master Agreement for Timber Operations (CDFG 2011b, MRC 2012). Relocation would be done to avoid fish death by dewatering or crushing by construction equipment. Seine netting and electrofishing would be used to capture salmonids at each site. Because MRC would use capture procedures best suited to each site, follow the most current guidelines available from CDFG and NMFS, use only qualified personnel directed by a fisheries biologist, and only perform construction activities during periods when salmonids are least likely to be present, injury or death of listed anadromous salmonids during fish relocation and subsequent site dewatering is expected to be less than 3% of the individuals present at each site. This estimate is based on evaluations provided by CDFG in annual reports to NMFS for similar salvage activities conducted under the Fisheries Restoration Grants Program in coastal northern California (CDFG 2005a, 2006, 2007, 2008, 2009b, 2010b). Because of seasonal timing restrictions on construction, only juvenile salmonids are expected to be affected. These activities would only affect small proportions of juvenile salmonids in the stream systems in which they occur, and most fish would be relocated safely. Road construction such as culvert replacement occurs at relatively small individual sites, and MRC would not conduct work at all potential road crossing sites or other instream work areas in any given year, or in any given ten-year period. MRC will need 40 years to upgrade the entire road system (including building new roads and associated stream crossings). In addition, not all new road crossings would need fish relocation because some would occur when the streambed at the construction site is naturally dry.

Effects on salmonids due to relocation from aquatic sites disturbed by construction equipment are expected to be minimal, as such efforts are unlikely to reduce the number of returning spawners in any given year by amounts detectable within the variations caused by natural conditions, or restrict the range of any species, Distinct Population Segment, or Evolutionarily Significant Unit. As a part of its activities under the auspices of CDFG's Fisheries Restoration Grants Program, MRC conducted fish salvage/relocation projects in 2005, 2006, 2007, 2010, and 2011, with a minimum of one project per year (in 2007 and 2010) and a maximum of eight projects in 2006. The total amount of Class I stream length affected by salvage/relocation activities in 2006 represents less than 0.04% of all Class I streams throughout the 12 watershed analysis units that completely or partially overlap the primary assessment area (MRC unpublished data); these yearly percentages would be similar throughout the proposed HCP/NCCP permit term. In the five years in which fish salvage/relocation projects were conducted, MRC captured and handled a minimum of five and a maximum of 15 Central California Coast Evolutionarily Significant Unit coho per year, a minimum of one and a maximum of 88 Southern Oregon/Northern California Coast Evolutionarily Significant Unit coho salmon per year, and a minimum of 10 and a maximum of 272 Northern California Distinct Population Segment steelhead per year, during relocation of salmonids from aquatic sites disturbed by construction equipment (MRC unpublished data).

The management and conservation measures that are part of the Proposed Action should cause a trend in geomorphological, hydrological, and riparian processes that would be beneficial for coho salmon, Chinook salmon, and steelhead in the primary assessment area compared with existing conditions. Decreasing sediment inputs under Proposed Action combined with potential reductions in peak flows would interact with increasing large woody debris loading to form more complex aquatic habitat compared with existing conditions. Characteristics of complex habitat ideal for juvenile salmonid rearing and adult holding areas include deeper and more frequent pools formed by the interaction of stream flow, large woody debris, and sediment. Increasing habitat complexity under the Proposed Action should improve rearing success for juvenile salmonids by creating refugia from winter high flows and springtime spates and enhancing cover and nutrient retention relative to existing conditions. Reduction of sediment delivery overall and fine sediment in particular under the Proposed Action should lead to more high-quality spawning gravel, distinguished by well-sorted, loose gravel that has a reduced fraction of fine sediment compared with existing conditions. Gravel with these qualities allows the free flow of well-oxygenated water to, and the flow of metabolic waste products away from, incubating eggs and alevins and improves egg incubation success.

Retention of large riparian trees, and increasing riparian canopy closure would improve stream shading to maintain cool water and riparian air temperatures, particularly in the summer. Improved riparian forest conditions would likely increase stream shading and also help maintain cool water temperatures, particularly in the summer. The increased implementation of stream habitat improvement projects under the Proposed Action would contribute to aquatic habitat recovery rates that should exceed rates under existing conditions and the No Action alternative and would provide benefits to salmonids in a shorter time frame. These projects, primarily large woody debris placement, would provide rapid benefits to salmonids by increasing cover, habitat complexity, velocity refuge during high flows, and spawning gravel retention. Increased aquatic habitat connectivity due to road crossing improvements under the Proposed Action should lead to an increase in habitat available to salmonids in the primary assessment area compared with existing conditions. In addition, there would be an extensive monitoring and adaptive management program under the Proposed Action that would monitor salmonid distribution, abundance, habitat, and the effectiveness of conservation and management measures. Adjustments to these measures would be made if needed to ensure maximum effectiveness and benefits to each species. While monitoring and fish relocation activities under the Proposed Action would result in mortality of a small number of salmonids each decade, population-level effects are not expected because of the combination of low risk of mortality from the monitoring effort and the low proportion of habitat sampled. Monitoring is essential to evaluate the effectiveness of MRC’s aquatic and riparian conservation measures and assess whether the biological goals and objectives of the HCP/NCCP are being met for these species.

Under the Proposed Action, HCP/NCCP measures for post-fire timber salvage would reduce the potential for sediment delivery to streams and other aquatic habitats compared with existing conditions and the No Action alternative, likely resulting in beneficial effects on salmonids and other aquatic and riparian species of concern. As discussed in Section 3.10.2 (Hazards and Hazardous Substances, Environmental effects and mitigation), total herbicide use under the Proposed Action would likely decrease compared with existing conditions and no acute or chronic effects on salmonids are expected due to the use of forest chemicals. The effects of illegal fishing and invasive species on anadromous salmonids are expected to be the same as existing conditions.

The Proposed Action would therefore have **beneficial effects** on coho salmon (in both the Central California Coast and Southern Oregon/Northern California Coast Evolutionarily Significant

Units), Chinook salmon (California Coastal Evolutionarily Significant Unit), and steelhead (both Northern California and Central California Coast Distinct Population Segments).

Coastal tailed frog

MRC's monitoring and adaptive management under the proposed HCP/NCCP includes surveys for presence, distribution, and relative abundance of coastal tailed frogs, which would include handling larval and post-metamorphic individuals. Surveys and monitoring would have effects on coastal tailed frog that would likely include harassment, harm, and occasional mortality during frog capture, handling, and release. Stream surveys could also result in physical disturbance or crushing of larvae as surveyors walk instream and during physical inspection of stream bottom substrates ("rubble rousing").

Estimates of the maximum numbers of coastal tailed frogs to be captured per decade, shown in Table 3.4-15, are derived from recent efforts and adjusted for possible population increases. These estimates reflect the numbers of each frog life stage that would be captured and handled, based on the historical capture rate at 10 monitoring sites in the primary assessment area. Since coastal tailed frog survey methods are typically low-impact and would be conducted by trained personnel and supervised by a qualified herpetologist, mortality is expected to be minimal. Coastal tailed frogs are expected to be subject to harassment, injury, and infrequent mortality during salmonid-focused snorkel and electrofishing surveys, outmigrant trapping, and fish relocation efforts during instream construction operations. These estimates do not include incidental harm, harassment, or mortality that may occur through modification of habitat during forest management activities.

Table 3.4-15. Estimated maximum number of coastal tailed frogs captured and handled per decade during monitoring activities over the 80-year Proposed HCP/NCCP permit term.

Life stage	Frog monitoring activities	Salmonid-focused surveys	Fish relocation operations
Larvae	6,000–12,000	20	2
Post-metamorphs	300–600	1	1

Effects on coastal tailed frogs due to monitoring activities are expected to be minimal, as such efforts would not substantially reduce numbers, cause populations to drop below self-sustaining levels, or restrict the range of the species. MRC historically has captured and handled a minimum of zero and a maximum of two coastal tailed frogs per year during salmonid-focused electrofishing surveys.

Under the Proposed Action, MRC would implement HCP/NCCP conservation measures intended to minimize and mitigate adverse effects on tailed frogs, including many of the general forest management, sediment management, road management, aquatic and riparian habitat management, and terrestrial habitat management measures designed to protect and enhance habitat for aquatic and terrestrial species. This also includes the designation of streams with breeding coastal tailed frogs as large Class II watercourses, regardless of drainage size, and the implementation of the same conservation and management measures applied in other Large Class II watercourses. The amount of herbicide use under the Proposed Action would be less than use under existing conditions and the No Action alternative (Section 3.10.2, Hazards and Hazardous Substances, Environmental effects and mitigation). Decreasing sediment inputs under the Proposed Action combined with maintenance of relatively natural stream and groundwater hydrology would interact with increasing recruitment of large woody debris to form more complex aquatic habitat compared with existing conditions. Reduction of sediment delivery overall and fine sediment in particular under the Proposed Action should lead to more high-quality tadpole habitat, since tadpoles attach to and feed on rock substrates. A predicted increase in canopy cover and decrease in water temperatures would benefit the coastal tailed frog, which inhabits cold (41–65°F [5–18.5°C]) (Brown 1975) streams. In addition, there would be an extensive monitoring and adaptive management program under the Proposed Action that would monitor presence of coastal tailed frog, its habitat, and the effectiveness of conservation and management measures. Adjustments to these measures would be made if needed to ensure maximum effectiveness and benefits to the species. Monitoring surveys under the Proposed Action would result in primarily non-lethal effects on coastal tailed frog. Mortality is expected to be minimal and population-level effects are not expected. Such monitoring is essential to evaluate the effectiveness of MRC's aquatic and riparian conservation measures and assess whether the biological goals and objectives of the HCP/NCCP are being met for this species. The Proposed Action would therefore have **beneficial effects** on coastal tailed frog.

California red-legged frog and northern red-legged frog

MRC's monitoring and adaptive management under the Proposed Action includes baseline surveys for presence and distribution of California red-legged frogs, and breeding habitat quality surveys which may include dip-netting and seining when necessary for identifying larvae. Surveys and monitoring would have effects on California red-legged frog that would likely include harassment, harm, and occasional mortality during the capture, handling, and release of the various life stages of California red-legged frog. The agencies believe mortality should be extremely rare. Stream surveys could result in physical disturbance or crushing of egg masses or larvae.

Estimates of the maximum number of California red-legged frogs that would be captured per decade, shown in Table 3.4-16, are derived from recent efforts and adjusted for possible population increases. These estimates reflect the numbers of each frog life stage that would be captured and handled, based on MRC's current federal recovery permit (issued under Section 10(a)(1)(A) of the federal ESA) and state Scientific Collecting Permit allowances prior to implementation of the HCP/NCCP. Since seining and dip-netting are typically low-impact survey techniques and surveys would be conducted by trained personnel and supervised by a qualified herpetologist, mortality is expected to be minimal. Red-legged frog is expected to be subject to harassment, injury, and infrequent mortality during salmonid-focused snorkel and electrofishing surveys, fish relocation efforts during instream operations, and EEZ activity clearance surveys, and rarely during salmonid outmigrant trapping. These estimates do not include incidental harm, harassment, or mortality that may occur through modification of habitat during forest management activities.

Table 3.4-16. Estimated maximum number of California red-legged frogs captured and handled per decade over the 80-year Proposed HCP/NCCP permit term.

Life stage	Frog Monitoring Activities	Salmonid-focused surveys	Fish relocation operations	EEZ clearance surveys
Egg masses	100–1,000	0	0	0
Larvae	2,000–4,000	10	0	0
Post-metamorphs	250–750	10	5	1

Effects on California red-legged frogs due to monitoring activities are expected to be minimal, as such efforts would not substantially reduce numbers, cause populations to drop below self-sustaining levels, or restrict the range of the species. MRC does not typically capture post-metamorphs during frog monitoring activities. MRC typically captures and handles a minimum of zero and a maximum of two red-legged frogs per year during salmonid-focused electrofishing surveys.

Under the Proposed Action, MRC would implement HCP/NCCP conservation measures specific to protection of red-legged frogs and focused on maintenance and management of both documented and potential breeding sites. This includes restrictions on maintenance and management of vegetation around ponds; maintenance of equipment limitation or exclusion zones around wetlands, wet areas, wet meadows, seeps, and springs; limits to water drafting of ponds; and limits to pond construction and maintenance. In addition, a modest improvement of habitat quality and quantity for California red-legged frogs and northern red-legged frogs is likely to occur because of many of the general forest management, sediment management, road management, aquatic and riparian habitat management, and terrestrial habitat management measures designed to protect and enhance habitat for other aquatic and terrestrial species. In particular, maintenance or a reduction of sediment delivery combined with increasing large woody debris recruitment over time would be likely to improve habitat conditions because pool depth and frequency should increase compared with existing conditions, and the use of herbicides would be expected to decrease relative to existing conditions. In addition, there would be an extensive monitoring and adaptive management program under the Proposed Action that would monitor presence California red-legged and northern red-legged frog, their habitat, and the effectiveness of conservation and management measures. Adjustments to these measures would be made if needed to ensure maximum effectiveness and benefits to each species. Monitoring surveys under the Proposed Action would result in primarily non-lethal effects on California red-legged frog. While monitoring activities under the Proposed Action would result in mortality of a very small number of red-legged frogs each decade, population-level effects are not expected because of the combination of low risk of mortality from the monitoring effort and the low proportion of habitat sampled. Such monitoring is essential to evaluate the effectiveness of MRC's aquatic and riparian conservation measures and assess whether the biological goals and objectives of the HCP/NCCP are being met for this species. The Proposed Action would therefore have **beneficial effects** on California red-legged frogs and northern red-legged frogs.

Navarro roach

As described above under the No Action alternative, the general decrease in water temperatures expected under the Proposed Action might reduce the amount or alter the distribution of rearing and foraging habitat for Navarro roach in the Navarro River basin, which is where Navarro Roach is found in the primary assessment area, since this species generally requires warm water temperatures. Although the amount and/or location of habitat in the preferred thermal range could change relative to existing conditions, it is likely that the increased stream shading and reduced water temperatures would more closely resemble the pre-European conditions under which this species evolved. These potential changes would not likely reduce the potential for successful rearing and foraging by this species throughout its range, which includes the Russian River in the secondary assessment area. Therefore, this effect would be **less than significant**.

Tidewater goby

Sediment delivery to streams would decrease under the Proposed Action and turbidity, suspended sediment, and peak flows would be reduced. Although this species requires sandy substrate to construct breeding burrows (and sand input from streams is required for formation and maintenance of coastal barrier sandbars and lagoons that form tidewater goby habitat), excessive sedimentation may degrade conditions needed for breeding burrows, thereby reducing reproductive success. The effects of sediment on estuarine habitat depend on the rate of input relative to the rate of output; inputs from managed watersheds may be greater than, less than, or equivalent to output. However, estuarine sediment input and output cannot be adequately quantified for purposes of this analysis. Compared with existing conditions, the potential for excessive sedimentation of tidewater goby habitat in estuaries downstream of the primary assessment area would be reduced. It is unlikely that sediment supply would be reduced to an extent that would be detrimental to tidewater gobies. Therefore, **no effects** on tidewater gobies are expected.

Southern torrent salamander

Under the Proposed Action, MRC would implement HCP/NCCP conservation measures specific to protection of springs and seeps. Springs and seeps that occur within Class I and II Aquatic Management Zones would benefit from the conservaton measures prescribed for those buffers, including general equipment exclusion as well as retention standards for canopy, basal area, and large woody debris. Similar protective measures would be applied for springs and seeps not within Class I or II Aquatic Management Zones. Increased canopy closure along with development of more advanced-successional forest, especially in headwater streams and in seeps and springs in Class I and II Aquatic Management Zones, would improve habitat conditions for southern torrent salamanders through increases in stream shading, which would subsequently help to maintain lower stream temperatures and regulate humidity, air, and soil temperatures. Longer-term trends in in-channel large woody debris loading would lead to increased habitat complexity that would benefit this species. The Proposed Action would therefore have **beneficial effects** on southern torrent salamander.

Foothill yellow-legged frog

HCP/NCCP conservation measures implemented by MRC under the Proposed Action, including many of the general forest management, sediment management, road management, aquatic and riparian habitat management, and terrestrial habitat management measures designed to protect and enhance habitat for aquatic and terrestrial species, would include increased erosion control measures and greater and more rapid increases in riparian forest density. Reduced sediment delivery to stream channels would improve habitat conditions for foothill yellow-legged frog by reducing the amount of sediment in interstices of cobbles and boulders, where foothill yellow-legged frog adults attach their egg masses and where tadpoles retreat for cover. Improvements to hydrology and runoff patterns would also maintain foothill yellow-legged frog habitat. Predicted decreases in stream water temperatures under the Proposed Action largely resulting from increases in riparian cover could adversely affect foothill yellow-legged frogs by delaying oviposition or slowing the development of eggs and/or tadpoles, although the magnitude of water temperature decrease is not expected to be substantial enough to preclude successful breeding and tadpole development across the primary assessment area. Increases in streamside canopy shading may also reduce opportunities for thermoregulation (i.e., basking). Improvements to habitat conditions, primarily due to reduced sediment delivery to stream channels, are expected to outweigh the potential adverse effects associated with increases in streamside canopy cover. Overall, the Proposed Action would therefore have **less-than-significant effects** on foothill yellow-legged frog.

Pacific pond turtle

An increase in riparian canopy cover and the overall basal area of riparian vegetation under the Proposed Action may reduce the total amount or quality of available terrestrial nesting habitat, and subsequent increases in stream shading may reduce opportunities for basking. However, HCP/NCCP conservation measures implemented by MRC under the Proposed Action, including many of the general forest management, sediment management, road management, aquatic and riparian habitat management, and terrestrial habitat management measures designed to protect and enhance habitat for aquatic and terrestrial species, would benefit Pacific pond turtle by improving overall aquatic and terrestrial habitat conditions. Longer-term trends in in-channel large woody debris loading should lead to increased habitat complexity, including deeper pools suitable for Pacific pond turtles. On balance, the Proposed Action would have **no effect** on Pacific pond turtles.

3.4.2.4 Alternative A

Effects on sediment delivery

As described in Section 3.2.2 (Geology, Soils, and Geomorophology; Environmental effects and mitigation), management practices and conservation measures related to erosion and sediment delivery to stream channels under Alternative A would be largely the same as those proposed under the Proposed Action, with additional measures to protect and enhance aquatic and riparian habitats, including a prohibition on harvest within one site-potential tree height (approximately 150 ft [46 m]) of all Class I streams, harvest and road restrictions in inner gorges, limitations on new road construction, decommissioning of unnecessary roads in sensitive watersheds, road crossing upgrades on Class I and large Class II streams, and annual winter inspection of all temporary and seasonal roads. These and other measures are expected to reduce surface erosion from roads and streamside areas, reduce road-related mass wasting, and reduce delivery of coarse and fine sediment to streams in the primary assessment area relative to existing conditions and provide increased benefits to aquatic habitat compared with the Proposed Action.

Reduced road-related fine sediment delivery to stream channels would reduce chronic turbidity and suspended sediment concentrations and the amount of fine sediment deposited on the channel bed surface and within spawning gravel substrates. Reduced coarse sediment delivery (mainly via reduced mass wasting) would reduce pool filling and channel simplification. Accordingly, habitat conditions for aquatic and riparian species of concern are expected to improve over time as sediment-related effects are reduced. Potential benefits to salmonids and other aquatic species would include increased spawning gravel quality and incubation success, deeper pools, increased rearing habitat area, and increased production of benthic macroinvertebrate food organisms.

Effects on stream flow patterns

Under Alternative A, as under the Proposed Action, the amount of land harvested per decade would be less than existing conditions and the proportion of selection harvest would be greater, likely resulting in slightly reduced peak flows and no appreciable change in summer low flows relative to existing conditions (Section 3.3.2, Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). There would be no harvest adjacent to Class I streams within a buffer distance equal to the height of one site potential tree (modeled as 150 ft [46 m]) , and riparian buffer widths on other streams under Alternative A would be greater than current standards and equal to or greater than the Proposed Action. These measures would additionally reduce hydrologic connectivity between upland areas and streams in the primary assessment area, further contributing to peak flow decreases. Implementation of a comprehensive road management program under Alternative A, including crossing upgrades and decommissioning of unused roads, would reduce the hydrologic connectivity between roads and streams, also contributing to peak flow decreases. Compared with existing conditions, reduced peak flows may help reduce detrimental scour of salmonid eggs and displacement and mortality of rearing juvenile salmonids, and could also reduce the potential for displacement and mortality of other fish and aquatic species during these high flow events. Reduced peak flow effects would be most likely in sand- and gravel-bedded channels with gradients less than about 2% (Grant et al. 2008), which provide important spawning, rearing, and foraging habitat for anadromous salmonids and other special-status fish and aquatic species in the primary and secondary assessment areas. Effects of reduced peak flows may also include reduced transport and deposition of fine sediment in sand- and gravel-bedded channels and possibly in steeper step-pool channels (Grant et al. 2008), potentially improving spawning, rearing, and foraging conditions for salmonids and other aquatic species compared with existing conditions.

Effects on riparian conditions

Forest management practices and riparian conservation measures under Alternative A would provide enhanced protection of riparian functions such as large woody debris recruitment, stream shading, sediment filtration, and bank stability compared with existing conditions. Along Class I streams, the no-harvest riparian buffer (equal to the height of one site potential tree) would provide additional protection to riparian conditions and functions compared with existing conditions and the Proposed Action. These practices and measures would contribute to maintenance and development of more advanced-successional forest habitat which would provide a more suitable microclimate (e.g., increased relative humidity, and lower air and soil temperatures) for many amphibians and other native species that use habitats along streams, and would improve habitat used by the various life stages of the fish species of concern in primary assessment area drainage basins. These effects would be similar to the Proposed Action but potentially enhanced under Alternative A due the restriction on harvest along Class I streams and a more rapid transition to high-retention silvicultural methods in other riparian buffers.

Riparian forest structure

Under Alternative A (as under the Proposed Action and all other alternatives) there would be a general trend toward more advanced-successional forest habitat and less early- and/or mid-successional habitat, and a trend toward more redwood-dominated habitat and less hardwood-dominated habitat in riparian buffer zones. Successional stage composition in riparian buffer zones is predicted to change dramatically over the 80-year analysis period, with advanced-successional habitat increasing from approximately 7% to 98% during this time (Section 3.6.2. Terrestrial Habitat and Wildlife Species of Concern, Environmental effects and mitigation). Since modeled riparian conditions include Class I and II riparian buffers, these changes would occur partly in response to the no-cut buffer along Class I streams under Alternative A. This shift towards more advanced-successional forest structure in riparian stands is also reflected in predicted changes in tree size class structure, and in particular, the density of large riparian trees. In riparian buffer zones, timber modeling results indicate that trees with a diameter at breast height > 32 in (81 cm) are predicted to increase from an estimated 2 trees per acre under existing conditions to approximately 28 trees per acre by year 80; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 8 trees per acre to approximately 38 trees per acre (Figure 3.4-6). See Appendix E for a description of the methods used to model predicted riparian tree density.

Large woody debris loading

Under Alternative A, riparian buffer widths and management measures would contribute to enhanced large woody debris recruitment and loading relative to existing conditions, the Proposed Action, and the other alternatives. As under the other alternatives, the amount of high-retention selection harvest in riparian buffers would increase over time (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation), as would the density of large riparian trees (i.e., trees > 24 in [10 cm] diameter at breast height) (Figure 3.4-6).

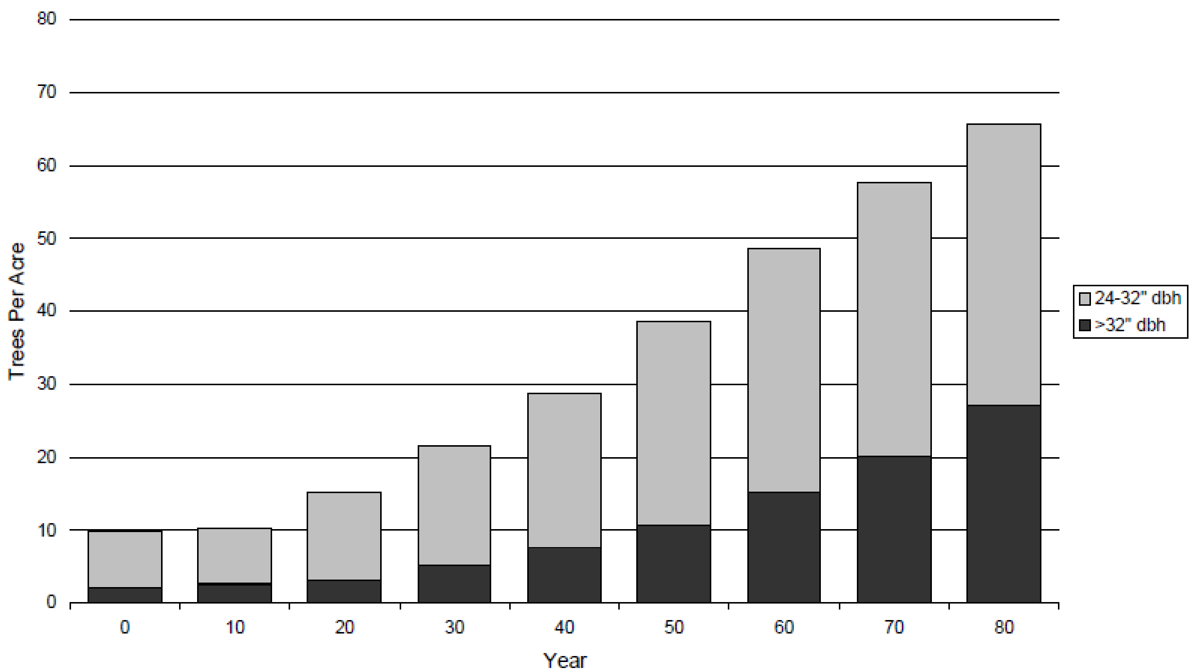


Figure 3.4-6. Large riparian (Aquatic Management Zone) tree density (average trees per acre) predicted under Alternative A.

The index of large woody debris loading in Class I and II streams would increase from a range of 0.01–0.02 under existing conditions to 0.30–1.00 or greater by year 80 (Table 3.4-17) (see Appendix K for a description of methods). Potential large woody debris loading is expected to correspond to the modeled trend in the number large trees in the riparian buffer zone over time (Figure 3.4-6). These trends represent greater modeled increases in large riparian trees and potential large woody debris loading under Alternative A than under Proposed Action and the other alternatives.

Table 3.4-17. Large woody debris loading index predicted for Class I and II streams in the primary assessment area under Alternative A.

Stream class		Minimum and maximum index of mean large woody debris loading (m^3/ha) by year[a]								
		0	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**
Class I	Minimum	0.02	0.03	0.06	0.12	0.19	0.35	0.55	0.76	0.97
	Maximum	0.02	0.03	0.07	0.14	0.24	0.43	0.67	0.93	> 1
Class II	Minimum	0.01	0.01	0.02	0.04	0.06	0.11	0.17	0.24	0.30
	Maximum	0.02	0.03	0.07	0.14	0.24	0.43	0.67	0.93	> 1

[a] An index value of 1 equals the assumed reference level of large woody debris loading (Appendix K).

The predicted overall increase in the rate and volume of large woody debris loading would increase aquatic habitat heterogeneity and available aquatic habitat for all life stages of salmonid fishes as well as other aquatic organisms including amphibians and aquatic reptiles. Increases in large woody debris loading would add roughness to the channel network, providing cover and velocity refuge for fish and other aquatic species and promoting retention of spawning gravel used by salmonids.

Stream shading

The canopy closure guidelines and standards for basal area retention and large tree retention that would be implemented under Alternative A are expected to help increase stream shading and improve suitability of stream water temperatures for salmonids and other sensitive aquatic species compared with existing conditions. Increased riparian shade would also help maintain or enhance riparian microclimate conditions favorable to amphibians and aquatic reptiles. These beneficial effects would be most pronounced in Class I stream buffers, where no harvest would be permitted. Timber modeling results indicate that riparian canopy closure is expected to increase substantially relative to existing conditions, with the fraction of riparian area in the densest cover class (i.e., > 60%) increasing from 70% at existing conditions to 90% by year 20 and greater than 95% from year 30 on (Figure 3.4-7). Increased canopy closure combined with increased average tree heights associated with development of more advanced-successional forest conditions and increased density of larger trees is expected to increase stream shading and result in decreased water temperatures in primary assessment area streams. Enhanced riparian forest structure would increase habitat suitability and the extent of suitably cool stream habitat for salmonids and cold water-associated amphibian species relative to existing conditions, and would also help moderate air and soil temperature and relative humidity in the riparian zone, providing improved habitat conditions for many amphibians. These effects would be more pronounced under Alternative A than under the other alternatives.

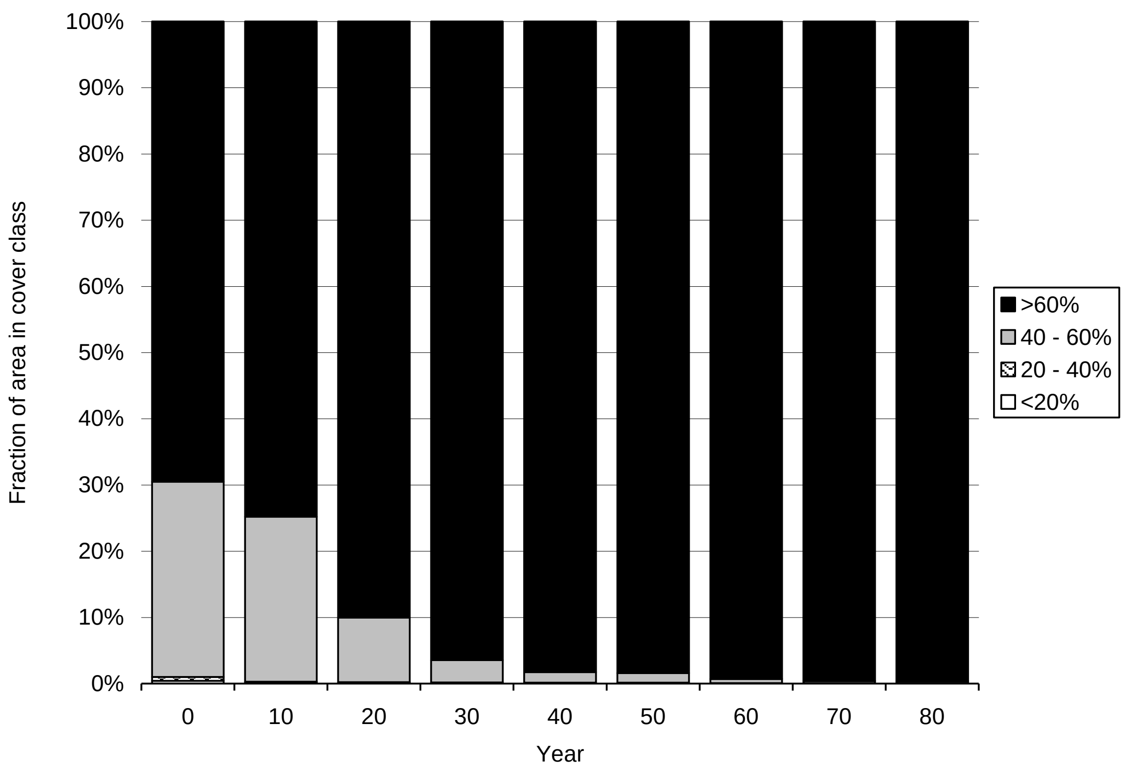


Figure 3.4-7. Canopy closure predicted in Class I and II riparian buffers under Alternative A.

Bank stability

Bank stability is expected to increase under Alternative A relative to existing conditions. Bank stability measures and guidelines under Alternative A would be similar to the Proposed Action, but with a no-cut riparian buffer along Class I streams and additional measures to reduce bank disturbance and erosion on steep streamside slopes in the primary assessment area. As under the

Proposed Action, bank protection measures at water drafting sites should help minimize point-source erosion. These measures, combined with a long-term trend of reduced sediment delivery to stream channels, a comprehensive road and crossing management plan, reduced peak flows, and increasing recruitment of large woody debris, would likely reduce bank instability and erosion rates over time compared with existing conditions and provide added benefits compared with the Proposed Action.

Under Alternative A, inputs of leaf litter and other organic material from riparian areas would be greater and cycling of nutrients derived from these inputs would be enhanced compared with existing conditions and the Proposed Action. These effects would be primarily due to implementation of no-cut riparian buffers along Class I streams and increased large woody debris recruitment. Benefits would include an increased prey base for rearing juvenile salmonids, aquatic-stage amphibians, and other aquatic species.

Summary of effects on aquatic habitat

As described above, aquatic habitat quality and quantity would increase under Alternative A relative to existing conditions, with beneficial changes even greater than those under the Proposed Action. As under the Proposed Action, aquatic habitat enhancement projects, including additions of large woody debris in salmonid streams, would contribute to additional, more rapid improvement to aquatic habitat compared with existing conditions. Stream-crossing improvements should increase aquatic habitat connectivity and in turn potentially increase overall available habitat, particularly for migratory fish.

Other factors

Under Alternative A, post-fire timber salvage would follow the prescriptions in MRC's proposed HCP/NCCP, which include site-specific measures to reduce erosion and sediment delivery to streams from roads, stream crossings, and general forested areas. Post-fire timber salvage would be prohibited in Aquatic Management Zones unless approved by the wildlife agencies. With concurrence of the wildlife agencies, MRC would restore damaged red-legged frog breeding sites or create new sites in adjacent, unaffected areas. The HCP/NCCP measures would provide additional erosion control in burned areas and would reduce the potential for sediment delivery to streams compared with existing conditions and the No Action alternative.

Under Alternative A, as under the No Action, Proposed Action, and other alternatives, herbicides and adjuvants would continue to be used by MRC, under regulation by the California Department of Agriculture and the Environmental Protection Agency. As described in Section 3.10.2 (Hazards and Hazardous Substances, Environmental effects and mitigation), there would be little to no change in the application method, frequency, and type of herbicide and adjuvant for control of vegetation compared with existing conditions. Total herbicide use under Alternative A would decrease compared with existing conditions, as it would under all alternatives. Effects related to herbicide use would therefore be the same under Alternative A as under the No Action alternative.

Under Alternative A, the effects of sediment delivery from rock pit activities, illegal fishing, and introduction of invasive species on aquatic and riparian habitats and species of concern would be the same as under the Proposed Action.

Effects on aquatic and riparian species of concern

In addition to the analysis presented here, site-specific effects on aquatic and riparian species of concern under Alternative A would be assessed and appropriate mitigation measures developed through completion of individual PTHPs, subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with applicable species protection and mitigation requirements.

Salmonids (coho salmon, Chinook salmon, steelhead)

MRC's monitoring and adaptive management under Alternative A includes surveys for anadromous salmonid presence, distribution, and smolt abundance. In addition, MRC would relocate (i.e., salvage) salmonids from aquatic sites during certain road construction activities as part of the measures outlined in the Master Agreement for Timber Operations (CDFG 2011b, MRC 2012). Surveys, monitoring, and relocation—including estimates of salmonid numbers captured and handled—would be the same as described above for the Proposed Action.

The management and conservation measures that would be implemented under Alternative A would reduce sediment delivery to stream channels, reduce peak stream flows, enhance riparian forest conditions, and increase large woody debris loading compared with existing conditions, thereby improving habitat conditions for coho salmon, Chinook salmon, and steelhead in the primary assessment area. Effects on riparian and aquatic habitat conditions would be similar to those described under the Proposed Action, but with increased erosion control measures and greater and more rapid increases in riparian forest density and large woody debris recruitment. Improved aquatic and riparian habitat conditions would provide benefits to salmonids that would be similar to but likely greater than the Proposed Action.

Stream habitat improvement projects and road crossing improvements under Alternative A would be the same as under the Proposed Action, with similar benefits to anadromous salmonids. As under the Proposed Action, an extensive monitoring and adaptive management program would ensure the effectiveness of conservation and management measures under Alternative A. While monitoring and fish relocation activities under Alternative A would result in mortality of a small number of salmonids each decade, population-level effects are not expected because of the combination of low risk of mortality from the monitoring effort and the low proportion of habitat sampled. Monitoring is essential to evaluate the effectiveness of MRC's aquatic and riparian conservation measures and assess whether the biological goals and objectives of the HCP/NCCP are being met for these species.

Post-fire timber salvage under Alternative A would be the same as under the Proposed Action, with similar benefits to salmonids and other aquatic and riparian species of concern due to reduced sediment delivery to streams and aquatic habitats. Total herbicide use under Alternative A would likely decrease compared with existing conditions and no acute or chronic effects on salmonids are expected due to the use of forest chemicals. The effects of illegal fishing and invasive species on anadromous salmonids are expected to be the same as existing conditions.

Alternative A would therefore have **beneficial effects** on coho salmon (in both the Central California Coast and Southern Oregon/Northern California Coast Evolutionarily Significant Units), Chinook salmon (California Coastal Evolutionarily Significant Unit), and steelhead (both Northern California and Central California Coast Distinct Population Segments).

Coastal tailed frog

MRC's monitoring and adaptive management under Alternative A includes surveys for presence and distribution of coastal tailed frogs. Surveys and monitoring, including estimates of the number of coastal tailed frogs captured and handled, would be the same as described above for the Proposed Action.

Effects on riparian and aquatic habitat conditions would be similar to those described under the Proposed Action, but with increased erosion control measures and greater and more rapid increases in riparian forest density and stream shading that could increase the extent of suitable cold-water habitat conditions for this species. Alternative A would therefore have **beneficial effects** on coastal tailed frog.

California red-legged frog and northern red-legged frog

MRC's monitoring and adaptive management under Alternative A includes surveys for presence and distribution of California red-legged frogs, as well as breeding habitat quality surveys. Surveys and monitoring, including estimates of the number of California red-legged frogs captured and handled, would be the same as described above for the Proposed Action.

Effects on riparian and aquatic habitat conditions would be similar to those described under the Proposed Action, but with increased erosion control measures and greater and more rapid increases in riparian forest density, large woody debris recruitment, and stream shading. Reduced sediment delivery to stream channels combined with increasing large woody debris recruitment would be likely to improve habitat conditions for these species because pool depth and frequency should increase. Alternative A would therefore have **beneficial effects** on California red-legged and northern red-legged frog.

Navarro roach

As described above under the No Action alternative and the Proposed Action, the decrease in water temperatures expected under Alternative A could reduce the amount or alter the distribution of rearing and foraging habitat for Navarro roach in the Navarro River basin, which is where Navarro Roach is found in the primary assessment area, since this species generally requires warm water temperatures. Although the amount and/or location of habitat in the preferred thermal range could change relative to existing conditions, it is likely that the increased stream shading and reduced water temperatures would more closely resemble the pre-European conditions under which this species evolved. These potential changes would not likely reduce the potential for successful rearing and foraging by this species throughout its range, which includes the Russian River in the secondary assessment area. Therefore, this effect would be **less than significant**.

Tidewater goby

Like the Proposed Action, sediment delivery to streams would decrease under Alternative A and turbidity, suspended sediment, and peak flows would be reduced. Although this species requires sandy substrate to construct breeding burrows (and sand input from streams is required for formation and maintenance of coastal barrier sandbars and lagoons that form tidewater goby habitat), excessive sedimentation may degrade conditions needed for breeding burrows, thereby reducing reproductive success. The effects of sediment on estuarine habitat depend on the rate of input relative to the rate of output; inputs from managed watersheds may be greater than, less than, or equivalent to output. However, estuarine sediment input and output cannot be adequately quantified for purposes of this analysis. Compared with existing conditions, the potential for excessive sedimentation of tidewater goby habitat in estuaries downstream of the primary assessment area would be reduced. It is unlikely that sediment supply would be reduced to an extent that would be detrimental to tidewater gobies. Therefore, **no effects** on tidewater gobies are expected.

Southern torrent salamander

Effects on riparian and aquatic habitat conditions would be similar to those described under the Proposed Action, but with increased erosion control measures and greater and more rapid increases in riparian forest density, large woody debris recruitment, and stream shading. Alternative A would therefore have **beneficial effects** on southern torrent salamander.

Foothill yellow-legged frog

Effects on riparian and aquatic habitat conditions would be similar to those described under the Proposed Action, but with increased erosion control measures and greater and more rapid increases in riparian forest density and stream shading. Reduced sediment delivery to stream channels would improve habitat conditions for foothill yellow-legged frog by reducing the amount of sediment in interstices of cobbles and boulders, where foothill yellow-legged frogs attach their egg masses and where tadpoles retreat for cover. Improvements to hydrology and runoff patterns would maintain foothill yellow-legged frog habitat. Predicted decreases in stream water temperatures under Alternative A as a result of increase in riparian cover could adversely affect foothill yellow-legged frogs by delaying oviposition or slowing the development of eggs and/or tadpoles, although the magnitude of the water temperature decrease is not expected to be substantial enough to preclude successful breeding and tadpole development across the primary assessment area. Increases in streamside canopy may also reduce opportunities for thermoregulation (i.e., basking). Improvements to habitat conditions, primarily due to reduced sediment delivery to stream channels, are expected to outweigh the potential adverse effects associated with increases in streamside canopy cover. Overall, Alternative A would have **less-than-significant effects** on foothill yellow-legged frog.

Pacific pond turtle

Effects on riparian and aquatic habitat conditions would be similar to those described under the Proposed Action, but with increased erosion control measures and greater and more rapid increases in riparian forest density, large woody debris recruitment, and stream shading. These changes would benefit Pacific pond turtle by improving overall aquatic habitat conditions. An increase in riparian canopy cover and the overall basal area of riparian vegetation under Alternative A may reduce the total amount of available terrestrial nesting habitat, and subsequent increases in stream shading may reduce opportunities for basking. However, longer-term trends in in-channel large woody debris loading should lead to increased habitat complexity, including deeper pools suitable for Pacific pond turtles. On balance, Alternative A would have **no effect** on Pacific pond turtles.

3.4.2.5 Alternative B

Effects on sediment delivery

Throughout the 80-year analysis period, implementation of Alternative B would result in less sediment delivery to stream channels from shallow and deep-seated landsliding than under existing conditions, due primarily to harvest restrictions in reserves (Section 3.2.2; Geology, Soils, and Geomorphology; Environmental effects and mitigation). Landslide-related sediment delivery to stream channels under Alternative B would be greater than under the No Action alternative during the first decade but less than the No Action alternative in subsequent decades. However, outside the reserves an increase in landslide sediment delivery to stream channels would likely occur under Alternative B. Sediment delivery to stream channels from surface erosion (e.g., sheetwash, rilling, and gullying) in the reserve areas under Alternative B would be less than under existing conditions and the other alternatives, but soil compaction and sediment delivery to stream channels from surface erosion in harvest areas outside of reserves is expected to be substantially greater than existing conditions due to predominantly clearcut silvicultural treatments that result in less canopy retention and basal area, more ground disturbance, and greater hydrologic change (e.g., increased runoff) than under existing conditions or other alternatives. Inside reserves, road-related erosion and sediment delivery to stream channels under

Alternative B would be less than from the same areas under existing conditions or under other alternatives. Outside reserves, road-related erosion and sediment delivery to stream channels would increase compared with existing conditions and would be similar to the No Action alternative. Road-related sediment delivery to stream channels outside reserves is due primarily to the lack of a comprehensive road management approach and schedule for road inventory under Alternative B.

The effects of sediment delivery under Alternative B on aquatic habitats and species of concern would vary in relation to reserve areas. In watersheds predominantly draining land within reserves, sediment delivery to stream channels would be reduced compared with existing conditions and the other alternatives. Aquatic habitat conditions in these streams would benefit from reduced turbidity and suspended sediment concentrations during storm events and reductions in the amount of fine sediment deposited on the channel bed surface and within spawning gravel substrates. In watersheds draining land outside reserves, as well as stream channels downstream of these areas, turbidity and sediment delivery could increase substantially relative to existing conditions and the other alternatives, resulting in degraded aquatic habitat conditions and potentially deleterious effects on aquatic and riparian species of concern. Because a majority of the primary assessment area would be subject to delivery of sediment originating from areas outside reserves, the quality of aquatic habitat in many assessment area streams under Alternative B would be reduced compared with existing conditions and the other alternatives, leading to degraded conditions for species of concern in many streams.

Effects on stream flow patterns

Management under Alternative B would have only negligible effects on peak flows and low flows at the scale of the primary assessment area. Outside reserves, channels draining local clearcuts within small subwatersheds, including some planning watersheds, could experience localized increases in peak flows (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). Such peak flow effects are most likely to occur in sand- and gravel-bedded channels with gradients less than about 2%, though effects on transport and deposition of fine sediment may also occur in steeper channels such as those with step-pool morphology (Grant et al. 2008). In the primary and secondary assessment areas, low-gradient channels provide the majority of the spawning, rearing, and foraging habitat for anadromous salmonids and other special-status fish and aquatic species. Some species, such as steelhead, may also use higher-gradient channels. However, peak flow effects may only be discernible in small watersheds when > 29% of the watershed is harvested by clearcut and for flows with a return period of 6 years or less (Grant et al. 2008). As under the other alternatives, uneven-aged silviculture is the primary harvest method in riparian buffer zones (outside reserves) throughout the analysis period, which may help to reduce the potential for increased peak flows that would likely result from commercial thinning and clearcut in the upland areas. Because peak flow effects in planning watersheds that experience commercial thinning and clearcut would likely attenuate as water moves downstream, measurable peak flow effects at the scale of the entire assessment area are not likely to occur.

While clearcutting in upland areas outside of the reserves has the potential to increase low flows relative to existing conditions and the other alternatives, the lower percentage of land harvested per decade would likely counter this effect (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). In riparian buffers, high retention selection and selection are the primary harvest methods throughout the analysis period, which should further reduce potential increases in low flows from clearcuts outside of the reserves.

Because changes in peak flows and low flows under Alternative B would likely be minor in the primary assessment area, no flow-related effects on aquatic habitat or species of concern are expected.

Effects on riparian conditions

Under Alternative B, riparian buffer widths and riparian management measures outside of reserves would be the same as the No Action alternative. Effects on habitat used by the freshwater life stages of the special-status fish species and riparian microclimate conditions for amphibians and other riparian species would be the same as the No Action alternative. Inside the reserves there would be no harvest in riparian buffer zones and riparian functions such as large woody debris recruitment, stream shading, sediment filtration, bank stability, and nutrient input would be enhanced relative to existing conditions and the other alternatives.

Riparian forest structure

Under Alternative B (as under the Proposed Action and all other alternatives) there would be a general trend towards more advanced-successional riparian forest habitat and less early- and/or mid-successional habitat (Section 3.6.2, Terrestrial Habitat and Wildlife Species of Concern, Environmental effects and mitigation); and a trend toward more redwood-dominated habitat and less hardwood-dominated habitat in riparian buffer zones (Section 3.5.2, Vegetation and Plant Species of Concern, Environmental effects and mitigation). Successional stage composition in riparian buffer zones is predicted to change considerably over 80 years, with advanced-successional habitat increasing from approximately 7% to 68% over the 80-year analysis period (Section 3.6.2, Terrestrial Habitat and Wildlife Species of Concern, Environmental effects and mitigation). This shift towards more advanced-successional forest structure in riparian stands is also reflected in predicted changes in the density of large riparian trees. Inside reserves, changes in riparian forest structure are likely to be similar to those predicted under Alternative A. In riparian buffer zones throughout the primary assessment area, timber modeling results indicate that trees with a diameter at breast height > 32 in (81 cm) are predicted to increase from an estimated two trees per acre under existing conditions to approximately 16 trees per acre by year 80; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated eight trees per acre to approximately 27 trees per acre (Figure 3.4-8). See Appendix E (Timber Model Description) for a description of the methods used to model predicted riparian tree density. The effects on aquatic and riparian habitats in the primary assessment area as a whole are expected to be similar to the No Action alternative.

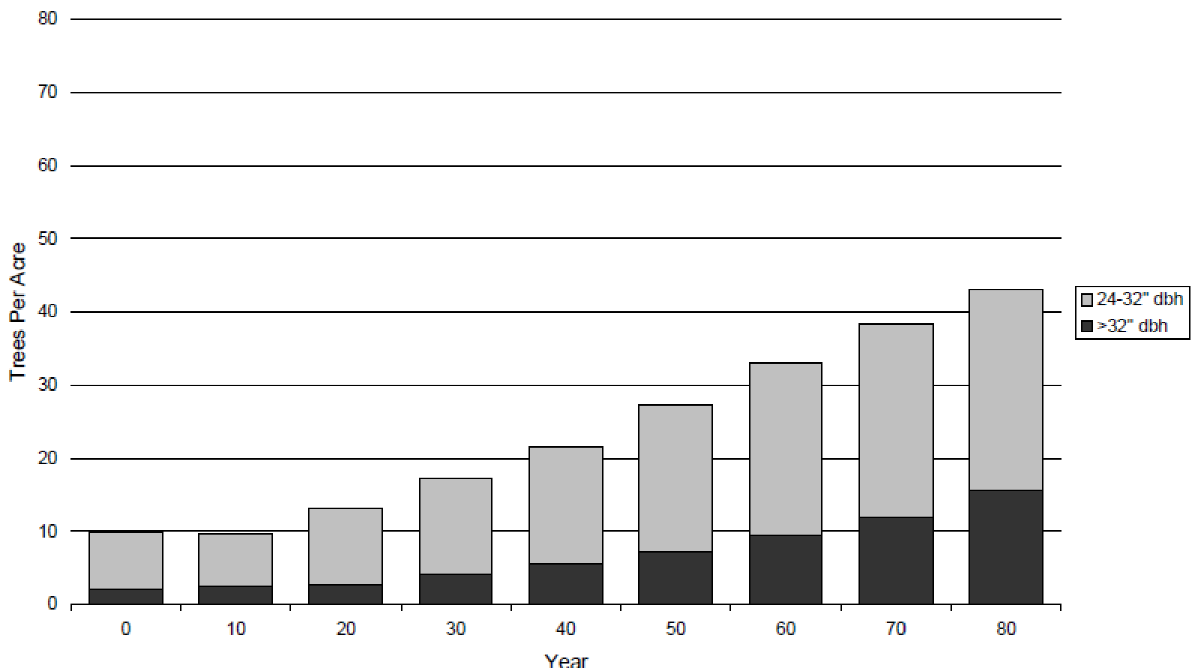


Figure 3.4-8. Large riparian (Aquatic Management Zone) tree density (average trees per acre) predicted under Alternative B.

Large woody debris loading

Outside reserves, guidelines for riparian buffer widths, silvicultural treatments (e.g., basal area retention and large tree retention), and large woody debris retention under would be similar to the No Action alternative, and should all have a positive effect on large woody debris recruitment over time compared with existing conditions. Inside reserves, increases in large woody debris loading would likely be similar to, but greater than, those predicted under Alternative A. Unlike the other alternatives, stream habitat improvement activities (i.e., addition of large woody debris) would not occur outside the reserves. These activities may occur inside reserves if approved by the agencies, but stream habitat improvement would not be a priority under Alternative B due to its focus on habitat for terrestrial species. The amount of high-retention selection harvest in riparian buffers (outside the reserves) would increase from decades 1–4 and would remain relatively stable for the duration of the analysis period (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation).

The index of large woody debris loading in Class I and II streams throughout the primary assessment area would increase from a minimum of 0.01 under existing conditions to a maximum of 0.33 by year 80 (Table 3.4-18) (see Appendix K for a description of methods). Large woody debris recruitment is expected to correspond to the modeled trend in the number large trees (i.e., trees > 24 in [61 cm] diameter at breast height) in the riparian buffer zone over time (Figure 3.4-8). Although the modeled magnitude and rate of increase in large woody debris loading represent increases relative to existing conditions and are greater than trends under the No Action alternative, these trends under Alternative B are lower than under the Proposed Action and Alternative A. The effects of large woody debris recruitment on aquatic and riparian habitat under this alternative would be similar to the No Action alternative.

Table 3.4-18. Large woody debris loading index predicted for Class I and II streams in the primary assessment area under Alternative B.

Stream class		Minimum and maximum index of mean large woody debris loading (m^3/ha) by year[a]								
		0	10	20	30	40	50	60	70	80
Class I	Minimum	0.02	0.02	0.03	0.05	0.07	0.11	0.15	0.20	0.24
	Maximum	0.02	0.02	0.04	0.07	0.10	0.15	0.21	0.28	0.33
Class II	Minimum	0.01	0.01	0.03	0.04	0.06	0.09	0.13	0.17	0.20
	Maximum	0.02	0.02	0.04	0.07	0.10	0.15	0.20	0.28	0.33

[a] An index value of 1 equals the assumed reference level of large woody debris loading (Appendix K).

Stream shading

In riparian buffers outside reserves, the canopy closure guidelines, basal area retention, and large tree retention standards included in the 2012 CFPRs would likely provide modest increases in stream shading and maintain or somewhat improve suitability of stream water temperatures in most parts of the primary assessment area for salmonids and other sensitive aquatic species. Some watershed analysis units would likely experience small reductions in riparian canopy closure, potentially leading to increases in stream water temperature, but these effects would be localized (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). Inside reserves, increases in the size and canopy closure of riparian trees are expected to be greater than those modeled under any alternative, potentially resulting in localized reductions in stream water temperature and effects on aquatic species of concern similar to those predicted under Alternative A.

In the primary assessment area as a whole, timber modeling results show that riparian canopy closure would likely increase relative to existing conditions. Riparian canopy closure along Class I and II streams is expected to increase relative to existing conditions, with the fraction of riparian area experiencing the highest cover class (i.e., > 60%) increasing from 70% at existing conditions to greater than or equal to 83% from years 20–80 (Figure 3.4-9). Although relatively small, the predicted increases in riparian canopy closure could help moderate air and soil temperature and relative humidity in the riparian zone, providing somewhat improved habitat conditions for many amphibians.

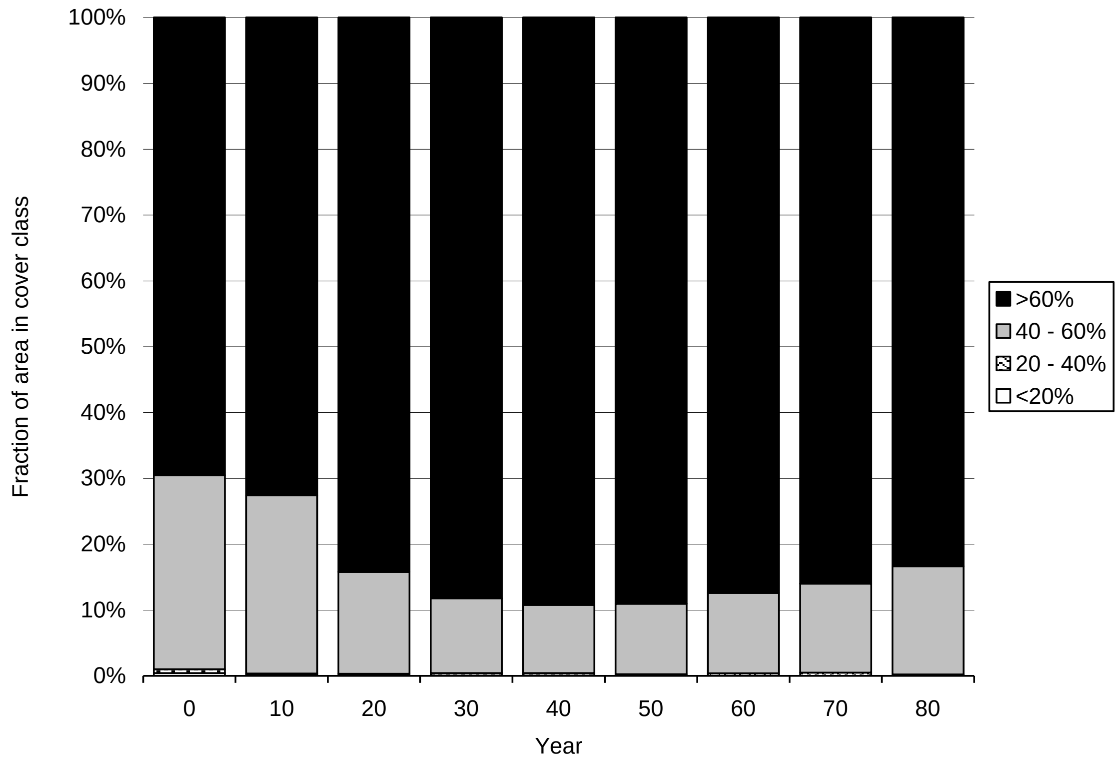


Figure 3.4-9. Canopy closure predicted in Class I and II riparian buffers under Alternative B.

Bank stability

Bank stability in the primary assessment area is expected to remain the same or potentially increase slightly under Alternative B relative to existing conditions. Outside reserves, bank stability measures and guidelines would be similar to the No Action alternative. As under the other alternatives, bank protection measures at water drafting sites would help minimize point-source erosion. In the no-harvest reserves, bank stability would be expected to improve substantially relative to existing conditions and the effects on aquatic species of concern would likely be similar to those described under Alternative A.

Nutrient input

Effects on inputs and cycling of leaf litter and other organic matter under Alternative B would be minimal and similar to those under the No Action alternative. Outside reserves, riparian forest management would be similar to the No Action alternative, with similar reductions in deciduous riparian tree density and allochthonous (i.e., external) nutrient inputs (primarily leaf litter) relative to existing levels. Effects on aquatic species and their habitats would likely be minimal and somewhat mitigated by the benefit of increased large woody debris recruitment, which would increase habitat complexity, promote retention of leaf litter, and increase effectiveness of instream nutrient cycling. In the reserves, nutrient inputs to streams would be expected to increase substantially compared with existing conditions and the effects on aquatic food webs and species of concern would likely be similar to those described under Alternative A.

Summary of effects on aquatic habitat

Under Alternative B, the effects of sediment delivery and riparian conditions, including large woody debris recruitment and other factors discussed above, on aquatic habitats and species of concern would vary in relation to reserve areas. Outside the reserves, increased sediment production from harvest activities would be expected, and streams in these areas and downstream of these areas would experience increases in the amount of fine sediment delivery compared with existing conditions and the other alternatives. Increased deposition of fine sediment on the channel bed surface and within spawning gravel substrates, and reduced pool depth and frequency due to sedimentation, would reduce the quality of spawning and rearing habitat for salmonids and amphibians and could also reduce production of benthic macroinvertebrates used as food by aquatic species. The potential increases in sediment delivery are also likely to degrade aquatic habitat in springs, seeps, and wetlands. In watersheds predominantly draining land within reserves, sediment delivery to stream channels would be reduced compared with existing conditions and the other alternatives, resulting in localized improvements in aquatic habitat conditions relative to existing conditions and potentially minor benefits to aquatic species of concern. Because changes in peak flows and low flows under Alternative B would likely be minor in the primary assessment area, no flow-related effects on aquatic habitat or species of concern are expected.

Outside the reserves, modest improvements in riparian forest conditions and the resulting effects on habitat used by the freshwater life stages of the special-status fish species and riparian microclimate conditions for amphibians and other riparian species would be very similar to the No Action alternative. Inside the reserves there would be no harvest in riparian buffer zones and riparian functions would be enhanced relative to existing conditions and the other alternatives. At the scale of the primary assessment area, large woody debris loading, stream shading, bank stability, and nutrient input would improve somewhat compared with existing conditions, with potential increases in refuge habitat and prey availability and reductions in water temperature. However, improvements would be less than those predicted under the Proposed Action and Alternative A.

Other factors

Under Alternative B, post-fire timber salvage outside the reserves would be the same as under the No Action alternative, and there would be no effect on aquatic and riparian habitat and species of concern compared with existing conditions. There would be no timber salvage operations in the reserves. As under the other alternatives, total herbicide use under Alternative B would decrease compared with existing conditions. There would be no herbicide use in the reserves. Due to the overall decreasing use of herbicides, the low relative rate of application in riparian buffer zones (< 1% of total acreage of land treated; Section 3.10 [Hazards and Hazardous Substances], Table 3.10-3), and the use of solely ground-based application methods (i.e., no aerial spraying), the use of herbicides under Alternative B is not expected to result in mortality (acute effects) or changes in reproductive success (chronic effects) on fish, aquatic invertebrates, or amphibian species of concern. There is insufficient information to determine potential effects on reptile species of concern (i.e., Pacific pond turtle) (Section 3.10.2, Hazards and Hazardous Substances, Environmental effects and mitigation).

Outside the reserves, rock pit operations under Alternative B would continue under the same management prescriptions currently in place, and would, therefore, have no effect compared with existing conditions. Likewise, it is expected that MRC's policies and practices under Alternative B would ensure that there is no effect of illegal fishing or introduction of invasive species on aquatic and riparian habitats and species of concern compared with existing conditions.

Effects on aquatic and riparian species of concern

In addition to the analysis presented here, site-specific effects on aquatic and riparian species of concern under Alternative B would be assessed through the completion of individual THPs, subject to input and review by CAL FIRE, CDFG, and review team agencies to ensure compliance with the CFPRs and other applicable species protection and mitigation requirements.

MRC would continue to conduct certain research and monitoring activities on its forestlands outside of the reserves under Alternative B, which may include surveys for salmonids and California red-legged frogs. Surveys may occasionally include the capture and handling of salmonids and California red-legged frogs. Alternative B does not include any authorization for incidental take of any listed salmonids or amphibians; a separate research or recovery permit issued under Section 10(a)(1)(A) of the federal ESA would be issued to MRC to authorize any incidental take associated with such surveys.

Salmonids (coho salmon, Chinook salmon, steelhead)

Impact 3.4-6. Effects on salmonids from reduced aquatic habitat quality and quantity. Long-term increases in fine sediment delivery to aquatic habitats in many portions of the primary assessment area would result in a loss of usable aquatic habitat and reduction in habitat quality relative to existing conditions. Although the volume of in-channel large woody debris would increase, stream water temperature would decrease in some areas, and riparian functions would improve compared with existing conditions, increased sediment delivery to stream channels from shallow landsliding, harvest areas, and roads would likely result in an overall decrease in the amount and quality of aquatic habitat at the scale of the primary assessment area. The effects on coho salmon (in both the Central California Coast and Southern Oregon/Northern California Coast Evolutionarily Significant Units), Chinook salmon (California Coastal Evolutionarily Significant Unit), and steelhead (both Northern California and Central California Coast Distinct Population Segments) would be **potentially significant**.

Mitigation Measure 3.2-1: Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding. Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding by (1) reducing the amount and rate of clearcut timber harvest, and (2) using aerial yarding (i.e., helicopter) rather than ground-based yarding systems on potentially unstable slopes. Potentially unstable slopes include those in Terrain Stability Unit 1 (inner gorge and steep slopes along low-gradient watercourses), Terrain Stability Unit 2 (inner gorge and steep slopes adjacent to high-gradient watercourses), and Terrain Stability Unit 3 (dissected and convergent topography). This is the same mitigation measure described in Section 3.2.2 (Geology, Soils, and Geomorphology; Environmental effects and mitigation).

Mitigation Measure 3.2-2: Reduce the potential for sediment delivery to stream channels from management-related surface erosion. Reduce the potential for management-related surface erosion (e.g., sheetwash, rilling, and gullying) to stream channels by (1) reducing the amount and rate of clearcut timber harvest; (2) limiting equipment use in headwater streams and swales; and (3) using aerial rather than ground-based yarding systems. This is the same mitigation measure described in Section 3.2.2 (Geology, Soils, and Geomorphology; Environmental effects and mitigation).

Mitigation Measure 3.2-3: Develop and implement a comprehensive road management approach. A comprehensive road management approach ensures that sediment delivery to stream channels from the existing and future road network is minimized by (1) defining when and how road-related point sources of erosion and sediment delivery would be treated; (2) prioritizing removal of road segments that pose the greatest erosion hazards and risks to aquatic resources; (3) specifying best management practices for inventory, maintenance and upgrade of existing roads; (4) specifying when, where and how new roads would be constructed; and (5) regulating road use. A comprehensive road management approach would include a schedule for inventory and control of road-related point sources of sediment and removal of unnecessary road segments. This is the same mitigation measure described in Section 3.2.2 (Geology, Soils, and Geomorphology; Environmental effects and mitigation).

Implementation of these mitigation measures would reduce the effects on salmonids to **less than significant**.

Navarro roach

As discussed in Section 3.3.2 (Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation), changes in riparian canopy closure under Alternative B are expected to be minor in the Navarro River basin, which is where Navarro Roach is found in the primary assessment area. There is no expected effect on stream temperatures and it is likely that suitable thermal habitat would still exist for this species in the Navarro River basin, although the location of preferred habitat might change over time. Therefore, implementation of Alternative B would have **no effect** on Navarro roach.

Tidewater goby

Long-term increases in suspended sediment and turbidity in some portions of the primary assessment area under Alternative B have the potential to cause increased sedimentation of estuarine habitat used by tidewater gobies compared with existing conditions. Although this species requires sandy substrate to construct breeding burrows (and sand input from streams is required for formation and maintenance of coastal barrier sandbars and lagoons that form tidewater goby habitat), excessive sedimentation may degrade conditions needed for breeding burrows, thereby reducing reproductive success. The effects of sediment on estuarine habitat depend on the rate of input relative to the rate of output; inputs from managed watersheds may be greater than, less than, or equivalent to output. However, estuarine sediment input and output cannot be adequately quantified for purposes of this analysis. Increased sedimentation of tidewater goby habitat in currently known occupied tidewater goby localities due to forest management activities under Alternative B is extremely unlikely because none of these localities is fed by streams draining the primary assessment area (USFWS 2005). However, sedimentation of potential (but currently unoccupied) tidewater goby habitat in the primary and secondary assessment areas is possible. Because effects on known populations of tidewater gobies are unlikely, the effects of Alternative B on tidewater gobies would be **less than significant**.

Coastal tailed frog

Within the terrestrial reserves under Alternative B, there would be an increase in conifer-dominated, advanced-successional stands and advanced-successional patch size and connectivity would continue to improve substantially over the 80-year analysis period. Habitat elements—including in-channel large woody debris, stream shading, bank stability, and nutrient input—would naturally re-establish in the absence of forest management, improving microhabitat conditions. Outside of the terrestrial reserves, removal of old-growth trees and less protection of riparian zones could adversely affect stream and riparian habitat conditions for tailed frog, including increased sedimentation and water temperature. Since increased habitat value inside of the reserves would be beneficial, the effects on tailed frogs across the primary assessment area as a whole are considered **less than significant**.

California red-legged frog and northern red-legged frog

Within the terrestrial reserves under Alternative B, habitat elements—including in-channel large woody debris, stream shading, bank stability, and nutrient input—would be enhanced. Outside of the terrestrial reserves, less protection of riparian zones could adversely affect stream and riparian habitat conditions for red-legged frogs, including increased sedimentation of pools. Since increased habitat value inside of the reserves would be beneficial, the effects on red-legged frogs across the primary assessment area as a whole are considered **less than significant**.

Southern torrent salamander

Within the terrestrial reserves under Alternative B, there would be an increase in conifer-dominated, advanced-successional stands and advanced-successional patch size and connectivity would continue to improve substantially over the 80-year analysis period. Habitat elements—including in-channel large woody debris, stream shading, bank stability, and nutrient input—would naturally re-establish in the absence of forest management, improving microhabitat conditions. Outside of the terrestrial reserves, removal of old-growth trees and less protection of riparian zones could adversely affect stream and riparian habitat conditions for southern torrent salamander, including increased sedimentation and water temperature. Since increased habitat value inside of the reserves would be beneficial, the effects on southern torrent salamander across the primary assessment area as a whole are considered **less than significant**.

Foothill yellow-legged frog

Within the terrestrial reserves under Alternative B, the volume of in-channel large woody debris, bank stability, and nutrient input would likely improve compared with existing conditions. Outside the reserves, even-aged management may offer openings in riparian canopy cover that could benefit foothill yellow-legged frogs by increasing basking opportunities for thermoregulation. Long-term increases in fine sediment delivery to aquatic habitats outside the reserves would reduce habitat quality for foothill yellow-legged frog relative to existing conditions. Due to overall improvements in riparian functions and in-channel habitat complexity at the scale of the primary assessment area, the resulting effects on foothill yellow-legged frog would be **less than significant**.

Pacific pond turtle

There is no documented evidence that Pacific pond turtles are particularly sensitive to the increases in turbidity that are expected outside the reserves under Alternative B. The volume of in-channel large woody debris, bank stability, and nutrient input inside the reserves would likely improve compared with existing conditions. Even-aged management outside of the reserves may offer openings in riparian canopy cover that could benefit pond turtles by increasing thermoregulatory and nesting opportunities. Since changes predicted under Alternative B are not expected to substantially reduce the quantity or quality of habitat for the species overall, there are likely **no effects** on Pacific pond turtle.

3.4.2.6 Alternative C

Effects on sediment delivery

Effects on sediment delivery to stream channels under Alternative C would be identical to those during the first 40 years of the Proposed Action (Section 3.2.2; Geology, Soils, and Geomorphology; Environmental effects and mitigation). Fewer management-related landslides and less management-related surface erosion associated with roads and harvest areas would reduce sediment delivery to stream channels relative to existing conditions. During the 40-year implementation period, reduced sediment delivery to stream channels under Alternative C would result in higher quality aquatic habitat by reducing episodic and chronic turbidity and suspended sediment concentrations and the amount of fine sediment deposited on the channel bed surface and within spawning gravels. While some of these benefits may continue to occur after the 40-year incidental take authorization period, management in the primary assessment area after year

40 is unknown and subsequent sediment-related effects on aquatic habitats and species of concern after 40 years of implementation are uncertain.

Effects on stream flow patterns

Effects on peak flows and low flows under Alternative C would be identical to those during the first 40 years of the Proposed Action (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). During the 40-year implementation period, the conservation measures under Alternative C would reduce the effects of forest management on surface runoff and peak flows and reduce soil compaction and disturbance compared with existing conditions. There would likely be no increase in peak flows under Alternative C relative to existing conditions and thus no change in the likelihood of streambed scour that could reduce incubation success of salmonids and other aquatic species. Low flow hydrology in the primary assessment area under Alternative C is not likely to change relative to existing conditions, and no effects on the amount or quality of aquatic habitat are expected. While some of these effects may continue to occur after the 40-year incidental take authorization period, management in the primary assessment area after year 40 is unknown and subsequent flow-related effects on aquatic habitats and species of concern after 40 years of implementation are uncertain.

Effects on riparian conditions

Forest management practices and riparian conservation measures under Alternative C would be the same as those implemented for the first 40 years under the Proposed Action. Riparian functions such as large woody debris recruitment, stream shading, sediment filtration, and bank stability would be enhanced compared with existing conditions. These practices and measures would contribute to maintenance and development of more advanced-successional forest habitat which would provide a more suitable microclimate (e.g., increased relative humidity, and lower air and soil temperatures) for many amphibians and other native species that use habitats along streams, and would improve habitat used by the various life stages of the fish species of concern in primary assessment area drainage basins during the 40-year implementation period. While some of these benefits may continue to occur after the 40-year incidental take authorization period, riparian management in the primary assessment area after year 40 is unknown and subsequent effects on riparian habitats and species of concern after 40 years of implementation are uncertain.

Riparian forest structure

During the first 40 years of implementation, effects on riparian forest structure under Alternative C would be the same as under the Proposed Action. As under the Proposed Action, trees with a diameter at breast height > 32 in (81 cm) are predicted to increase in riparian buffer zones from an estimated 2 trees per acre under existing conditions to approximately 6 trees per acre by year 40; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 8 trees per acre to approximately 20 trees per acre (Figure 3.4-10). While some aspects of riparian forest structure may persist after the 40-year incidental take authorization period, management in the primary assessment area after year 40 is unknown and subsequent changes in riparian forest structure and resulting effects on riparian habitat conditions (e.g., microclimate) and species of concern after 40 years are uncertain.

Large woody debris loading

Under Alternative C, riparian buffer widths and management measures would be identical to the Proposed Action through year 40. Under Alternative C, like the Proposed Action, the index of large woody debris loading increases from as low as 0.01 under existing conditions to as much as 0.24 by year 40 (Table 3.4-19). See Appendix K for a description of large woody debris modeling methods. Large woody debris loading is expected to correspond to the modeled trend of the number large trees (i.e., trees > 24 in [61 cm] diameter at breast height) in the riparian buffer zone over time (Figure 3.4-10).

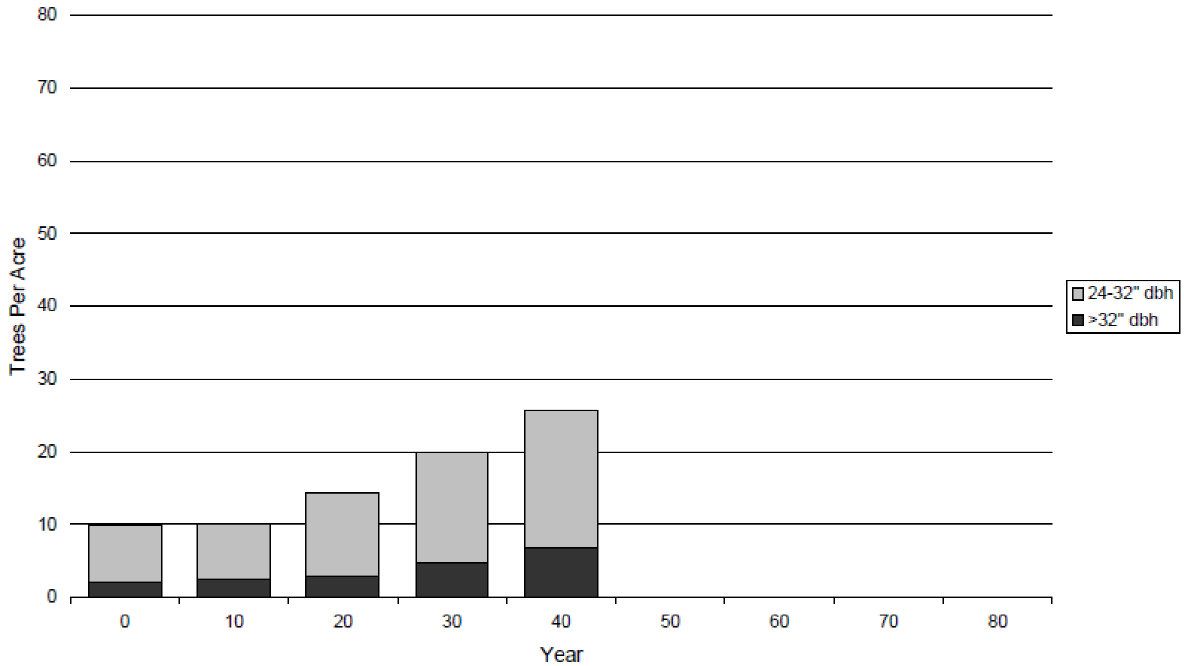


Figure 3.4-10. Large riparian (Aquatic Management Zone) tree density (average trees per acre) predicted under Alternative C.

Table 3.4-19. Large woody debris loading index predicted for Class I and II streams in the primary assessment area under Alternative C.

Stream class		Minimum and maximum index of mean large woody debris loading (m^3/ha) by year[a]				
		0	10	20	30	40
Class I	Minimum	0.02	0.02	0.05	0.10	0.17
	Maximum	0.02	0.03	0.07	0.14	0.24
Class II	Minimum	0.01	0.02	0.04	0.09	0.15
	Maximum	0.02	0.03	0.07	0.14	0.24

[a] An index value of 1 equals the assumed reference level of large woody debris loading (Appendix K).

As under the Proposed Action, MRC's stream habitat improvement program under Alternative C would include placement of large woody debris in priority coho salmon watersheds and other streams in the primary assessment area. Stream habitat improvement would more rapidly increase the benefits of large woody debris recruitment during the 40-year implementation period of Alternative C compared with existing conditions and the No Action alternative.

The predicted overall increase in the rate and volume of large woody debris loading during the 40-year implementation period would increase aquatic habitat heterogeneity and available aquatic habitat for all life stages of salmonid fishes as well as other aquatic organisms including amphibians and aquatic reptiles. Increases in large woody debris loading would add roughness to the channel network, providing cover and velocity refuge for fish and other aquatic species and promoting retention of spawning gravel used by salmonids.

Stream shading

Under Alternative C, the riparian canopy closure guidelines, basal area retention, and large tree retention standards would be the same as those implemented during the first 40 years of the Proposed Action. These measures are expected to help maintain or increase stream shading and maintain or improve suitability of stream water temperatures for salmonids and other sensitive aquatic species compared with existing conditions. Increased riparian shade would also help maintain or enhance riparian microclimate conditions favorable to amphibians and aquatic reptiles. Timber modeling results indicate that riparian canopy closure along Class I and II streams would likely increase relative to existing conditions, with the fraction of riparian area in the densest cover class (i.e., > 60%) increasing from 70% at existing conditions to at least 85% by years 30–40 (Figure 3.4-11). Although the increased canopy closure is not as large as the increase predicted under the No Action alternative, the wider riparian buffers and greater long-term increases in large tree retention under Alternative C, as under the Proposed Action, would result in greater benefits to other riparian functions (e.g., microclimate, large woody debris recruitment) compared with existing conditions and the No Action alternative. A denser riparian canopy combined with increased average tree heights associated with development of more advanced-successional forest conditions and increased density of larger trees should increase stream shading and result in decreased water temperatures in primary assessment area streams during the 40-year implementation period. Although these changes would have the greatest potential to benefit salmonids and cold water-associated amphibian species via maintenance or reduction of stream water temperature, enhanced riparian forest structure would also help moderate air and soil temperature and relative humidity in the riparian buffer zone, providing improved microhabitat conditions for amphibians relative to existing conditions.

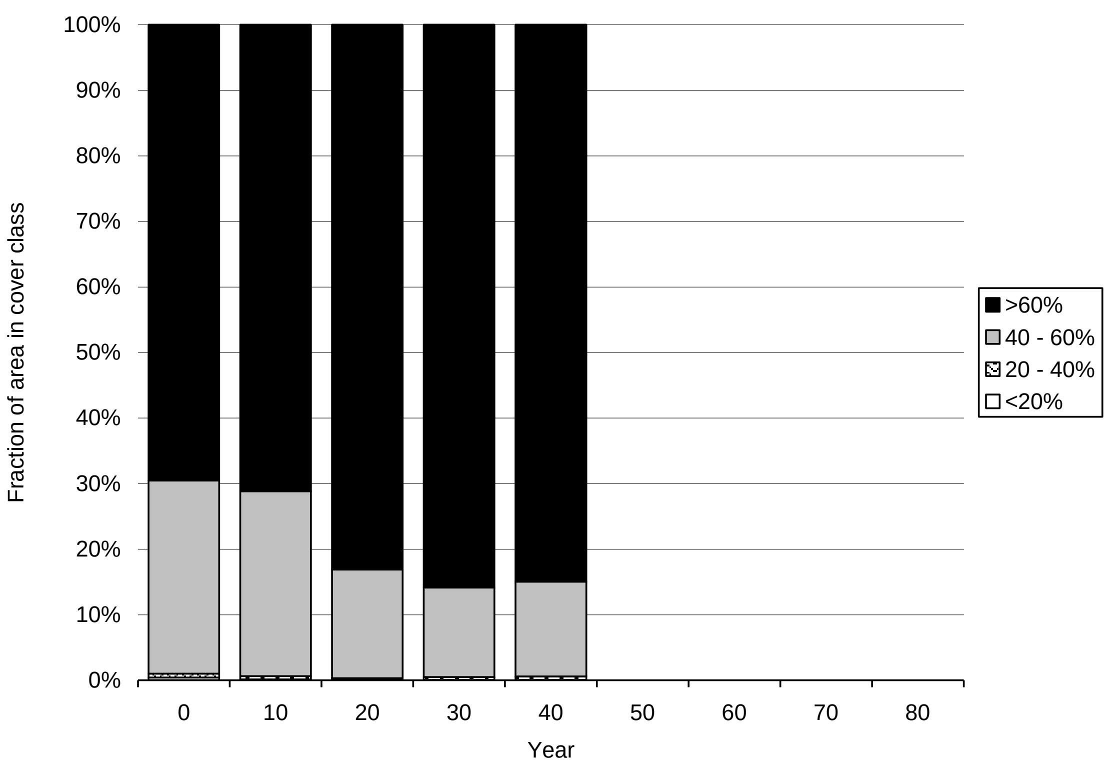


Figure 3.4-11. Canopy closure predicted in Class I and II riparian buffers under Alternative C.

Bank stability

Effects on bank stability under Alternative C would be to the same as those under the Proposed Action through year 40**.** Limits on ground disturbance within riparian buffer zones in the primary assessment area and bank protection measures at water drafting sites would limit point-source erosion. Combined with a trend of reduced sediment delivery to stream channels, a road and crossing management plan, reduced peak flows, and increasing recruitment of large woody debris, bank instability and erosion rates should be reduced over time compared with existing conditions.

Nutrient input

Effects on nutrient inputs and cycling under Alternative C would be to the same as those under the Proposed Action through year 40. Nutrient inputs and cycling under Alternative C would not differ appreciably from existing conditions.

Summary of effects on aquatic habitat

Aquatic habitat conditions under Alternative C are expected to improve compared with existing conditions, with the same effects as during the first 40 years of the Proposed Action. Reductions in sediment delivery to stream channels relative to existing conditions, combined with riparian forest recovery, would contribute to improvements in habitat used by aquatic and riparian species of concern. Stream substrate conditions and fine sediment effects should improve during the 40-year implementation period due to improved road management and forest management in riparian buffer zones, leading to reduced sediment loading. Stream water temperature should decrease slightly because of increased canopy cover as a consequence of increased riparian protection measures under Alternative C. Measures for large tree retention, basal area retention, and large woody debris retention would maintain or enhance in-channel large woody debris and provide increased large woody debris recruitment potential compared with existing conditions, aiding pool formation, improving spawning gravel quality and quantity, providing refugia from peak flows, and providing overwintering habitat for anadromous and resident salmonids and other fishes. Stream-crossing improvements should increase aquatic habitat connectivity and in turn potentially increase overall available habitat, particularly for migratory fish. While some of these benefits may continue to occur after the 40-year incidental take authorization period, aquatic and riparian habitat management in the primary assessment area after year 40 is unknown and subsequent effects on aquatic and riparian habitats and species of concern after 40 years of implementation are uncertain.

Other factors

Effects of post-fire timber salvage under Alternative C would be the same as under the Proposed Action for the first 40 years, with potential benefits to aquatic and riparian habitats and species of concern due to reduced sediment delivery to streams and other aquatic habitats. Under Alternative C, as under the other alternatives, herbicides and adjuvants would continue to be used by MRC under regulation by the California Department of Agriculture and the Environmental Protection Agency. As described in Section 3.10.2 (Hazards and Hazardous Substances, Environmental effects and mitigation), there would be little to no change in the application method, frequency, and type of herbicide and adjuvant for control of vegetation compared with existing conditions. Total herbicide use under Alternative C would decrease compared with existing conditions. Due to the decreasing use of herbicides, the low relative rate of application in riparian buffer zones (< 1% of total acreage of land treated; Section 3.10 [Hazards and Hazardous Substances], Table 3.10-3), and the use of solely ground-based application methods (i.e., no aerial spraying), the use of herbicides under Alternative C is not expected to result in mortality (acute effects) or changes in reproductive success (chronic effects) on fish, aquatic invertebrates, or amphibian species of concern. There is insufficient information to determine potential effects on reptile species of concern (i.e., Pacific pond turtle) (Section 3.10.2, Hazards and Hazardous Substances, Environmental effects and mitigation).

Under Alternative C, the proposed HCP would include management practices to avoid creating rock pits within the Aquatic Management Zone (riparian zone) of Class I and II streams, and sediment routing measures to minimize delivery of sediment from rock pits to streams. These measures should somewhat reduce the risk of sediment delivery from rock pit activities compared with existing conditions.

It is expected that MRC's policies and practices under Alternative C would ensure that there is no effect of illegal fishing or introduction of invasive species on aquatic and riparian habitats and species of concern compared with existing conditions.

Effects on aquatic and riparian species of concern

In addition to the analysis presented here, site-specific effects on aquatic and riparian species of concern under Alternative C would be assessed and appropriate mitigation measures developed through completion of individual PTHPs, subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with applicable species protection and mitigation requirements.

Salmonids (coho salmon, Chinook salmon, steelhead)

The effects of Alternative C on coho salmon (in both the Central California Coast and Southern Oregon/Northern California Coast Evolutionarily Significant Units), Chinook salmon (California Coastal Evolutionarily Significant Unit), and steelhead (both Northern California and Central California Coast Distinct Population Segments) would be the same as those under the Proposed Action for the first 40 years, and would be **beneficial**.

Navarro roach

Effects under Alternative C would be the same as those in the first 40 years under the Proposed Action. The general decrease in water temperatures expected under Alternative C could reduce the amount or alter the distribution of rearing and foraging habitat for Navarro roach in the Navarro River basin, which is where Navarro Roach is found in the primary assessment area, since this species generally requires warm water temperatures. Although the amount and/or location of habitat in the preferred thermal range could change relative to existing conditions, it is likely that the reduced water temperatures would more closely resemble the pre-European conditions under which this species evolved. These potential changes would not likely reduce the potential for successful rearing and foraging by this species throughout its range, which includes the Russian River in the secondary assessment area. Therefore, this effect would be **less than significant**.

Tidewater goby

As under the Proposed Action, sediment delivery to streams would decrease under Alternative C and turbidity, suspended sediment, and peak flows would be reduced. Although this species requires sandy substrate to construct breeding burrows (and sand input from streams is required for formation and maintenance of coastal barrier sandbars and lagoons that form tidewater goby habitat), excessive sedimentation may degrade conditions needed for breeding burrows, thereby reducing reproductive success. The effects of sediment on estuarine habitat depend on the rate of input relative to the rate of output; inputs from managed watersheds may be greater than, less than, or equivalent to output. However, estuarine sediment input and output cannot be adequately quantified for purposes of this analysis. Compared with existing conditions, the potential for excessive sedimentation of tidewater goby habitat in estuaries downstream of the primary assessment area would be reduced. It is unlikely that sediment supply would be reduced to an extent that would be detrimental to tidewater gobies. Therefore, **no effects** on tidewater gobies are expected.

Amphibian and aquatic reptile species of concern

The effects of Alternative C on coastal tailed frog, California red-legged frog, northern red-legged frog, southern torrent salamander, and Pacific pond turtle would be similar to those of the Proposed Action for the first 40 years, and would be **beneficial**. The effects of Alternative C on foothill yellow-legged frog would be **less than significant**.

3.4.2.7 Comparison of alternatives

Table 3.4-20 provides a summarized comparison of effects on aquatic and riparian habitats and species of concern under each of the alternatives.

Overall, the Proposed Action would provide enhanced aquatic and riparian habitat benefits compared with the No Action alternative, but the effects would not be as beneficial as those under Alternative A. Alternative B would be similar to the No Action alternative, with modest additional benefits and reduction in adverse effects due to the prohibition of commercial timber harvest inside of terrestrial reserves and reduced percentage of area harvested for the primary assessment area as a whole. However, increased peak flows and sediment delivery to aquatic habitats outside of the terrestrial reserves under Alternative B would result in adverse effects on aquatic and riparian habitats and species of concern at the scale of the primary assessment area. Effects on aquatic and riparian habitats under Alternative C are similar to the Proposed Action for a period of 40 years, but some benefits of conservation and adaptive management measures would not be realized in 40 years.

Sediment delivery to aquatic habitats would increase under the No Action alternative and Alternative B. Under the Proposed Action, Alternative A, and Alternative C, sediment delivery would be reduced compared with existing conditions, resulting in improved aquatic habitat conditions. Effects due to changes in hydrology and flow patterns would be most pronounced under the No Action alternative, with increased peak flows in some watersheds. The Proposed Action, Alternative A, and Alternative C would all have beneficial effects on aquatic habitat conditions related to hydrology and stream flow patterns. Under Alternative B, only negligible changes in peak flows or low flows relative to existing conditions would be expected at the scale of the primary assessment area.

Under every alternative there would be a shift from hardwood-dominated to more conifer-dominated riparian habitats. Timber modeling results indicate that advanced-successional habitat in riparian buffer zones would increase under all alternatives. The increase would be greatest under Alternative A (increase from existing levels of 7% to over 98% by year 80), followed by the Proposed Action (80%), No Action alternative (77%), and Alternative B (68%). The increasing trend in advanced-successional riparian habitat under Alternative C is identical to the Proposed Action through year 40 (both increase to about 34% by year 40), but conditions after year 40 are uncertain under Alternative C because management could change after the 40-year incidental take authorization term expires.

Timber modeling results indicate a predicted increase in large tree density in riparian buffer zones under all alternatives, which would promote recruitment of in-channel large woody debris that would benefit aquatic and riparian species of concern. Similar to increases in advanced-successional habitat, the greatest increase in large tree density within riparian buffer zones would occur under Alternative A, followed in order by the Proposed Action, Alternative B, and the No Action alternative. The increase in large tree density would result in predicted increases in large woody debris loading rates under all alternatives, with particularly pronounced, and similar, increases by year 80 predicted for both the Proposed Action and Alternative A. Increases under the No Action alternative and Alternative B would be similar and much more modest by year 80. Similar modest increases in large woody debris loading rates are predicted through year 40 under Alternative C (the same as predicted under the Proposed Action).

Alternative A would result in the most protections for salmonids and other aquatic and riparian species of concern as a result of management and conservation measures that substantially improve riparian and aquatic habitat conditions and functions. The Proposed Action would also provide benefits for aquatic and riparian habitats and species of concern, though the benefits would be slightly less than those under Alternative A. Alternative C offers the same benefits as the Proposed Action, but only for a duration of 40 years. Some of the greatest benefits expected under the Proposed Action and Alternative A require longer time periods of up to 80 years to develop more fully (particularly increases in canopy closure/stream shading and large tree density in riparian buffer zones, and in-channel large woody debris loading rates). Reduced sediment delivery compared with existing conditions would likely improve the quality of spawning substrates, increase pool habitat, and improve production of benthic macroinvertebrates under Alternative A, the Proposed Action, and Alternative C.

The No Action alternative and Alternative B would provide some beneficial effects on aquatic and riparian habitats, primarily resulting from increases in riparian buffer zone large tree density, canopy closure/stream shading, and in-channel large woody debris loading, but benefits would be less than under the Proposed Action and Alternative A. Under the No Action alternative and Alternative B, improvements in riparian forest conditions and functions would be substantially offset by potentially detrimental effects related to sediment delivery and peak flow increases in some watersheds. Increased sedimentation under the No Action alternative and Alternative B could fill pools and gravel interstices, reduce habitat complexity, and reduce production of benthic macroinvertebrate food resources, thereby reducing the quality and quantity of spawning and rearing habitat for juvenile salmonids and other aquatic species of concern. Increased peak flows under the No Action alternative could cause increased scour of salmonid and amphibian eggs and spawning substrates, potentially reducing spawning success.

Table 3.4-20. Comparison of alternatives for aquatic and riparian habitats and species of concern.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Sediment delivery	Increased rate and magnitude of sediment delivery to aquatic habitats from landslides, roads, and harvest areas compared with existing conditions.	Forest management, silviculture treatments, and road management would reduce sediment delivery to aquatic habitats compared with existing conditions and the No Action alternative.	Management and conservation measures similar to but more protective than the Proposed Action. Reduced sediment delivery to aquatic habitats compared with existing conditions and the No Action alternative.	Increased rate and magnitude of sediment delivery to aquatic habitats from landslides, roads, and harvest areas relative to existing conditions. At the scale of the primary assessment area, landslide- and road-related sediment delivery would be similar to the No Action alternative. Outside reserves, sediment delivery from harvest areas would be greater than No Action and other alternatives.	Same as the Proposed Action through year 40: reduced sediment delivery compared with existing conditions and No Action. Effects after year 40 are uncertain.
Stream flow patterns	Increase in area harvested would increase low flows in some watersheds and increase peak flows relative to existing conditions.	Amount of land harvested per decade would be less than existing conditions, with slightly reduced peak flows and no appreciable change in low flows relative to existing conditions. Peak flows and low flows would likely be lower than under the No Action alternative.	Slightly reduced peak flows and no appreciable change in low flows relative to existing conditions. Peak flows and low flows would likely be similar to Proposed Action and lower than under the No Action alternative.	Peak flows may increase and low flows may decrease in some watersheds relative to existing conditions due to clearcutting outside reserves. However, with no harvest in reserves and an overall reduction in amount of harvest relative to existing conditions, no effects on stream flow patterns are expected at the scale of the primary assessment area.	Peak flows and low flows same as Proposed Action and lower than under the No Action alternative through year 40. Reduced peak flows and no change in low flows compared with existing conditions. Effects after year 40 are uncertain.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Riparian forest structure	Increase in advanced-successional riparian forest and increased density of large riparian trees (24-32 in and > 32 in) relative to existing conditions.	Increase in advanced-successional riparian forest and increased density of large riparian trees (24-32 in and > 32 in) relative to existing conditions. Increases would be greater and more rapid than under the No Action alternative.	Increase in advanced-successional riparian forest and increased density of large riparian trees (24-32 in and > 32 in) relative to existing conditions. Increases would be greater and more rapid than under the No Action and Proposed Action.	Increase in advanced-successional riparian forest and increased density of large riparian trees (24-32 in and > 32 in) at the scale of the primary assessment area relative to existing conditions. Increase in advanced-successional habitat less than No Action alternative. Increases in large riparian tree density greater than No Action but less than Proposed Action and Alternative A	Same as the Proposed Action through year 40: increase in advanced-successional riparian forest and density of large riparian trees compared with existing conditions and No Action alternative. Effects after year 40 are uncertain.
Large woody debris loading	Large woody debris recruitment and the modeled index of large woody debris loading in Class I and II streams would increase relative to existing conditions in response to increases in advanced-successional riparian forest and large tree density (see above).	Large woody debris recruitment and the modeled index of large woody debris loading in Class I and II streams would increase relative to existing conditions in response to increases in advanced-successional riparian forest and large tree density (see above). Increases in recruitment and loading would be greater and more rapid than under the No Action alternative. Large woody debris placement for aquatic habitat improvement would provide added benefits in priority coho salmon watersheds.	Large woody debris recruitment and the modeled index of large woody debris loading in Class I and II streams would increase relative to existing conditions in response to increases in advanced-successional riparian forest and large tree density (see above). Increases would be greater and more rapid than under the No Action and Proposed Action. Large woody debris placement for aquatic habitat improvement would provide added benefits in priority coho salmon watersheds.	Large woody debris recruitment and the modeled index of large woody debris loading in Class I and II streams would increase relative to existing conditions in response to increases in advanced-successional riparian forest and large tree density (see above). Increase in advanced-successional habitat less than No Action alternative. Increases in large riparian tree density greater than No Action but less than Proposed Action and Alternative A. Increases in the index of large woody debris loading similar to No Action.	Same as the Proposed Action through year 40: increase in large woody debris recruitment and loading compared with existing conditions and No Action, with greater and more rapid increase than under the No Action alternative. Effects after year 40 are uncertain.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Stream shading	Stream shading would increase relative to existing conditions as riparian forest density and canopy cover increase. The modeled amount of riparian area in the densest canopy cover class (i.e., > 60%) would increase from 70% at existing conditions to ≥ 90% from years 20–80. Potential effects would include lower stream water temperatures and reduced variability of riparian air and soil temperature and relative humidity.	Stream shading would increase relative to existing conditions and the No Action alternative. The modeled amount of riparian area in the densest canopy class would increase from 70% at existing conditions to 80–85% starting in year 20. Additional riparian basal area and canopy retention measures, which cannot be accurately modeled, would result in improved stream shading relative to the No Action alternative. Also, wider riparian buffers and greater increases in large tree retention under the Proposed Action would provide added benefits compared with existing conditions and the No Action alternative. Potential effects would include lower stream water temperatures and reduced variability of riparian air and soil temperature and relative humidity.	Stream shading would increase relative to existing conditions and the Proposed Action. The modeled amount of riparian area in the densest canopy class would increase from 70% at existing conditions to 90% by year 20 and > 95% from year 30 on. Potential effects, including lower stream water temperatures and reduced variability of riparian air and soil temperature and relative humidity, would be greater under Alternative A than any other alternative.	Changes in stream shading in riparian buffers outside reserves would be variable, with increases in some areas and decreases in others. In the primary assessment area as a whole, stream shading would likely increase somewhat relative to existing conditions. The modeled amount of riparian area in the densest canopy class would increase from 70% at existing conditions to ≥ 83% from years 20–80. Potential effects would include lower stream water temperatures and reduced variability of riparian air and soil temperature and relative humidity compared with existing conditions. These benefits would be less than under the Proposed Action and Alternative A.	Same as the Proposed Action through year 40: increase in amount of densest riparian canopy relative to existing conditions, starting in year 20. Lower stream water temperatures and reduced variability of riparian air and soil temperature and relative humidity compared with existing conditions and the No Action alternative. Effects after year 40 are uncertain.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Bank stability	Bank stability would remain the same or potentially increase relative to existing conditions due to timber retention standards, bank protection measures at water drafting sites, and other limits on site disturbance in riparian buffers.	Bank stability would likely increase relative to existing conditions and the No Action alternative due to timber retention standards, a comprehensive road and crossing management plan, reduced peak flows, bank protection measures at water drafting sites, and other limits on site disturbance in riparian buffers.	Bank stability would likely increase under Alternative A relative to existing conditions and the Proposed Action. Conservation and management measures would include those described under the Proposed Action, plus a wide no-cut riparian zone along Class I streams and additional measures to reduce bank disturbance and erosion on steep streamside slopes in the primary assessment area.	Bank stability at the scale of the primary assessment area would likely remain the same or potentially increase slightly relative to existing conditions. Outside reserves, bank stability measures and guidelines would be similar to the No Action alternative. In reserves, bank stability would likely be similar to Alternative A.	Same as the Proposed Action through year 40: increased bank stability compared with existing conditions and the No Action alternative. Effects after year 40 are uncertain.
Nutrient input	There would be little, if any, change in nutrient input relative to existing conditions. Riparian management measures would result in a largely conifer-dominated riparian forest with reduced inputs of deciduous leaf litter. However, increased large woody debris loading would likely improve nutrient retention and aquatic nutrient cycling functions.	The effects of the Proposed Action on nutrient inputs would be the same as under the No Action. Nutrient inputs and cycling under the Proposed Action would not differ appreciably from existing conditions.	Under Alternative A, nutrient inputs from riparian areas would be greater and nutrient cycling would be enhanced compared with existing conditions and the Proposed Action, primarily due to implementation of no-cut riparian buffers along Class I streams and increased large woody debris recruitment.	At the scale of the primary assessment area there would be little, if any, change in nutrient input relative to existing conditions. Outside the reserves, effects would be the same as those under the No Action alternative. Inside reserves, nutrient inputs to streams would likely increase substantially compared with existing conditions and the effects would be similar to those described under Alternative A.	Same as the Proposed Action through year 40: no appreciable differences in nutrient input compared with existing conditions. Effects after year 40 are uncertain.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Aquatic habitat summary	An overall loss of usable aquatic habitat and reduction in habitat quality would likely occur relative to existing conditions. Despite increases in stream large woody debris loading, increased sediment delivery to aquatic habitats would likely reduce pool depth and frequency in streams and reduce the quantity and quality of habitat in streams, springs, seeps, and wetlands. Sedimentation of spawning gravels plus episodes of elevated turbidity and suspended sediment associated with high flow events would likely reduce habitat quality for spawning salmonids and for benthic macroinvertebrate communities.	Aquatic habitat conditions would improve compared with existing conditions and the No Action alternative. Reduced sediment delivery to aquatic habitats and peak flows and increased large woody debris loading relative to existing conditions would improve spawning gravel quality and quantity, aid pool formation, and provide high flow refuge habitat. Stream water temperature would decrease slightly because of increased riparian canopy cover. Aquatic habitat improvement projects would contribute to additional, more rapid improvement to aquatic habitat compared with existing conditions and the No Action alternative. Stream crossing improvements should increase aquatic habitat connectivity and in turn increase overall available habitat.	Aquatic habitat quality and quantity would increase under Alternative A compared with existing conditions and the No Action alternative, with even greater benefits than those under the Proposed Action.	Increased sediment delivery to aquatic habitats outside the reserves and in downstream areas would reduce the quality of stream spawning and rearing habitat and aquatic habitat in springs, seeps, and wetlands compared with existing conditions and the other alternatives. Small improvements in riparian forest conditions outside reserves would result in modest improvements in aquatic habitat conditions. In watersheds predominantly draining land within reserves, sediment delivery to stream channels would be reduced and aquatic habitat conditions would improve compared with existing conditions and the other alternatives. Inside the reserves there would be no harvest in riparian buffer zones and aquatic habitat would be enhanced relative to existing conditions and the other alternatives. At the scale of the primary assessment area, increased large woody debris and riparian forest conditions would drive potential increases in high flow refuge habitat and reductions in water temperature relative to existing conditions, but sedimentation would likely increase. Improvements would be less than those predicted under the Proposed Action and Alternative A.	Same as the Proposed Action through year 40: increased aquatic habitat quality and quantity compared with existing conditions and the No Action alternative. Effects after year 40 are uncertain.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Other factors	Effects of post-fire timber salvage, rock pit operations, illegal fishing, and invasive species on aquatic habitats and species of concern would not change compared with existing conditions. Herbicide use (Section 3.10, Hazards and Hazardous Substances) would decrease relative to existing conditions and the potential for adverse effects on aquatic and riparian species of concern is expected to be low.	Measures to avoid and minimize sediment delivery associated with post-fire timber salvage and rock pit operations would likely reduce sedimentation of aquatic habitats from these activities compared with existing conditions and the No Action alternative. Effects of illegal fishing and invasive species on aquatic habitats and species of concern would not change compared with existing conditions. Herbicide use (Section 3.10, Hazards and Hazardous Substances) would decrease relative to existing conditions and the potential for adverse effects on aquatic and riparian species of concern is expected to be low.	Same as the Proposed Action.	Same as the No Action alternative outside reserves. Post-fire salvage, rock pit operations, and herbicide use prohibited inside reserves.	Same as the Proposed Action through year 40. Effects after year 40 are uncertain.
Aquatic and riparian species of concern					
Salmonids (coho salmon, Chinook salmon, steelhead)	**Potentially significant effects** due to reductions in aquatic habitat quantity and quality from increased sediment delivery to aquatic habitats.	**Beneficial effects** from improvements to aquatic and riparian habitat conditions relative to existing conditions and the No Action alternative.	**Beneficial effects** from improvements to aquatic and riparian habitat conditions relative to existing conditions and the No Action alternative. Benefits would likely be greater than those under the Proposed Action.	**Potentially significant effects**: reduced habitat quantity and quality from increase in sediment deposition compared with existing conditions, despite overall improvements in large woody debris water temperature, and riparian functions at the scale of the primary assessment area. With mitigation, these effects would be **less than significant**.	Same as the Proposed Action through year 40. Effects after year 40 are uncertain.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Navarro roach	**Less than significant effects** due to potential decrease in stream water temperature and resulting change in the amount and location of warm water habitat compared with existing conditions.	Same as the No Action alternative.	Same as the No Action alternative.	**No effect.** Likely no effect on stream temperatures in the Navarro River basin, so suitable thermal habitat would still exist for this species.	Same as the No Action alternative and the Proposed Action through year 40. Effects after year 40 are uncertain.
Tidewater goby	**Less than significant effects** due to potential for increased sedimentation in potential habitat at currently unoccupied locations.	**No effect**. Reduced turbidity, suspended sediment, and peak flows compared with existing conditions and the No Action, and thus reduced potential for excessive sedimentation of tidewater goby habitat in estuaries downstream of the primary assessment area.	Same as the Proposed Action.	Same as the No Action alternative.	Same as the Proposed Action through year 40. Effects after year 40 are uncertain.
Coastal tailed frog	**Potentially significant effects** due to decreased habitat value from increase in sediment deposition.	**Beneficial effects** from improvements to aquatic and riparian habitat conditions.	**Beneficial effects** from improvements to aquatic and riparian habitat relative to existing conditions and the No Action alternative. Improvements would be greater than under the Proposed Action.	**Less than significant effects** due to decreased habitat value from increased sediment deposition and water temperature outside the reserves, but improvements to microhabitat conditions inside the reserves from natural re-establishment of in-channel large woody debris, stream shading, bank stability, and nutrient input.	Same as the Proposed Action through year 40. Effects after year 40 are uncertain.
California red-legged frog/northern red-legged frog	**Potentially significant effects** due to decreased habitat value from increase in sediment deposition.	**Beneficial effects** from improvements to aquatic and riparian habitat conditions.	**Beneficial effects** from improvements to aquatic and riparian habitat relative to existing conditions and the No Action alternative. Improvements would be greater than under the Proposed Action.	**Less than significant effects** due to decreased habitat value from increased sediment deposition outside the reserves, but improvements to habitat elements inside the reserves including in-channel large woody debris, stream shading, bank stability, and nutrient input.	Same as the Proposed Action through year 40. Effects after year 40 are uncertain.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Southern torrent salamander	**Potentially significant effects** due to decreased habitat value from increase in sediment deposition.	**Beneficial effects** from improvements to aquatic and riparian habitat conditions.	**Beneficial effects** from improvements to aquatic and riparian habitat relative to existing conditions and the No Action alternative. Improvements would be greater than under the Proposed Action.	**Less than significant effects** due to decreased habitat value from increased sediment deposition and water temperature outside the reserves, but improvements to microhabitat conditions inside the reserves from natural re-establishment of in-channel large woody debris, stream shading, bank stability, and nutrient input.	Same as the Proposed Action through year 40. Effects after year 40 are uncertain.
Foothill yellow-legged frog	**Potentially significant effects** due to decreased habitat value from increase in sediment deposition.	**Less than significant effects** due to decrease in water temperatures and decrease in basking opportunities; improvement in habitat value from decrease in sediment deposition.	**Less than significant effects** due to decrease in water temperatures and decrease in basking opportunities relative to existing conditions; improvement in habitat value from decrease in sediment deposition relative to existing conditions and the No Action alternative. Improvements would be greater than under the Proposed Action.	**Less than significant effects** due to decreased habitat value outside the reserves from increased sediment delivery to aquatic habitats (though basking opportunities will increase), but improvements to habitat conditions inside the reserves from increasing in-channel large woody debris, bank stability, and nutrient input.	Same as the Proposed Action through year 40. Effects after year 40 are uncertain.
Pacific pond turtle	**Less than significant effects** due to infilling of pools and reduction in terrestrial nesting and basking habitat.	**No effect** overall due to adverse effects of increased shading and positive effects from increased large woody debris recruitment and deeper pools.	Same as the Proposed Action.	**No effect** overall on Pacific pond turtle due to an increase in canopy openings for basking but diminished health of the riparian zone outside the reserves, and a healthier riparian zone (e.g., large woody debris recruitment) but increased riparian shade (which would reduce basking habitat) inside the reserves.	Same as the Proposed Action through year 40. Effects after year 40 are uncertain.

3.4.3 PTEIR alternate standard analysis for the Proposed Action, Alternative A, and Alternative C

In its TMP (Appendix A) and HCP/NCCP, MRC has proposed alternate standards to the current (2012) CFPRs, which would be implemented and included in PTHPs prepared under the Proposed Action, Alternative A, or Alternative C. Alternate standards are not proposed for the No Action alternative because no TMP, HCP, or NCCP would be implemented. Likewise, alternate standards are not proposed for Alternative B because no TMP or NCCP would be implemented. The 2012 CFPRs (14 CCR §1092[b]) authorize CAL FIRE to accept alternate standards in a PTHP where it has been demonstrated in a PTEIR that the alternate standard provides resource protections that are equal to or better than the standard operational rule and its implementation would have a less than significant impact on the environment. Also, where future changes in the CFPRs occur, the current operational standards (2012 CFPRs) may be accepted by CAL FIRE as alternate standards where the PTEIR has similarly demonstrated a less than significant impact.

The proposed alternate standards were reviewed by the lead agencies to determine the resource area(s) to which they apply (see Attachment D to Appendix A). For each alternate standard that applies to Aquatic and Riparian Habitats and Species of Concern, the analysis in Sections 3.4.2.3, 3.4.2.4, and 3.4.2.6 and the cumulative effects analysis in Sections 4.4.2, 4.4.3, and 4.4.5 demonstrates that its implementation as part of the Proposed Action, Alternative A, or Alternative C would provide equal or better protection to Aquatic and Riparian Habitats and Species of Concern than the 2012 CFPR standard and its implementation would either (1) not result in adverse environmental impacts or (2) result in impacts that are below the level of significant effect on the environment. This analysis considered the effects of implementing the proposed alternate standards as part of a suite of management and conservation measures contained in the HCP, NCCP, and TMP.

The following are the CFPRs for which alternate standards (or current operational standards, which due to a rule change could become an alternate standard) have been proposed by MRC in its TMP (Appendix A) and/or its HCP/NCCP and are applicable to Aquatic and Riparian Habitats and Species of Concern:

895.1, 913.1(a)(2)(A), 913.1(a)(2)(E), 913.3(b), 913.3(b)(1-3), 913.4(a), 913.4(b), 913.4(d)(1-2), 913.4(d)(3)(A), 913.6(b)(4), 913.6(e)(1), 914.1(a), 914.1(c), 914.2(d), 914.2(f-i), 914.3(a), 914.6, 914.7(a), 914.7(b), 914.7(b)(3,4,5,7,9,10,11), 914.8(d-f), 915, 915.1, 915.2, 915.3, 915.4, 916.2(b-c), 916.3, 916.3(a), 916.3(c-g), 916.4(b-f), 916.5, 916.6, 916.7, 916.11(a), 919.4, 923(d-f), 923.1(a), 923.1(c-h), 923.1(j), 923.2(b-c), 923.2(f-t), 923.2(v), 923.3, 923.4(a-d), 923.4(f-i), 923.4(l-o), 923.5, 923.8, and 923.9(a-e).

The EIS/PTEIR analysis demonstrates that these alternate standards would provide equal or better protection to Aquatic and Riparian Habitats and Species of Concern than the 2012 CFPR standard. Implementation of these alternate standards would have a less than significant impact and would not contribute to cumulative effects on Aquatic and Riparian Habitats and Species of Concern, and may be proposed in PTHPs by MRC and approved by CAL FIRE (14 CCR §1092[c]).

A complete list of MRC's proposed alternate standards is included in the TMP (Appendix A) as Attachment D. Attachment D of the TMP also includes a reference to the location of each alternate standard in the TMP and/or HCP/NCCP, and the CFPR standard (rule) it would replace.

3.5 Vegetation and Plant Species of Concern

This section describes the existing terrestrial vegetation and associated plant species of concern within the assessment area, and the effects of implementing the alternatives on both the various vegetation types and on the plant species of concern. The vegetation and plant species of concern assessment area is broken down into the primary assessment area and secondary assessment area, and occasionally by inventory block (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1).

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is of a similar forest type, geology, climate, and hydrology and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects in the secondary assessment area are therefore expected to be similar to those in the primary assessment area.

3.5.1 Affected environment/Environmental setting

Information on the terrestrial vegetation and plant species of concern in the assessment area was obtained from several sources representing the best and most recent data available. The lead agencies used information largely derived from surveys conducted on MRC property by MRC and the previous landowner (Louisiana-Pacific, Inc.), statewide databases, and scientific literature. Primary data sources include:

- MRC's HCP/NCCP (2012).
- MRC's History of the Land (2009b).
- MRC's vegetation geographic information system layers (MRC 2009, unpublished data).
- California Wildlife Habitat Relationships System database (version 8.2) (CDFG and California Interagency Wildlife Task Group [CIWTG] 2008).
- CalVeg geographic information system layers (USDA Forest Service 2000, USDA Forest Service 2004).
- CDFG's list of Terrestrial Natural Communities and Special Community Types (CDFG 2010c).
- CDFG's California Natural Diversity Database (CDFG 2009a).
- California Native Plant Society Online Rare Plant Inventory (accessed August 2009).

The following sections summarize: (1) the existing terrestrial vegetation conditions in the assessment area, including California Wildlife Habitat Relationships habitat types and rare/unique plant communities; and (2) the plant species of concern that occur or potentially occur in the assessment area.

3.5.1.1 Terrestrial vegetation classification

For this EIS/PTEIR the agencies used the classification scheme MRC developed for timberlands in the primary assessment area to stratify the forest into comparable vegetation types for the purposes of conducting timber inventories and assessing timber growth and yield potential (MRC 2012). However, lands in the secondary assessment areas are owned by several entities (Section

4, Cumulative Effects) and do not have vegetation information in the same format as in the primary assessment area. Instead, the agencies used CalVeg data (USDA Forest Service 2000) for the secondary assessment area. In order to provide a uniform basis for vegetation-related effects analyses, MRC data for the primary assessment area and CalVeg data for the secondary assessment area were both converted to corresponding California Wildlife Habitat Relationships habitat types. For the primary assessment area, the agencies collaborated and created a crosswalk between MRC's classification scheme and the California Wildlife Habitat Relationships habitat types; see Appendix L for more detail. For the secondary assessment area, the crosswalk created by the USDA Forest Service (2004) was used. Although the California Wildlife Habitat Relationships system was developed as a wildlife habitat relationships information system to enable predictions of wildlife distribution and abundance (Mayer and Laudenslayer 1988), it is widely applied across the state to type vegetation, especially when the intent is to assess available habitat for wildlife species. All three classification schemes (i.e., CalVeg, MRC and California Wildlife Habitat Relationships) take into account a stand's species composition, size class, and canopy closure. The overall vegetation structure (density and tree size) of the stand, in combination with key characteristics of species composition, is correlated to successional stage (e.g., pioneer, early-, mid-, or late-successional); successional stage is also an important component of these schemes.

Plant community classification of California Natural Diversity Database Special Community Types and Habitat Elements

Within the assessment area, there are a number of plant community types that are identified as Special Community Types on CDFG's list of Terrestrial Natural Communities recognized by the California Natural Diversity Database (CDFG 2010a). Additionally, within the primary assessment area, there are a number of plant community types identified as Habitat Elements[32] for the purpose of this EIS/EIR. These California Natural Diversity Database Special Community Types and Habitat Elements contribute to habitat diversity for wildlife, and substantially increase both the plant and wildlife diversity found throughout the assessment area (Section 3.6, Terrestrial Habitats and Wildlife Species of Concern). The California Natural Diversity Database Special Community Types and Habitat Elements classification systems are described below.

The California Natural Diversity Database considers Special Community Types on CDFG's list of Terrestrial Natural Communities rare and worthy of consideration during effects analyses. California Natural Diversity Database Special Community Types are classified using the National Vegetation Classification System (Grossman et al. 1998), which is expressed in this state by the Manual of California Vegetation (Sawyer and Keeler-Wolf 1995, Sawyer et al. 2009). In addition to this system, California Natural Diversity Database has a number of rare community type records that are classified using the Holland (1986) system.

Habitat Elements are derived from site-specific knowledge of the primary assessment area, wildlife data such as bird nesting sites and occupied habitat, and information relayed by landowners on adjoining properties (MRC 2012). There are six Habitat Elements identified in the primary assessment area: (1) old-growth trees; (2) wildlife trees; (3) downed wood; (4) rocky outcrops; (5) hardwoods within conifer stands; and (6) wetlands, watercourses, seeps, and springs. Of these types, old-growth trees and hardwoods within conifer stands are discussed as Habitat Elements below in Section 3.5.1.4 and in more detail under Section 3.6 (Terrestrial Habitats and Wildlife Species of Concern). Wetlands, watercourses, seeps, and springs are

[32] Habitat Elements are analogous to habitat elements described in MRC's HCP/NCCP (2012).

discussed under Section 3.4 (Aquatic and Riparian Habitats and Species of Concern). The other Habitat Elements (i.e., wildlife trees, downed wood, and rocky outcrops) are discussed in Section 3.6 (Terrestrial Habitats and Wildlife Species of Concern) as elements specific to wildlife needs.

3.5.1.2 California Wildlife Habitat Relationships habitat types in the primary and secondary assessment areas

California Wildlife Habitat Relationships habitat types in the primary and secondary assessment areas, as converted from MRC structure classes and CalVeg data, are presented in Table 3.5-1 and Appendix F, Figure F-4.

Table 3.5-1. California Wildlife Habitat Relationships habitat types in the primary and secondary assessment areas.

<table>
<tr><th>California Wildlife Habitat Relationships habitat subdivision</th><th colspan="2">California Wildlife Habitat Relationships habitat type</th><th>Primary assessment area (ac)</th><th>Secondary assessment area (ac)</th></tr>
<tr><td rowspan="11">Tree-dominated</td><td rowspan="2">Closed-cone Pine-Cypress[a]</td><td>Bishop Pine Forest[a]</td><td>319[c]</td><td rowspan="2">20,481</td></tr>
<tr><td>Mendocino Pygmy Cypress Forest[b]</td><td>135[c]</td></tr>
<tr><td colspan="2">Douglas-fir</td><td rowspan="2">115,073[d,e]</td><td>84,043</td></tr>
<tr><td colspan="2">Redwood</td><td>395,112</td></tr>
<tr><td colspan="2">Blue oak woodland</td><td rowspan="2">1,084[c]</td><td>118</td></tr>
<tr><td colspan="2">Coastal oak woodland</td><td>612</td></tr>
<tr><td colspan="2">Eucalyptus</td><td>0[c]</td><td>68</td></tr>
<tr><td colspan="2">Montane hardwood-conifer</td><td>83,559[d]</td><td>25,473</td></tr>
<tr><td colspan="2">Montane hardwood</td><td>4,249[d]</td><td>91,498</td></tr>
<tr><td colspan="2">Montane riparian</td><td>56[c]</td><td>4,142</td></tr>
<tr><td colspan="2" style="display:none"></td></tr>
<tr><td rowspan="3">Shrub-dominated</td><td colspan="2">Chamise-redshank chaparral</td><td>0</td><td>280</td></tr>
<tr><td colspan="2">Coastal scrub</td><td rowspan="2">386[c]</td><td>9,628</td></tr>
<tr><td colspan="2">Mixed chaparral</td><td>4,729</td></tr>
<tr><td rowspan="4">Herbaceous-dominated</td><td colspan="2">Annual grassland</td><td>1,669[c]</td><td>54,167</td></tr>
<tr><td colspan="2">Saline emergent wetland</td><td>0</td><td>23</td></tr>
<tr><td colspan="2">Fresh Emergent Wetland</td><td rowspan="2">360[f,g]</td><td>0</td></tr>
<tr><td colspan="2">Wet meadow</td><td>142</td></tr>
<tr><td rowspan="2">Aquatic</td><td colspan="2">Lacustrine</td><td>360[f,g]</td><td>907</td></tr>
<tr><td colspan="2">Riverine</td><td>2,054 mi[c]</td><td>2.559 mi[h]</td></tr>
<tr><td rowspan="2">Developed</td><td colspan="2">Urban</td><td>NA[i]</td><td>3,305</td></tr>
<tr><td colspan="2">Cropland</td><td>NA[i]</td><td>5,449</td></tr>
</table>

California Wildlife Habitat Relationships habitat subdivision	California Wildlife Habitat Relationships habitat type	Primary assessment area (ac)	Secondary assessment area (ac)
Non-vegetated	Barren	NA[i]	3,183

[a] Bishop pine forest is a vegetation type in Manual of California Vegetation (Sawyer et al. 2009).
[b] Mendocino Pygmy Cypress Forest is a California Natural Diversity Database Special Community Type (CDFG 2010c).
[c] Source: MRC's HCP/NCCP (2012)
[d] Source: timber model output data. Net acreage is reported, which is estimated as 3% less than gross acreage (which includes features such as roads).
[e] For the purposes of modeling alternatives, Douglas-fir acreage is lumped with Redwood acreage within the primary assessment area and referred to as Redwood.
[f] MRC's natural community data set, unpublished data.
[g] For additional discussion of acreage, see Section 3.5.1.4.
[h] U.S. Geological Survey National Hydrography Dataset (USGS 2010b), 1:24,000
[i] MRC does not include data for these California Wildlife Habitat Relationships types in its data set.

Redwood and Douglas-fir California Wildlife Habitat Relationships habitat types cover over half (56%) of the primary assessment area, with Montane Hardwood-Conifer habitat type covering another 40% of the area. Other California Wildlife Habitat Relationships habitat types in the primary assessment include Closed-cone Pine-Cypress, Blue Oak and Coastal Oak Woodland (combined as Oak Woodland for MRC's HCP/NCCP), Montane Hardwood, Montane Riparian, Mixed Chaparral and Coastal Scrub (combined as Shrub for MRC's assessment), Annual Grassland, Fresh Emergent Wetland, Wet Meadow, Riverine, and Lacustrine.

Redwood California Wildlife Habitat Relationships habitat type occupies the greatest percentage of the secondary assessment area (56%), with Douglas-fir, Montane Hardwood and Annual Grassland California Wildlife Habitat Relationships habitat types occupying around 10% each. Other California Wildlife Habitat Relationships habitat types present include: Closed-cone Pine-Cypress, Douglas-fir, Blue Oak Woodland, Coastal Oak Woodland, Eucalyptus, Montane Hardwood-Conifer, Montane Riparian, Chamise-redshank Chaparral, Mixed Chaparral, Coastal Scrub, Annual Grassland, Saline Emergent Wetland, Wet Meadow, and Lacustrine.

The distribution of vegetation types within the assessment area varies depending on timber harvest history, soils, and climate. The Redwood California Wildlife Habitat Relationships habitat type is more common on northern and coastal lands, while Montane Hardwood, Grassland, and Oak Woodland habitat types are more typical of inland and southern lands. The following sections describe the distribution, dominant plant associates, and ecological features of the California Wildlife Habitat Relationships habitat types that are covered by the HCP/NCCP. For reference purposes, each habitat type description lists the closest equivalent vegetation alliance in the second edition of the Manual of California Vegetation (Sawyer et al. 2009). Those California Wildlife Habitat Relationships habitat types in the secondary assessment area but not the primary are described in Appendix M.

Tree-dominated habitats: North Coast Conifer

Closed-cone Pine-Cypress

The Closed-cone Pine-Cypress California Wildlife Habitat Relationships habitat type is a unique forest type located on rocky, nutrient-poor soils (e.g., thin acidic soils, serpentine soils) where the growth of many trees and shrubs is limited by the suboptimal soil conditions (Sholars 1997). Closed-cone Pine-Cypress habitat type is patchily distributed along coastal California from southern San Diego County north to Oregon, also appearing inland in the Peninsular and Coast Ranges and in the North and Central Sierra Nevada. It is typically found at low elevations near the coast, though some interior stands may be located at elevations up to 6,550 ft (2,000 m) (Mayer and Laudenslayer 1988). In Closed-cone Pine-Cypress forest, closed-cone conifers make up at least 50% relative cover of the overstory and consist of usually one species of either pine or cypress (Mayer and Laudenslayer 1988). Closed-cone Pine-Cypress habitat type is most equivalent to the Manual of California Vegetation *Callitropsis pigmaea* Woodland Alliance (Mendocino pygmy cypress woodland) or *Pinus muricata* Forest Alliance (Bishop pine forest) (Sawyer et al. 2009).

Within the primary assessment area, Closed-cone Pine-Cypress habitat type is separated into Mendocino pygmy cypress forest and Bishop Pine forest (Table 3.5-1). Pygmy Cypress Forest is a California Natural Diversity Database Special Community Type (CDFG 2010c) and therefore a description of the community type is provided in Section 3.5.1.3.

There are 319 ac (129 ha) of Bishop pine forest within the primary assessment area, located within the Albion, Garcia River, and South Coast inventory blocks. Bishop pine forests in the assessment area are dominated by Bishop pine (*Pinus muricata*) and includes the following shrub associates: California huckleberry (*Vaccinium ovatum*), salal (*Gaultheria shallon*), Pacific rhododendron (*Rhododendron macrophyllum*), and western Labrador tea (*Rhododendron neoglandulosum*, *Ledum glandulosum* in Hickman 1993;Mayer and Laundenslayer 1988; Sawyer and Keeler-Wolfe 1995). Bishop pine forests in the assessment area typically reach a height of 66 ft (20 m) and have a shrub layer with dense canopy and sparse herbaceous layer (Mayer and Laudenslayer 1988).

Fire is an essential part of the Closed-cone Pine-Cypress habitat type ecology. The dominant tree species require high temperatures, such as those created by fire, to stimulate the release of seeds. Even-aged stands are common and result from periodic stand-replacing fires that kill existing closed-cone conifers while stimulating seed release and creating the bare mineral soil conditions necessary for germination and successful seedling establishment (Holland and Keil 1995, Schoenherr 1992, Esser 1994). The closed-cone strategy for seed dispersal in Bishop pine is variable; northern populations, including those found in Mendocino County, may release seeds as a result of extremely warm daytime temperatures, desiccation due to old age, or fire, while the tightly closed cones of southern populations tend to release seed only after a hot fire (Holland and Keil 1995). As with other closed-cone coniferous communities, the exclusion of fire for extended periods can result in reduced seedling establishment and increased vulnerability to disease in mature trees. In Bishop pine stands, fire-free periods of 80 years or more have been found to result in greatly increased susceptibility to disease (Cope 1993). For more information on the fire ecology of Mendocino pygmy cypress forests, see Section 3.5.1.3. The Mendocino Lightning Complex fire in 2008 burned 17 ac (7 ha) of Bishop pine forest; no data are currently available on how the forest is regenerating (MRC 2012).

Closed-cone Pine-Cypress habitat type supports a small percentage of merchantable timber and includes an ecologically valuable forest type (Mendocino Pygmy Cypress Forest). For these reasons, Closed-cone Pine-Cypress habitat type would not be included in MRC's timber harvest operations; however, some of these stands are adjacent to forests that would be managed for timber production. Therefore, MRC is seeking HCP/NCCP coverage for limited harvest-associated activities (i.e., roads) in the Closed-cone Pine-Cypress habitat type.

Douglas-fir

The Douglas-fir California Wildlife Habitat Relationships habitat type occurs in the north Coast Range of California, from Sonoma County north to the Oregon border at elevations from 500 to 2,000 ft (150 to 600 m) and in the Klamath Mountains of California and Oregon at elevations from 1,000 to 4,000 ft (300 to 1,200 m) (Sawyer 1980). Relative to the Redwood California Wildlife Habitat Relationships habitat type, Douglas-fir habitat type occurs on drier sites with poorer soils; soil types include sedimentary granitic and ultramafics (gabbro, peridotite, and serpentine; Mayer and Laudenslayer 1998).

The Douglas-fir habitat type is composed of a canopy of Douglas-fir (*Pseudotsuga menziesii*) with a dominance of at least 50% and a sub-canopy level of broad-leaved evergreen trees. Plant species composition varies with soil parent material, moisture, topography, and disturbance history. Sub-dominant tree species on less rocky, dry soils include canyon live oak (*Quercus chrysolepis*), tanoak (*Lithocarpus densiflorus*), Pacific madrone (*Arbutus menziesii*) and California black oak (*Quercus kelloggii*). Western hemlock (*Tsuga heterophylla*) may be co-dominant with Douglas-fir and tanoak in areas transitional to Redwood/Douglas-fir forest (Mayer and Laudenslayer 1998). A wide range of understory shrubs may be present, varying primarily by soil type and along a moisture gradient, and include the following: Oregon-grape (*Berberis aquifolium*), California blackberry (*Rubus ursinus*), dwarf rose (*Rosa gymnocarpa*), poison oak (*Toxicodendron diversilobum*), vine maple (*Acer circinatum*), California hazel (*Corylus cornuta*), salal, Pacific rhododendron, California laurel (*Umbellularia californica*), California buckthorn (*Rhamnus californica*), and Brewer oak (*Quercus garryana* var. *breweri*) (Mayer and Laudenslayer 1998). The Douglas-fir habitat type is most equivalent to the Manual of California Vegetation *Pseudotsuga menziesii* Forest Alliance (Douglas-fir forest), *Pseudotsuga menziesii–Lithocarpus densiflorus* Forest Alliance (Douglas-fir–tanoak forest), and *Tsuga heterophylla* Forest Alliance (Western hemlock forest). Additionally, there are likely inclusions of *Acer macrophyllum* Forest Alliance (Bigleaf maple forest) within the more broadly-defined Douglas-fir habitat type (Sawyer et al. 2009).

Due to forestry practices, Douglas-fir habitat type is primarily composed of second-growth stands (MRC 2012). Typical stand structure includes a lower overstory of broad-leaved, evergreen trees (i.e., tanoak, Pacific madrone) with an open, higher overstory of coniferous trees. Shrub and herbaceous cover vary along moisture and elevation gradients, with shrubs more prevalent in lower elevations and moister sites and herbaceous species more prevalent at higher elevations (Mayer and Laudenslayer 1988). Fire plays an important role in the altering the structure in the Douglas-fir habitat type; both Douglas-fir and tanoak seedlings regenerate after fire, with tanoaks initially superseding Douglas-fir in growth. Over time, Douglas-fire surpasses tanoak and dominates the canopy. Post-fire understory dominants have been shown to vary by silvicultural treatment; forbs followed by tanoak tend to dominate on sites that have been salvaged post-fire whereas deer brush (*C. integerrimus*) along with other shrubs tends to dominate in sites that have been left untreated (Barbour et al. 2007).

Within the primary assessment area, MRC combines Redwood and Douglas-fir habitat types for a total of 115,073 ac (46,569 ha). The majority of that acreage consists of stands that are a mix of redwood and Douglas-fir, with the density of redwoods generally exceeding that of Douglas-fir. A very small percentage of the combined acreage consists of stands that are dominated by Douglas-fir; the acreage is estimated to be 2,146 ac (868 ha) (MRC 2012). Within the secondary assessment area, there are approximately and 84,043 ac (34,026 ha) of Douglas-fir habitat type. Overall, this vegetation type is located throughout the central and eastern portions of the primary and secondary assessment areas. Like Redwood, the Douglas-fir habitat type supports merchantable timber and would be included in timber operations. For the purposes of the timber model however, the Douglas-fir habitat type is lumped with Redwood and referred to as the Redwood California Wildlife Habitat Relationships habitat type.

Redwood

Coast redwood (*Sequoia sempervirens*) is endemic to California and southern Oregon, occurring from just north of the Oregon border south to San Luis Obispo County in California (Barbour and Major 1988). Coast redwood is not likely to occur above 1,000 ft (305 m) in elevation (FNAEC 1993), though it can be found to range from sea level to over 3,000 ft (915 m) in Monterey County (Becking 1968). The Redwood California Wildlife Habitat Relationships habitat type is generally present within 2–10 mi (4–16 km) of the coast (Mayer and Laudenslayer 1988) in areas of consistent fog, with high summer humidity, cool temperatures, and well-developed soils (Shuford and Timossi 1989). Soil types are relatively young, deep, alluvial and colluvial parent materials, sometimes with high acidic content and sometimes the habitat type is found on serpentine soils (Mayer and Laudenslayer 1988). Redwoods are intolerant of salt spray and strong, desiccating winds (Olson et al. 1990, Sugihara et al. 2006). Pure redwood forests transition to Redwood/Douglas-fir forests further inland (Mayer and Laudenslayer 1988) along a gradient of increased evapo-transpiration and inadequate soil moisture (Mahony and Stuart 2001; Sugihara et al. 2006) and the coast redwood species tends to taper out at approximately 31 mi (50 km) inland from the coast (Mayer and Laudenslayer 1988).

Redwood and Douglas-fir often co-occur in areas classified as the Redwood habitat type, with Douglas-fir occupying up to half of the canopy cover. The associated species mix varies both moving from north to south within the coast redwood species range, as well as moving inland from the coast. In the assessment area, common associated tree species include Douglas-fir, tanoak, and Pacific madrone with the following species potentially contributing: Bishop pine, Grand fir (*Abies grandis*), golden chinquapin (*Chrysolepis chrysophylla*), western hemlock, red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*), California laurel, and nutmeg (*Torreya californica*). Shrub species include blue blossom (*Ceanothus thyrsiflora*), coyote brush (*Baccharis pilularis*), manzanita (*Arctostaphylos* spp.), and California huckleberry (MRC 2012, Mayer and Laudenslayer 1988). The Redwood habitat type is most equivalent to the Manual of California Vegetation *Sequoia sempervirens* Forest Alliance (Redwood forest) (Sawyer et al. 2009).

Due to forestry practices, the Redwood habitat type in the assessment area is primarily composed of second-growth stands (MRC 2012). These stands are characterized by even-aged structure with a dense canopy (> 60% crown closure) and substantial shrub layer. As successional stage progresses within these stands, the habitat typically changes from a mix of hardwoods and conifers to a purely conifer-dominated stand. Fire plays a significant role in redwood forests, altering successional stage in the stand (Mayer and Laudenslayer 1988). Fire return intervals vary widely among redwood forests. Redwood trees are resilient when fires do occur, as they are able to initiate vigorous sprout growth from underground burls (Ramage et al. 2010). The climax stage of the Redwood habitat type is characterized by a bilayered canopy, dominated by redwood and Douglas-fir trees. The pre-forest management era range in natural variability in landscape proportion of successional hardwood stands (i.e., hardwood-dominated stands on conifer sites) is unknown. Likewise, range of variability of the proportion of hardwoods to conifers in mature and old-growth stands in the redwood region, and how that range varies by geographic and topographic gradients is largely unknown. There are some areas of old-growth coast redwood; MRC protects approximately 101 ac (41 ha) of un-harvested old growth considered “Type I” (MRC 2012). MRC defines “Type I” old-growth stands as “an un-harvested stand with at least 3 contiguous acres of old-growth” (MRC 2012). Further detail on old-growth stands is provided in Section 3.5.1.4 and also Section 3.6 (Terrestrial Habitat and Wildlife Species of Concern).

Within the primary assessment area, MRC combines redwood and Douglas-fir habitat types for a total of 115,073 ac (46,569 ha). The majority of that acreage consists of stands that are a mix of redwood and Douglas-fir, with the density of redwoods generally exceeding Douglas-fir (MRC 2012). Within the secondary assessment area, there are approximately 395,112 ac (159,964 ha) of Redwood habitat type. The Redwood habitat type is located along the western portions of the assessment areas and is the primary target for timber production.

Tree-dominated habitats: Broad-leaved

Blue Oak Woodland

In coastal northern California, oak woodland forms an ecotone between the mixed evergreen forests of the coast and the grasslands of the Central Valley (Jimerson and Carothers 2002). They can occur at elevations from just above sea level to 5,000 ft (1,525 m) in interior regions. The Blue Oak Woodland California Wildlife Habitat Relationships habitat type occurs more inland than the Coastal Oak Woodlands, along the foothills of the coast range from 250 to 3,000 ft (75 to 915 m) (Mayer and Laudenslayer 1988). Soils and parent material tend to be shallow, rocky, infertile, well-drained soils (McDonald 1990).

In the Blue Oak Woodland habitat type, blue oak (*Quercus douglasii*) makes up over 80% of the trees present. Coast live oak and valley oak are common associates. Shrub species include poison oak, California coffeeberry (*Rhamnus californica*), buckbrush (*Ceanothus cuneatus*), redberry (*Rhamnus illicifolia*), California buckeye *(Aesculus californcia*), and manzanita. The herbaceous layer is composed of a mix of native and non-native forbs (e.g., filaree [*Erodium* spp.], fiddleneck [*Amsinckia menziesii*]) and predominantly non-native, annual grasses (e.g., bromes [*Bromus* spp.] and oats [*Avena* spp.]) (Mayer and Laudenslayer 1988). Blue Oak Woodland habitat type is most equivalent to the Manual of California Vegetation *Quercus douglasii* Woodland Alliance (Blue Oak Woodland) (Sawyer et al. 2009).

Successional trends in blue oak habitat are not well understood. Most stands of blue oak habitat are characterized by medium to large tree stages with few young oaks present. This age structure suggest that blue oak regeneration is being impaired. Possible reasons include land use changes, increased consumption and/or damage of acorns and seedlings, competition between seedlings and introduced annual grasses, and the absence of appropriate climatic conditions (Mayer and Laudenslayer 1988).

Within the primary assessment area, MRC combines Coastal Oak Woodland with Blue Oak Woodland habitat types for a total of 1,084 ac (439 ha). The majority of the Oak Woodland habitat types in the primary assessment area occur in the Ukiah inventory block, with a small percentage in the Noyo and Rockport inventory blocks. Within the secondary assessment area, there are approximately 118 ac (48 ha)[33] of the Blue Oak Woodland habitat type. The HCP/NCCP would only include Blue Oak Woodlands in timber harvest operation to reduce the density of conifers invading these woodlands as it is believed that fire exclusion is promoting Douglas-fir encroachment; additionally some of these stands are adjacent to forests that would be managed for timber production. Therefore, MRC is seeking HCP/NCCP coverage for activities in the Blue Oak Woodland habitat type.

[33] CalVeg's estimate may be an under-representation of Blue Oak Woodland habitat, as much of it may get lumped into the more general category of Montane Hardwood Conifer habitat type.

Coastal Oak Woodland

The Coastal Oak Woodlands California Wildlife Habitat Relationships habitat type occurs closer to the coast than the Blue Oak Woodland habitat type, in the coastal foothills and valleys from Trinity County to northern Baja California. Soils and parent material are extremely variable (Mayer and Laudenslayer 2005, revised).

In the North Coast Range, the Coastal Oak Woodland habitat type is often dominated by Coast live oak (*Quercus agrifolia*). Other common overstory species are Oregon white oak (*Quercus garryana*), California black oak, canyon live oak, Pacific madrone and interior live oak (*Quercus wislizeni*), though where these species dominate instead, the habitat is typed Montane Hardwood. Typical understory shrubs include California blackberry, creeping snowberry (*Symphoricarpos mollis*), and toyon. The herbaceous layer includes natives such as bracken fern (*Pteridium aquilinum*), California polypody (*Polypodium californica*), and miner's lettuce (*Claytonia perfoliata*), as well as a high percentage of non-native, annual grasses (e.g., bromes and oats; Mayer and Laudenslayer 2005, revised). The Coastal Oak Woodlands habitat type is most equivalent to the Manual of California Vegetation *Quercus agrifolia* Woodland Alliance (Coast live oak woodland) (Sawyer et al. 2009). Additionally, there are likely inclusions of *Arbutus menziesii* Forest Alliance (Madrone forest) within the more broadly-defined Coastal Oak Woodlands California Wildlife Habitat Relationships habitat type (Sawyer et al. 2009).

Along the north coast of California, the composition and density of both overstory trees and understory of oak woodland varies and reflects the environmental diversity over which this habitat occurs. The canopy can range from open to closed, depending on moisture availability. Oaks are slow-growing trees and therefore succession from young to mature stands requires 60–80 years (Mayer and Laudenslayer 2005). Successional trends are not well understood for this habitat type, as for most oak forests. The introduction of grazing animals by Europeans during the Mission Periods (1769–1824) led to a shift in ground cover from perennial native bunch grasses to European annual grasses. This shift, as well as the 20th century policy of fire exclusion is believed to have slowed regeneration in oak woodlands (Mayer and Laudenslayer 2005, revised). In some areas, it appears that coast live oak is being replaced by California bay as a result of grazing pressures and lack of successful regeneration (McBride 1974).

Within the primary assessment area, MRC combines acreages of Coastal Oak Woodland habitat type with the Blue Oak Woodland habitat type for a total of 1,084 ac (439 ha). The majority of the Oak Woodlands habitat types in the primary assessment area occur in the Ukiah inventory block, with a small percentage in the Noyo and Rockport inventory blocks. Within the secondary assessment area, there are approximately 612 ac (248 ha) of the Coastal Oak Woodland habitat type. The HCP/NCCP would only include Coastal Oak Woodlands in timber harvest operation to reduce the density of conifers invading these woodlands; additionally some of these stands are adjacent to forests that would be managed for timber production. Therefore, MRC is seeking HCP/NCCP coverage for activities in the Coastal Oak Woodland habitat type.

Montane Hardwood-Conifer

The Montane Hardwood-Conifer California Wildlife Habitat Relationships habitat type occurs throughout California and into Oregon; in northwestern California it borders the upper and/or inland margins of the California Wildlife Habitat Relationships Redwood and Douglas-fir habitat types, generally delineated by less rainfall and fog than the adjacent habitats. In the assessment area, elevations range from 1,000 to 4,000 ft (300 to 1,200 m). Soils for this habitat type are well drained, mesic soils and the terrain is mountainous with narrow valleys and slopes averaging 57% (Mayer and Laudenslayer 1988).

The Montane Hardwood-Conifer California Wildlife Habitat Relationships habitat type contains a mix of tree species with no specific species emerging as dominant; however, at least one-third of the trees must be conifer and one-third must be broad-leaved. The tree species mix varies by locale within California. For the North Coast area, the mix primarily consists of ponderosa pine (*Pinus ponderosa*), Douglas-fir, California black oak, tanoak, Pacific madrone, and Oregon white oak. Other species may include golden chinquapin, canyon live oak, red alder, sugar pine (*Pinus lambertiana*), knobcone pine (*Pinus attenuata*), western hemlock, and western red cedar (*Thuja plicata*) (Mayer and Laudenslayer 1988). The Montane Hardwood-Conifer California Wildlife Habitat Relationships habitat type is most equivalent to the Manual of California Vegetation *Quercus* (*agrifolia*, *douglasii*, *garryana*, *kelloggii*, *lobata*, *wislizeni*) Forest Alliance (Mixed oak forest) and *Pseudotsuga menziesii* Forest Alliance (Douglas-fir forest). Additionally, there are likely inclusions of *Alnus rubra* Forest Alliance (Red alder forest) and *Acer macrophyllum* Forest Alliance (Bigleaf maple forest) within the more broadly-defined Montane Hardwood-Conifer California Wildlife Habitat Relationships habitat type (Sawyer et al. 2009).

The composition of Montane Hardwood-Conifer stands is generally determined by harvest history, slope, aspect, and soil type. These stands are often early-successional to conifer types and occur after a major disturbance, such as fire or timber harvest. Following conifer harvest, some areas may become dense forest containing primarily tanoak, while others may contain mixed-species vegetation. In relatively productive soils, these stands usually progress toward conifer-dominated stands but in relatively harsh conditions the hardwoods may remain dominant. A late-successional conifer-hardwood community would likely have an overstory of redwood or Douglas-fir and an understory of hardwoods (Mayer and Laudenslayer 1988).

The Montane Hardwood-Conifer habitat type is the second-most abundant vegetation type in the primary assessment area; it occupies 83,559 ac (33,815 ha) of the primary assessment area and approximately 25,473 ac (10,313 ha) of the secondary assessment area. Within the primary assessment area, it is found in all inventory blocks with highest acreage in the Navarro East and Rockport inventory blocks. This habitat type supports merchantable timber and would be included in timber operations.

Montane Hardwood

The Montane Hardwood California Wildlife Habitat Relationships habitat type occurs throughout portions of northern and southern California and is common throughout Mendocino County (Barbour and Major 1977; Holland and Keil 1995). Elevations range from 300 ft (100 m) near the Pacific Ocean to 9,000 ft (2,745 m) in Southern California. Hardwood species are found on poorly developed or rocky soils, warmer and dryer south-facing slopes, and where heavy harvesting or catastrophic fires have cleared conifer forests (Mayer and Laudenslayer 1988).

In the Coast Range and Klamath Mountains, the Montane Hardwood California Wildlife Habitat Relationships habitat type is often characterized by a dominance of canyon live oak, although in the assessment area tanoak is the most common dominant. Middle elevation associates are Douglas-fir, tanoak, madrone, California black oak, and California laurel. Lower elevation associates are knobcone pine, ghost pine (*Pinus sabiniana*), and Oregon white oak. Shrubs include manzanita, mountain mahogany (*Cercocarpus* spp.), and poison oak. The Montane Hardwood California Wildlife Habitat Relationships habitat type is most equivalent to the Manual of California Vegetation *Lithocarpus densiflorus* Forest Alliance (Tanoak forest) and *Quercus* (*agrifolia, douglasii, garryana, kelloggii, lobata, wislizeni*) Forest Alliance (Mixed oak forest) (Sawyer et al. 2009).

The Montane Hardwood habitat type includes a prominent hardwood tree layer with an underdeveloped and sparse shrub and herbaceous layer (Mayer and Laudenslayer 1988). Hardwood stands usually develop where conditions allow them to out-compete redwood and Douglas-fir; tanoaks in particular are favored under these conditions. If there is adequate moisture, Redwood and Douglas-fir eventually out-compete tanoaks in natural succession, though this process can take many decades or even centuries (Mayer and Laudenslayer 1988).

The Montane Hardwood habitat type occupies 4,249 ac (1,719 ha) of the primary assessment area and approximately 91,498 ac (37,044 ha) of the secondary assessment area. Within the primary assessment area, it is found in all inventory blocks with the highest acreage in the Rockport inventory block. Where conditions are suitable, areas covered by Montane Hardwood would be managed under the HCP/NCCP to encourage conversion to redwood and Douglas-fir stands within the primary assessment area; therefore, this habitat type ultimately supports merchantable timber and would be included in timber operations.

Montane Riparian

Riparian forests are a special habitat type representing transitional areas between aquatic and upland zones, encompassing sharp environmental gradients, unique ecological processes, and diverse communities (Naiman et al. 1993). The Montane Riparian California Wildlife Habitat Relationships habitat type is found in the Klamath, Coast, and Cascade ranges and the Sierra Nevada south to Kern and Santa Barbara counties. Elevation ranges from sea level to 8,000 ft (2,440 m) (Mayer and Laudenslayer 1988).

In north coastal California, riparian forests are dominated by red alder, along with various willow species (e.g., coastal willow [*Salix hookeriana*], Arroyo willow [*S. lasiolepis*], Pacific willow [*Salix lucida*]), Sitka willow [*S. sitchensis*]), California laurel, big leaf maple, and in wider stream valleys, black cottonwood (*Populus trichocarpa*). Moist riparian soils, which are typically very diverse in texture, support more luxuriant growth of understory herbs than adjacent uplands. Ground cover species may include bracken fern, maidenhair (*Adiantum jordanii*), ladyfern (*Athyrium felix-femina*), torrent sedge (*Carex nudata*), horse tail (*Equisetum* spp.), honeysuckle (*Lonicera* spp.), California rose (*Rosa californica*), monkey flower (*Mimulus* spp.), and many other shrub and herbaceous plants. Along bottomlands, seeps, and lower hillsides, red alder often dominates the riparian community (Holland 1986). The Montane Riparian California Wildlife Habitat Relationships habitat type is most equivalent to the Manual of California Vegetation *Acer macrophyllum* Forest Alliance (Bigleaf maple forest), *Alnus rubra* Forest Alliance (Red alder forest), and *Populus trichocarpa* Forest Alliance (Black cottonwood forest). Additionally, there are likely inclusions of *Carex nudata* Herbaceous Alliance (Torrent sedge patches), *Salix hookeriana* Shrubland Alliance (Coastal dune willow thickets), and *Salix lasiolepis* Shrubland Alliance (Arroyo willow thickets) within the more broadly-defined Montane Riparian California Wildlife Habitat Relationships habitat type (Sawyer et al. 2009).

In north coastal California, riparian plant communities mature from early successional stages dominated by small herbs and willow sprouts to more complex communities dominated by deciduous tree species such as red alder and black cottonwood. The frequency and distribution of these successional stages within a watershed is generally a function of the flood and scour disturbance regime associated with floodplains, banks and terraces adjacent to the stream. The condition of riparian plant communities is often a strong indicator of conditions in the surrounding uplands since riparian buffer zones are the recipients of changes in the extensive uplands around them. Thus, changes in flood frequency, intensity and timing, as well as changes in sediment transport and deposition, profoundly affect regeneration and succession in riparian plant communities (Naiman et al. 1993).

The Montane Riparian habitat type (referred to as "deciduous riparian (red alder)" in MRC's typing scheme) occupies 56 ac (23 ha) of the primary assessment area. The largest portion of this is within the Rockport inventory block, with the remainder in the South Coast inventory block. Within the secondary assessment area, there are approximately 4,142 ac (1,677 ha) of the habitat type. Although Montane Riparian would not be included in timber harvest operations under the HCP/NCCP, some of these stands are adjacent to forests that would be managed for timber production. Therefore, MRC is seeking HCP/NCCP coverage for activities in the Montane Riparian habitat type.

In addition to the Montane Riparian habitat type, which is generally restricted in location to areas immediately adjacent to streams, MRC applies a management zone that encompass this habitat type as well as a bounding portion of the upland forest (i.e., a combination of many California Wildlife Habitat Relationships, including Douglas-fir and Redwood). This zone is called the Aquatic Management Zone. The Aquatic Management Zone's width is determined by stream classification and slope, criteria that will often overestimate the amount of Montane Riparian habitat type. For more detail regarding Aquatic Management Zone boundary determination and width criteria see MRC's HCP/NCCP (MRC 2012). There are approximately 25,000 ac (10,117 ha) of Aquatic Management Zone in the primary assessment area. The Aquatic Management Zone is more inclusive than the Montane Riparian habitat and therefore supports merchantable timber and would be included in timber operations.

For the purposes of the timber model, there are fixed "riparian buffer zones." Similar to the Aquatic Management Zone, this buffer zone encompasses Montane Riparian as well as upland, coniferous forest habitat types. The buffer width varies depending on the alternative (Section 2, Alternatives). The riparian buffer zone supports merchantable timber and would be included in timber operations.

Herbaceous-dominated habitats

Annual Grassland

The Annual Grassland California Wildlife Habitat Relationships habitat type occurs throughout the Central Valley, in the coastal mountains of Mendocino and Sonoma County, and in other locations in southern California. It occurs mostly on flat plains to gently rolling foothills, on a variety of soil types (Mayer and Laudenslayer 2005, revised).

The Annual Grassland habitat type is dominated by non-native, annual plant species. Common grasses include wild oats, soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), red brome (*Bromus madritensis*), and wild barley (*Hordeum* spp.). Common forbs include filaree, turkey mullein (*Ereomocarpus setigerus*), true clover (*Trifolium* spp.), bur clover (*Medicago* spp.), and popcorn flower (*Plagiobothrys* spp.) (Mayer and Laudenslayer 2005, revised). The Annual Grassland California Wildlife Habitat Relationships habitat type is most equivalent to the Manual of California Vegetation *Avena* (*barbata, fatua*) Semi-Natural Herbaceous Stands (Wild oats grasslands), *Bromus* (*diandrus, hordeaceus*)– *Brachypodium distachyon* Semi-Natrual Herbaceous Stands (Annual brome grasslands), *Cynosurus echinatus* Semi-Natural Herbaceous Stands (Annual dogtail grasslands), and *Lolium perenne* Semi-Natural Herbaceous Stands (Perennial rye grass fields) (Sawyer et al. 2009).

Prior to the invasion of the non-native annual grasses, areas now typed as Annual Grasslands were dominated by native, perennial bunchgrasses or, on drier alluvial plains a mix of native, annual species. Primarily due to livestock grazing starting early in the nineteenth century, introduced European annual grasses invaded and took over most of the grassland area in the state

(Barbour et al. 1991). Consequently, succession does not occur in these grasslands and the annuals function as a climax community (Mayer and Laudenslayer 2005, revised).

The Annual Grassland habitat type occupies 1,669 ac (675 ha) of the primary assessment area and approximately 54,167 ac (21,930 ha) of secondary assessment area. Within the primary assessment area, the majority of the acreage occurs within the South Coast inventory block, with a substantial amount also in the Big River and Garcia River inventory blocks. As with all herbaceous California Wildlife Habitat Relationships community types, the Annual Grassland habitat type would not be included in timber harvest operations, though some of these stands are adjacent to forests that would be managed for timber production. Therefore, MRC is seeking HCP/NCCP coverage for activities in Annual Grassland type.

Fresh Emergent Wetland

The Fresh Emergent Wetland California Wildlife Habitat Relationships habitat type occurs throughout California in areas where there is a depression or a basin that is saturated or at least periodically flooded long enough to support obligate wetland plants, often adjacent to rivers and lakes. They encompass habitats described by Cowardin et al. (1979) as riverine, lacustrine, and palustrine emergent wetland. Soils are predominately silt and clay, with intermixed courser sediments and organic materials (Mayer and Laudenslayer 1988).

The Fresh Emergent Wetland habitat type is dominated by erect, rooted herbaceous hydrophytes including: big leaf sedge (*Carex amplifolia*), Baltic rush (*Juncus balticus*), cattails (*Typha* spp.), tules (*Schoenoplectus* spp.), and California bulrush (*Schoenoplectus californicus*, *Scirpus californicus* in Hickman 1993; Mayer and Laudenslayer 1988). The Fresh Emergent Wetland California Wildlife Habitat Relationships habitat type is most equivalent to the following Manual of California Vegetation alliances: *Schoenoplectus acutus* Herbaceous Alliance (Hardstem bulrush marsh), *Schoenoplectus californicus* Herbaceous Alliance (California bulrush marsh), and *Typha* (*angustifolia*, *domingensis*, *latifolia*) Herbaceous Alliance (Cattail marshes).

Within the primary assessment area, Fresh Emergent Wetland is combined with Wet Meadow and Lacustrine California Wildlife Habitat Relationships habitat types; their estimated combined area is 360 ac (146 ha). Because MRC only inventories wetlands as necessary to determine a management strategy where harvesting or other management activities are proposed (i.e., there is no comprehensive wetland inventory for MRC lands), this area is only a subset of existing wetlands in the primary assessment area. There have been no comprehensive surveys for the Fresh Emergent Wetland habitat type within the secondary assessment area. However, if lands were to be acquired within the secondary assessment area, wetland surveys would need to be conducted as necessary where harvesting or other management activities are proposed (as for the primary assessment area). Through the association with lentic aquatic communities, Fresh Emergent Wetlands are a type for which MRC is seeking HCP/NCCP coverage. For further discussion of wetland habitat, see Section 3.5.1.4 where National Wetlands Inventory estimates of wetland acreage in the primary and secondary assessment areas are provided.

Wet Meadow

The Wet Meadow California Wildlife Habitat Relationships habitat type occurs along streams, areas with concave topography, and/or where springs or seeps provide abundant available water (Ratliff 1985). The habitat type usually occurs above 3,940 ft (1,200 m) in the north and above 5,900 ft (1,800 m) in the south (Mayer and Laudenslayer 1988). Wet Meadows are small in extent, but of high interest and value. They include a sphagnum bogs within Mendocino pygmy cypress forests and numerous springs and seeps. Springs are locations where water emerges from the ground and flow is evident; seeps are generally considered to be areas where water emerges from the ground, but flow is not evident. Aquatic vegetation, wet soil, and standing water are often evident around seeps and springs throughout most of the year.

The Wet Meadow habitat type is variable throughout California, but generally supports graminoids with some shrub cover along the margins. Graminoids include a variety of sedges (e.g., Nebraska sedge [*Carex nebrascensis*] and beaked sedge [*Carex utriculata*]), reed grasses (*Calamagrostis* spp.) and bent grass (*Agrostis* spp.), a variety of rushes (*Juncus* spp.) and a lower percentage cover of forbs such as Anderson aster (*Aster alpigenus*), primrose monkey flower (*Mimulus primuloides*), cow's clover (*Trifolium wormskioldii*), and small white violet (*Viola macloskeyi*) (Mayer and Laudenslayer 1988). The Wet Meadow habitat type is most equivalent to the following Manual of California Vegetation alliances: *Deschampsia caespitosa* Herbaceous Alliance (Tufted hair grass meadows), *Eleocharis macrosatachya* Herbaceous Alliance (Pale spike rush marshes), *Elymus glaucus* Herbaceous Alliance (Blue wild rye meadows), *Hordeum brachyantherum* Herbaceous Alliance (Meadow barley patches), and *Poa pratensis* Semi-Natural Herbaceous Stands (Kentucky blue grass turf) (Sawyer et al. 2009).

The Wet Meadow habitat type is characteristically defined by its hydrology; seasonality and reliability of yearly water inflows and outflows largely determine the stability of this habitat type. It tends to succeed bog communities and in turn is succeeded by mesic meadows and dry meadows or forests. Natural succession to coniferous forest is typical at montane and subalpine elevations. However, Wood (1975) has shown that forests may also transition back to wet meadow, depending on localized site conditions. As with the Saline Emergent Wetland habitat type, various factors affect the stability and duration of the Wet Meadow habitat type, including hydrological alternations, grazing, and channel erosion (Mayer and Laudenslayer 1988).

Within the primary assessment area, Wet Meadow is combined with Fresh Emergent Wetland and Lacustrine habitat types; their estimated combined area is 360 ac (146 ha). Because MRC only inventories wetlands as necessary to determine a management strategy where harvesting or other management activities are proposed, this area is only a subset of existing wetlands within the primary assessment area. Within the secondary assessment area, there are 142 ac (57 ha) of the Wet Meadow habitat type. Through the association with lentic aquatic communities, Wet Meadow are a type for which MRC is seeking HCP/NCCP coverage. For further discussion of wetland habitat see Section 3.5.1.4, where National Wetlands Inventory estimates of wetland acreage in the primary and secondary assessment areas are provided.

3.5.1.3 California Natural Diversity Database Special Community Types

Several California Natural Diversity Database Special Community Types occur in the primary and secondary assessment areas, a number of which support plant species of concern. Table 3.5-2 and Appendix F, Figure F-5 summarize the extent and distribution, respectively, for each of the California Natural Diversity Database Special Community Types in the assessment area; this list was generated by querying the California Natural Diversity Database database for the United States Geological Survey quadrangles that include the primary and secondary assessment area (CDFG 2009a). Descriptions of these communities are provided below. For reference purposes, each community description lists the closest equivalent vegetation alliance in the second edition of Manual of California Vegetation (Sawyer et al. 2009).

Table 3.5-2. California Natural Diversity Database Special Community Types in the primary and secondary assessment areas.

Major habitat subdivision	California Natural Diversity Database Special Community Type	Primary assessment area (ac)[a]	Secondary assessment area (ac)[a]
Tree-dominated	Grand Fir Forest	0	509
	Mendocino Pygmy Cypress Forest	135[b]	4,316
	Upland Douglas-Fir Forest	0	2,775
Shrub-dominated	Northern Coastal Bluff Scrub	0	4
Herbaceous-dominated	Coastal and Valley Freshwater Marsh	0	326
	Coastal Brackish Marsh	0	175
	Coastal Terrace Prairie	0	18
	Fen	0	Approx. 70[c]
	Northern Coastal Salt Marsh	67[b]	1,268
	Sphagnum Bog	0	Approx. 1,165[d]

[a] Unless otherwise noted, source: California Natural Diversity Database (CDFG 2009a).
[b] Source: MRC's natural community data set, unpublished data.
[c] Source: California Natural Diversity Database (CDFG 2009a); the fen acreage is estimated based on a circle with 0.2-mi accuracy.
[d] Source: California Natural Diversity Database (CDFG 2009a); the bog acreage is estimated based on a circle with 1-mi accuracy.

Tree-dominated communities

Grand Fir Forest

Grand Fir Forest is a California Natural Diversity Database Special Community Type (CDFG 2010c). Grand Fir is a common vegetation series outside of California, but within California the Grand Fir Forest occurs exclusively along the coast in Humboldt, Mendocino, and Sonoma counties (Sawyer and Keeler-Wolf 1995). There are 509 ac (206 ha) of Grand Fir Forest in the secondary assessment area; it does not occur in the primary assessment area (CDFG 2009a).

In the Grand Fir Forest California Natural Diversity Database Special Community Type, grand fir (*Abies grandis*) is the dominant tree species present. Species associated with the community include Bishop pine, Douglas-fir, grand fir, red alder, coast redwood, Sitka spruce (*Picea sitchensis*), tanoak, Western hemlock, and white fir (*Abies concolor*) (Sawyer and Keeler-Wolf 1995). Within the assessment area, these stands are typically dominated by grand fir with small amounts of Douglas-fir and western hemlock present, and an understory including tanoak, Pacific wax myrtle (*Morella californica*, *Myrica californica* in Hickman 1993), sword fern, snowberry (*Symphoricarpos* spp.), evergreen violet (*Viola sempervirens*), goose grass (*Galium aparine*), vetch (*Vicia* spp.), and California huckleberry (CDFG 2009a). Trees are typically less than 230 ft (70 m) tall, with a continuous canopy, while shrub and herbaceous layers vary from sparse to dense (Sawyer and Keeler-Wolf 1995). Grand Fir Forest is classified in Manual of California Vegetation as *Abies grandis* Forest Alliance (Grand fir forest) (Green 1999, Sawyer et al. 2009).

Grand fir trees are a seral species, adapted to long fire intervals of over 100 years (Sawyer et al. 2009). The younger trees have thin bark and fires easily kill them. The older trees are slightly more resistant but often are secondarily killed by heart and root-decaying fungi that come in after fires. After fires, seedlings establish in open conditions and persist as the species is shade tolerant (Sawyer et al. 2009).

Mendocino Pygmy Cypress Forest

Perhaps the most unique plant community in the assessment area is Mendocino Pygmy Cypress Forest, which occurs only in coastal Mendocino County as a narrow, discontinuous strip up to several miles wide along the coast (Barbour and Major 1988). Pygmy Cypress Forest is a California Natural Diversity Database Special Community Type (CDFG 2010c) and is designated as an environmentally sensitive habitat area in the Mendocino County General Plan (Sholars 1997). The largest concentration of Mendocino Pygmy Cypress Forest occurs between Fort Bragg and Albion, approximately 1 to 2 mi (1.6 to 3.2 km) inland. Several smaller areas of Mendocino Pygmy Cypress Forest occur south of Point Arena, including Roseman Creek, Slick Rock Creek, and Galloway Creek. Additional occurrences are found along the central Sonoma County coast (Mayer and Laudenslayer 1988). There are 135 ac (55 ha) of Mendocino Pygmy Cypress Forest in the primary assessment area (located within the Albion inventory block; MRC's natural community data set, unpublished data) and approximately 4,320 ac (1,750 ha) in the secondary assessment area (CDFG 2009a).

Mendocino Pygmy Cypress Forest occurs on sterile, podzolized soils where dwarfed closed-cone conifers make up more than 75% of the total basal area (MRC 2012). Mendocino pygmy forest consists of pygmy cypress (*Hesperocyparis pygmaea* [misapplied synonym is *Callitropsis pygmaea; Cupressus goveniana* ssp. *pygmaea* in Hickman 1993], California Rare Plant Rank 1B.2), often co-dominant with Bolander's pine (*Pinus contorta* ssp. *bolanderi*, California Rare Plant Rank 1B.2), with a variety of plant associates including pygmy manzanita (*Arctostaphylos nummularia* ssp. *mendocinoensis* [*Arctostaphylos mendocinoensis* in Hickman 1993], California Rare Plant Rank 1B.2) and California sedge (*Carex californica*, California Rare Plant Rank 2.3). An understory of dwarfed shrubs is often present and may include Fort Bragg manzanita (*Arctostaphylos nummularia*), western Labrador tea, California huckleberry, and salal (Sholars 1982, 1997). Other plants associated with this community are coast trefoil (*Lotis formosissimus*) and Bolander's sweet pea (*Lathyrus vestitus* ssp. *bolanderi*), both a food source and/or potential host plant for the larval stage of the federally listed lotis blue butterfly (*Lycaeides argyrognomon lotis*). Mendocino Pygmy Cypress Forest is classified in Manual of California Vegetation as *Callitropsis pigmaea* Woodland Alliance (Mendocino pygmy cypress woodland) (Green 1999, Sawyer et al. 2009).

Individual trees within the Mendocino Pygmy Cypress Forest community type that are over 40 years old may be only 10 ft (3 m) in height and 1 in (2.5 cm) in trunk width (Schoenherr 1992, Johnston 1994). Fire is an essential part of pygmy cypress forest ecology; dominant tree species require high temperatures, such as those created by fire, to stimulate the release of seeds. Even-aged stands are common and result from periodic stand-replacing fires that kill existing closed-cone conifers while stimulating seed release and creating the bare mineral soil conditions necessary for germination and successful seedling establishment (Schoenherr 1992, Esser 1994, Holland and Keil 1995). The exclusion of fire for extended periods can result in the decline and senescence of these comparatively short-lived species (Holland and Keil 1995). The accumulation of fuels as a result of fire suppression over many years can result in catastrophic fires that consume any remaining cones and seed (Holland and Keil 1995). Seed release may occur as a result of old age or death in pygmy conifers, but without periodic fires and the bare mineral soil conditions they create, successful germination is severely reduced (Esser 1994). Most shrub species present in the pygmy forest are also fire-adapted and stump-sprout after a fire (Sholars 1997). Thus, sustainable management of these forests is likely to require controlled burns.

In recent years, housing development has contributed to the decline of Mendocino pygmy cypress forest acreage, in addition to indirect effects from septic leach fields that increase soil nutrients and escalate the growth rates of dwarf species (Sholars 1984, Sholars 1997). Fire roads within Mendocino pygmy cypress forest may also increase the nutrient load in podzolized soils by altering watershed drainage patterns (Sholars 1984).

Upland Douglas-fir Forest

Upland Douglas-fir Forest is a California Natural Diversity Database Special Community Type (CDFG 2010c) located in discontinuous patches along the North Coast Ranges, from Mendocino County north to Oregon, at elevations below 6,000 ft (1,830 m). The climax community occurs on moderately deep, well-drained soils in droughty but not xeric conditions (e.g., caused by rainshadows; Holland 1986). There are 2,775 ac (1,123 ha) of Upland Douglas-fir Forest in secondary assessment area. Though there is a lot of Douglas-fir California Wildlife Habitat Relationships habitat type in the primary assessment area, Upland Douglas-fir forest (a late-succesional type) does not occur in the primary assessment area (CDFG 2009a).

The Upland Douglas-fir Forest considered by CDFG as a Special Community consists of a mixed-age climax forest dominated (greater than 80%) by Douglas-fir (Holland 1986). Within the assessment area, these stands tend to consist of old-growth Douglas-fir mixed with hardwoods, often adjacent to mixed evergreen forest, oak woods and chapparal habitat types (CDFG 2009a). The trees are tall (approx. 200 ft [60 m]), even-aged and form a dense canopy (closure greater than 70%). Upland Douglas-fir Forest succeeds Sitka Spruce-Grand Fir Forest or Western Hemlock Forest (Holland 1986). Upland Douglas-fir Forest is classified in the Manual of California Vegetation as *Pseudotsuga menziesii* Forest Alliance (Douglas-fir forest) (Sawyer et al. 2009).

Shrub-dominated communities

Northern Coastal Bluff Scrub

Northern Coastal Bluff Scrub is a California Natural Diversity Database Special Community Type (CDFG 2010c) that occurs at localized sites along the California coast between Point Conception and Point Mendocino, in exposed areas with nearly constant winds with a high salt content. The soils are usually rocky and nutrient-poor (Holland 1986). There are only 4 ac (2 ha) of Northern Coastal Bluff Scrub in the secondary assessment area; it does not occur within the primary assessment area (CDFG 2009a).

The species associated with this community are dwarf shrubs, herbaceous perennials, and annuals, many of which are succulent (Holland 1986). Within the assessment area, species present include bearberry (*Arctostaphylos uva-ursi*), Carmel ceonothus (*Ceanothus griseus*), wild buckwheat (*Eriogonum* sp.), gumplant (*Grindelia* sp.), ocean-bluff bluegrass (*Poa unilateralis*), oatgrass (*Danthonia* sp.), goldenaster (*Chrysopsis* sp.), fescue (*Festuca* sp.), plantain (*Plantago* sp.), and seaside daisy (*Erigeron glaucus*) (CDFG 2009a). The shrub layer is the most prevalent layer, often forming a continuous mat and is low, often prostrate, and 2–20 in (5–50 cm) high (Holland 1986). Northern Coastal Bluff Scrub does not have an equivalent in the Manual of California Vegetation (Sawyer et al. 2009).

Herbaceous-dominated communities

Coastal and Valley Freshwater Marsh

Coastal and Valley Freshwater Marsh is a California Natural Diversity Database Special Community Type (CDFG 2010c) that occurs occasionally along the coast, in valleys near river mouths, and around the margins of lakes and springs. The community is common in the Sacramento and San Joaquin Valleys in river oxbows and other floodplain areas, and most extensive in the upper portion of the Sacramento-San Joaquin River Delta. There are 326 ac (132 ha) of Coastal and Valley Freshwater Marsh in the secondary assessment area; it does not occur in the primary assessment area (CDFG 2009a).

Coastal and Valley Freshwater Marsh is characterized by permanent flooding by freshwater with a lack of substantial current; the consequent, prolonged saturation in the area permits accumulation of deep, peaty soils and thereby habitat for a particular suite of species (Holland 1986). It is dominated by bulrush (*Schoenoplectus* spp.) and cattail (Holland 1986). These species form a dense canopy of perennial, emergent monocots that grow to 13 to 16 ft (4 to 5 m) tall (Holland 1986). Coastal and Valley Freshwater Marsh is classified in the Manual of California Vegetation as *Schoenoplectus californicus* Herbaceous Alliance (California bulrush marsh) and *Typha* (*angustifolia*, *domingensis*, *latifolia*) Herbaceous Alliance (cattail marshes) (Sawyer et al. 2009).

Coastal Brackish Marsh

Coastal Brackish Marsh is a California Natural Diversity Database Special Community Type (CDFG 2010c) that occurs along the interior edges of coastal bays and estuaries or in coastal lagoons. It is most prevalent around Suisun Bay, at the mouth of the Sacramento-San Joaquin Delta. There are 175 ac (71 ha) of Coastal Brackish Marsh in the secondary assessment area; it does not occur in the primary assessment area (CDFG 2009a).

Coastal Brackish Marsh is characterized by permanent flooding by brackish waters, resulting in conditions intermediate to Salt Marsh and Freshwater Marsh. Salinity varies, increasing at high tide and/or during seasons of low freshwater runoff (Holland 1986). The community is similar to Salt Marsh and Freshwater Marsh with some plants characteristic of each, including cattail, water buttons (*Cotula* spp.), saltgrass (*Distichlis* spp.), California bulrush, and salt rush (CDFG 2009a). Coastal Brackish Marsh is dominated by a dense cover of perennial, emergent monocots that grow to 6.6 ft (2 m) tall (Holland 1986). It is classified in the Manual of California Vegetation as *Typha* (*angustifolia*, *domingensis*, *latifolia*) Herbaceous Alliance (cattail marshes) (Green 1999, Sawyer et al. 2009).

Coastal Terrace Prairie

Coastal Terrace Prairie is located along the coastal zone of California, often adjacent to a larger scrub-grassland complex. Research in the past decade has expanded the range of the community type and also refined the community composition (Barbour et al. 2007). There are 18 ac (7 ha) of Coastal Terrace Prairie in the secondary assessment area; it does not occur in the primary assessment area (CDFG 2009a).

Coastal Terrace Prairie is dominated by California oatgrass (*Danthonia* spp.). In some areas, this species co-occurs with a variety of native perennial and non-native, annual species. In other areas, oatgrass co-occurs with tufted hairgrass (*Deschampsia* spp.) as well as species such as Douglas iris (*Iris douglasiana*). Finally, a third type consists of a higher percentage of exotic, perennial grass species such as hairy oatgrass (*Danthonia pilosa*), with various sedge species (Barbour et al. 2007). Coastal Terrace Prairie is classified in the Manual of California Vegetation as *Calamagrostis nutkaensis* Herbaceous Alliance (Pacific reed grass meadows), *Deschampsia* *caespitosa* Herbaceous Alliance (Tufted hair grass meadows), and *Danthonia californica* Herbaceous Alliance (California oat grass prairie) (Green 1999, Sawyer et al. 2009).

Fen

The Fen community is a California Natural Diversity Database Special Community Type (CDFG 2010c) that is exceedingly rare in California; there is only one known locality, occurring in Mendocino County at a site known as the Inglenook Fen. Fens are formed where advancing, shell-rich sand dunes block acidic drainage waters from upland Bishop pine and redwood forests. The soils range from sands on the dune side to nearly peat inland, with sand and mineral material present throughout (Baker 1972). There is approximately (estimated based on a circle with a 0.2-mile accuracy) 70 ac (28 ha) of Fen in the secondary assessment area, 6.5 mi (10 km) north of Fort Bragg, between Highway 1 and Ten Mile Road, within MacKerricher State Park; it does not occur in the primary assessment area (CDFG 2009a).

A number of vegetation types are present within the Fen community. At the western end of Inglenook Fen, near the open water, sedges (*Carex* spp.) and spikerush (*Eleocharis acicularis*) dominate. In the central and eastern portions, the diverse topography supports a richer suite of species with western Labrador tea and Pacific wax myrtle bushes dominating the shrub layer and tussocks of sedge and reedgrass (*Calamagrostis* spp.) dominating the herbaceous layer. Species of concern include Point Reyes horkelia (*Horkelia marinensis*; California Rare Plant Rank 1B.2) (Baker 1972). The Fen community does not have an equivalent Manual of California Vegetation classification, but is likely included as a subset to *Calamagrostis nutkaensis* Herbaceous Alliance (Pacific reed grass meadows), *Morella californica* Shrubland Alliance (Wax myrtle scrub), and *Rhododendron neoglandulosum* Shrubland Alliance (Western Labrador-tea thickets) (Sawyer et al. 2009).

Northern Coastal Salt Marsh

Northern Coastal Salt Marsh is a California Natural Diversity Database Special Community Type (CDFG 2010c) that is located along the California coast from the Oregon border south to Point Conception. It is found along sheltered inland margins of bays, lagoons, and estuaries and is prevalent in Humboldt Bay, Tomales Bay, Elkhorn Slough, Morro Bay, and the San Francisco Bay Area. Soils are hydric and subject to regular tidal inundation for most or part of each year (Holland 1986). There are 67 ac (27 ha) of Northern Coastal Salt Marsh in the primary assessment area and 1,268 ac (513 ha) in the secondary assessment area (CDFG 2009a).

Northern Coastal Salt Marsh is characterized by higher salinity values than Coastal Brackish Marsh. Northern Coastal Salt Marsh species are usually segregated in bands; non-native cordgrass dominates areas adjacent to open water, pickleweed dominates mid-littoral elevations, and a more diverse mix of species dominates areas closer to high ground (Holland 1986). The community is dominated by a dense cover of highly productive, suffructescent, salt-tolerant hydrophytes that grow up to 3 ft (1 m) tall (Holland 1986). Northern Coastal Salt Marsh is classified in the Manual of California Vegetation as *Sarcocornia pacificia* (*Salicornia depressa*) Herbaceous Alliance (Pickleweed mats) (Green 1999, Sawyer et al. 2009).

Sphagnum Bog

Sphagnum Bog is a California Natural Diversity Database Special Community Type (CDFG 2010c) that is scattered in the North Coast Ranges (i.e., Sonoma County into Oregon), the Klamath Ranges, and in the Sierra Nevada and Cascade Ranges (i.e., Tulare County into Oregon) at elevations from 1,000 to 6,000 ft (305 to 1,820 m) in the north and 5,000 to 9,000 ft (1,515 to 2,730 m) in the south (Holland 1986). The type forms in depressions within pygmy forest and bordering redwood communities (Sholars 1984) and is rare in California. Specifically, sphagnum bogs develop in low-lying areas fed by mineral-poor seeps and springs that are invaded by various moss species, including those of the genus *Sphagnum*. Over time, the accumulation of peat formed from plant remains alters the hydrology of the bog, isolating it from input of groundwater. The increased dependence on direct input of rainwater, together with the organic acids released by decaying sphagnum, lowers the pH of the bog. The low pH, saturated organic soil, and very low nutrient availability create conditions favorable to a highly specialized group of plants, including a number of carnivorous plants (Schoenherr 1992, Holland and Keil 1995). Because bogs are nutrient-poor, they are particularly vulnerable to watershed changes that cause an influx of organic matter or mineral-rich water (Guntherspergen and Stearns 1985), and to alteration of drainage patterns. There are approximately (based on a circle with a one mile accuracy) 1,165 ac (471 ha) of Sphagnum Bog in the secondary assessment area; it does not occur in the primary assessment area (CDFG 2009a).

Sphagnum Bog is dominated by a dense growth of low-growing, herbaceous perennials and low shrubs (Holland 1986). Plant associates include western labrador tea, Pacific wax myrtle, round-leaved sundew (*Drosera rotundifolia*), rush (*Juncus* spp.), California pitcher plant (*Darlingtonia californica*), and some introduced species (e.g., pitcher plant [*Sarracenia* spp.]). Sphagnum bogs also support a rare, federally endangered, but potentially extinct invertebrate species, the lotis blue butterfly (Shapiro and Manolis 2007, USFWS 2011a). The larval stage of the federally-endangered lotis blue butterfly (*Lycaeides argyrognomon lotis*) is thought to feed exclusively on seaside bird's-foot trefoil (*Lotus formisissimus*) and potentially Pacific pea (*Lathyrus vestitus*) (Arnold 1983), rare plants found in Sphagnum bog habitat. Sphagnum Bog does not have an equivalent Manual of California Vegetation classification, but is likely included as a subset to *Morella californica* Shrubland Alliance (Wax myrtle scrub) or *Rhododendron neoglandulosum* Shrubland Alliance (Western Larador-tea thickets) (Sawyer et al. 2009).

3.5.1.4 Habitat Elements

Several Habitat Elements occur in the primary and secondary assessment areas, a number of which support special-status plant species. Table 3.5-3 and Appendix F, Figure F-5 summarize the extent and distribution, respectively, for each of the Habitat Elements in the assessment area. Descriptions of these communities are provided below.

Table 3.5-3. Habitat Elements in the primary and secondary assessment areas.

Major habitat subdivision	Habitat Elements	Primary assessment area (ac)	Secondary assessment area (ac)
Tree-dominated	Hardwoods	No estimate available	No estimate available
	Old-growth Forest	Type I: 102[a] Type II: 520[a]	No estimate available
Herbaceous-dominated	Wetlands	2,267[b]	14,733[b]

[a] Source: MRC's natural community data set, unpublished data.
[b] Source: National Wetlands Inventory (USFWS 2011b) (Table 3.5-4).

Hardwood stands and hardwoods within conifer stands

Native hardwoods (i.e., tanoak, madrone, true oaks, chinquapin, and bay laurel in the uplands and red alder, bigleaf maple, willow, and Oregon ash in riparian buffer zones) within conifer stands are an MRC habitat element. However, past intensive timber management practices initiated successional processes that have lead to an early but natural successional condition in which hardwoods dominate or comprise a substantial portion of stand composition. Although there is little information regarding the pre-European range of variability in proportion of forestlands in this successional stage, or the relative portion of hardwoods among unmanaged stands, the percentage of hardwood-dominated stands and of hardwoods in conifer types are likely elevated above pre-history conditions. By one estimate the hardwood contribution to standing volume across the region increased by a factor of 3 from 1953 to 1994 (Regional Committee on Hardwood Retention 1996). Hardwoods are a natural understory component of mixed redwood and Douglas-fir forests and are important habitat for many wildlife species. Furthermore, hardwood-dominated conditions are a natural successional stage of conifer succession. Some hardwood stands have never been managed for conifer timber production but rather persist as a natural and persistent habitat type within the assessment area. Therefore, MRC strives both to reduce the perceived unnatural, elevated percentage of hardwood stands while protecting the hardwoods elements that are an essential and natural part of the landscape. To this end, MRC classifies hardwood-dominated stands according to the following scheme:

- Class I stands are dominated by native hardwoods and have never been managed for conifer timber production.
- Class II stands are dominated by native hardwoods and may have had some conifer harvest, although their suitability for conifer restoration is unknown.
- Class III stands are dominated by native hardwoods only because of past management and are clearly suitable for conifer restoration (MRC 2012). Within this type, MRC has designated in the HCP/NCCP approximately 1,000 ac (405 ha) to be retained as representative of this early-successional stage.

There are no estimates available for the amount of Class I to Class III hardwood stands for the assessment areas. While there is an accurate assessment of oak-dominated stands within the assessment area (see Blue Oak Woodland and Coastal Oak Woodland California Wildlife Habitat Relationships habitat type descriptions), stand class is generally unknown until a stand is investigated for potential harvest. Guidelines for harvest in each of the stand classes are described in more detail in the analyses of alternatives section below (Section 3.5.2). Additionally, information on the value of hardwoods to wildlife is described in Section 3.6 (Terrestrial Habitats and Wildlife Species of Concern).

Old-growth forest

Redwood forest and several Douglas-fir alliances are California Natural Diversity Database Special Community Types (CDFG 2010c). They are classified in the Manual of California Vegetation as *Sequoia sempervirens* Forest Alliance (Redwood forest) and *Pseudotsuga menziesii* Forest Alliance (Douglas-fir forest) (Sawyer et al. 2009). Within the primary assessment area, there is an estimated 102 ac (41 ha) of Type I old-growth forest and 520 ac (210 ha) of Type II in redwood and redwood/Douglas-fir forests. MRC treats old-growth forests (i.e., stands) and old-growth trees in younger stands as Habitat Elements. Because of their importance as habitat for wildlife species of concern, old-growth forests and individual trees within younger stands are discussed in more detail under Section 3.6 (Terrestrial Habitat and Wildlife Species of Concern).

Wetlands

For this EIS/PTEIR the agencies use MRC's definition of wetlands as 'wet areas' (isolated patches of wet soil, often with aquatic vegetation and standing water; wetlands and standing water in roadside ditches are excluded from this classification) and categorizes these as an important Habitat Element (MRC 2012). Within the primary assessment area, MRC inventories wetlands only as it is necessary to determine a site-specific management strategy because harvesting or other management activities are proposed at the site; there has been no formal wetland delineation of the primary assessment area. The National Wetlands Inventory (USFWS 2011b), funded under USFWS, provides more comprehensive information on the type and extent of wetlands within the assessment area, as provided in Table 3.5-4.

Table 3.5-4. Wetland types in the primary and secondary assessment areas.

Wetland types	Primary assessment area (ac)	Secondary assessment area (ac)
Estuarine	26	1,831
Freshwater Emergent Wetland	34	2,068
Freshwater Forested/Shrub Wetland	723	5,781
Freshwater Pond	20	300
Lake	0	38
Riverine	1,464	4,714
Total	**2,267**	**14,732**

3.5.1.5 Plant species of concern

For the EIS/PTEIR, plant species of concern are defined as those species listed, proposed, or under review as rare, threatened, or endangered by the federal government and/or the State of California, and those recognized as rare or endangered by a collaborative effort between California Native Plant Society and CDFG.

Several sources were queried for the United States Geological Survey quadrangles that include the primary and secondary assessment area to generate a preliminary list of plant species of concern with the potential to occur in the assessment area:

- Lists of special-status species generated by the USFWS (USFWS 2009a);
- California Natural Diversity Database (CDFG 2009a); and
- California Native Plant Society Online Rare Plant Inventory (Accessed: August 2009).

The comprehensive, preliminary list of plant species of concern, including their corresponding California Wildlife Habitat Relationships vegetation type, is provided in Appendix N. The preliminary list was reviewed to determine which species have the potential to occur within the assessment area based on habitat requirements. All species were determined to potentially occur in the assessment area; therefore, the preliminary list of plant species of concern is also the finalized scoping list.

One-hundred and four plant species of concern were identified that could potentially occur in the assessment area. Twenty-one of these species have been documented within the primary assessment area; the remaining species occur in the secondary assessment area or within a United States Geological Survey quadrangle that overlaps the secondary assessment area. Thirty-one of these species would be covered by the HCP/NCCP, and 17 of these species are federally and/or state-listed as threatened, endangered, rare, or candidate species. The distribution, habitat associations, and threats to federally- and/or state-listed plant species are summarized in Appendix N. Appendix N also identifies the California Wildlife Habitat Relationships habitat types and California Natural Diversity Database communities that most closely correspond to the habitat requirements for the 104 plant species of concern with the potential to occur in the assessment area, based on review of the Califorinia Native Plant Society habitat type descriptions.

In total, forty-five of the 104 species have the potential to occur in at least one of the four California Wildlife Habitat Relationships timber types (i.e., Douglas-fir, Redwood, Montane Hardwood, and Montane Hardwood-Conifer), with one additional species potentially occurring in the Montane Riparian California Wildlife Habitat Relationships habitat type. The remaining species occur only in non-timber habitat types. Of the 46 species of concern that potentially occur in timber-related California Wildlife Habitat Relationships habitat types, 21 are covered under the HCP/NCCP and 25 are not covered under the HCP/NCCP.

Appendix N provides information on all of the above species. Below is key information pertinent to potential impacts on each of these species, including potential threats.

Species of concern that potentially occur in timber-related California Wildlife Habitat Relationships habitat types

McDonald's rock cress (Arabis mcdonaldiana)

McDonald's rock cress is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. Within these habitats, McDonald's rock cress is restricted to openings in tree canopy cover on serpentine to lateritic soils, often with high levels of many heavy metals (USFWS 2009b). Potential threats to the species include mining, destruction by off-road vehicles, and, due to fire suppression activities, habitat encroachment by knobcone pine or other species tolerant of serpentine soils (CNPS 2009, USFWS 2009b).

Sonoma canescent manzanita (Arctostaphylos canescens ssp. sonomensis)

Sonoma canescent manzanita is a perennial, evergreen shrub. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir, and redwood. It is threatened by development and timber harvest (CNPS 2011).

Raiche's manzanita (Arctostaphylos stanfordiana ssp. raichei)

Raiche's manzanita is a perennial, evergreen shrub. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir, and redwood. It is threatened by urbanization (CNPS 2011).

Humboldt milk-vetch (Astragalus agnicidus)

Humboldt milk-vetch is a perennial shrub. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: montane hardwood-conifer, montane hardwood, Douglas-fir, and redwood. Threats to the species include timber harvest, road maintenance, grazing, construction, canopy closure, and interspecific competition, often with pampas grass (*Cortaderia jubata*) (CNPS 2011, MRC 2012).

Leafy reed grass (Calamagrostis foliosa)

Leafy reed grass is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: coastal scrub, Douglas-fir, and redwood. Threats to this species are unknown.

Coastal bluff morning-glory (Calystegia purpurata ssp. saxicola)

Coastal bluff morning-glory is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. It is threatened by development, foot traffic, and non-native plants (CNPS 2011).

Swamp harebell (Campanula californica)

Swamp harebell is a perennial, rhizomatous herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir, redwood, montane hardwood, and montane hardwood-conifer. It is threatened by competition, grazing, development, marsh habitat loss, timber harvest, road maintenance, and trampling (CNPS 2011).

Dissected-leaved toothwort (Cardamine pachystigma var. dissectifolia)

Dissected-leaved toothwort is a perennial, rhizomatous herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. Location, rarity, and endangerment information are needed on this species. It is threatened by road maintenance (CNPS 2011).

California sedge (Carex californica)

California sedge is a perennial, rhizomatous herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. It is threatened by competition, grazing, development, marsh habitat loss, timber harvest, road maintenance, and trampling (CNPS 2011).

Bristly sedge (Carex comosa)

Bristly sedge is a perennial, rhizomatous herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships type: montane hardwood. It is threatened by marsh drainage and road maintenance (CNPS 2011).

Lagoon sedge (Carex lenticularis var. limnophila)

Lagoon sedge is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. It is known in California from fewer than 10 occurrences, all historical; therefore, no information currently exists on potential threats (CNPS 2011).

Green yellow sedge (Carex viridula var. viridula)

Green yellow sedge is a perennial herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. No information currently exists on potential threats (CNPS 2011).

Oregon goldthread (Coptis laciniata)

Oregon goldthread is a perennial, rhizomatous herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat

Relationships types: Douglas-fir, and redwood. It is potentially threatened by erosion and timber harvest activities (CNPS 2011).

Norris' beard-moss (Didymodon norrisii)

Norris's beard-moss is a non-vascular plant. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. It is potentially threatened by road maintenance, timber harvest, and road construction (CNPS 2011).

Streamside daisy (Erigeron biolettii)

Streamside daisy is a perennial herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: montane hardwood, montane hardwood-conifer, Douglas-fir, and redwood. Location, rarity, and endangerment information are needed; no information currently exists on potential threats (CNPS 2011).

Kellogg's (= Red Mountain) buckwheat (Eriogonum kelloggii)

Kellogg's buckwheat is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. Known from just a few occurrences, it is potentially threatened by mining (CNPS 2009).

Coast fawn lily (Erythronium revolutum)

Coast fawn lily is a perennial, bulbiferous herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: montane hardwood-conifer, Douglas-fir, redwood, and montane hardwood. It is threatened by timber harvest, non-native plants, and road maintenance and possibly by grazing (CNPS 2011).

Minute pocket-moss (Fissidens pauperculus)

Minute pocket-moss is a non-vascular plant. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. Threats to this species include loss or degradation of its habitat (Poor Pocket Moss Recovery Team 2007).

Mendocino gentian (Gentiana setigera)

Medoncino gentian is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. It is threatened by mining activities and wetland alteration (CNPS 2011).

American manna grass (Glyceria grandis)

American manna grass is a perennial, rhizomatous herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the California Wildlife Habitat Relationships type: montane riparian. No information currently exists on potential threats (CNPS 2011).

Bolander's horkelia (Horkelia bolanderi)

Bolander's horkelia is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. It is threatened by vehicles, and development (CNPS 2011).

Thin-lobed horkelia (Horkelia tenuiloba)

Thin-lobed horkelia is a perennial herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships type: montane hardwood. It is threatened by development (CNPS 2011).

Small groundcone (Kopsiopsis hookeri [Boschniakia hookeri in Hickman 1993])

Small groundcone is a parasitic, perennial, rhizomatous herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir, and redwood. It is possibly threatened by timber harvest (CNPS 2011).

Marsh pea (Lathyrus palustris)

Marsh pea is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. No information currently exists on potential threats (CNPS 2011).

Coast lily (Lilium maritimum)

Coast lily is a perennial, bulbiferous herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir, redwood, montane hardwood, and montane hardwood-conifer. It is threatened by road maintenance, urbanization, development, horticultural collecting, timber harvest, grazing, non-native plants, habitat fragmentation, and recreational activities (CNPS 2011).

Cobb Mountain lupine (Lupinus sericatus)

Cobb Mountain lupine is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: montane hardwood, montane hardwood-conifer, Douglas-fir, and redwood. It is threatened by geothermal development, habitat alteration, timber harvest, road maintenance, road widening, and herbicides. It is an early-successional species, however, and will colonize disturbed sites (CNPS 2011).

Northern microseris (Microseris borealis)

Northern microseris is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. There are very few known occurrences and no information currently exists on potential threats (CNPS 2011).

Leafy-stemmed mitrewort (Mitella caulescens)

Leafy-stemmed mitrewort is a perennial, rhizomatous herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir, redwood, montane hardwood, and montane hardwood-conifer. It is threatened by timber harvest and road maintenance (CNPS 2011).

Robust monardella (Monardella villosa ssp. globosa)

Robust mondardella is a perennial rhizomatous herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships type: montane hardwood. Many occurrences have not been recently seen and no information currently exists on potential threats (CNPS 2011).

Howell's montia (Montia howellii)

Howell's montia is an annual herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. It is threatened by timber harvest, road construction, road maintenance, vehicles, and competition (CNPS 2011).

Baker's navarretia (Navarretia leucocephala ssp. bakeri)

Baker's navarretia is an annual herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. It is threatened by development, habitat alteration, road construction, and agriculture (CNPS 2011).

Wolf's evening-primrose (Oenothera wolfii)

Wolf's evening-primrose is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir, and redwood. It is threatened by road maintenance, development, foot traffic, invasive plant control, non-native plants, and hybridization with non-native Oenothera spp. (CNPS 2011).

Seacoast ragwort (Packera bolanderi var. bolanderi)

Seacoast ragwort is a perennial, rhizomatous herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. It is potentially threatened by timber harvest, road maintenance, and erosion (CNPS 2011).

White-flowered rein orchid (Piperia candida)

White-flowered rein orchid is a perennial herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: montane hardwood-conifer, montane hardwood, Douglas-fir and redwood. It is threatened by timber harvest (CNPS 2011).

North Coast semaphore grass (Pleuropogon hooverianus)

North Coast semaphore grass is a rhizomatous herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: montane hardwood, montane hardwood-conifer, Douglas-fir and redwood. Threats to this species include timber harvest operations, roadside maintenance, competition by non-native species, and destruction by feral pigs (CNPS 2009).

Great burnet (Sanguisorba officinalis)

Great burnet is a perennial, rhizomatous herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir, redwood, montane hardwood, and montane hardwood-conifer. It is potentially threatened by non-native plants (CNPS 2011).

Red Mountain stonecrop (Sedum laxum ssp. eastwoodiae)

Red Mountain stonecrop is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. It is a serepentine obligate and known from less than ten occurrences that are all protected on Red Mountain. Therefore, although this species cannot be excluded from the scoping list due to habitat preferences (i.e., there is serpentine habitat with the primary and secondary assessment area), it is unlikely to be located within the assessment area as all records to date suggest that it is a Red Mountain endemic on the Noble Butte quad. Threats to this species are unknown (CNPS 2011).

Maple-leaved checkerbloom (Sidalcea malachroides)

Maple-leaved checkerbloom is a perennial herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir, redwood, montane hardwood, and montane hardwood-conifer. It is threatened by timber harvest and associated road usage, non-native plants, competition, low reproduction, road maintenance, and development (CNPS 2011).

Siskiyou checkerbloom (Sidalcea malviflora ssp. patula)

Siskiyou checkerbloom is a perennial, rhizomatous herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships type: montane hardwood. It is threatened by road widening and non-native plants and possibly by timber harvest (CNPS 2011).

Purple-stemmed checkerbloom (Sidalcea malviflora ssp. purpurea)

Purple-stemmed checkerbloom is a perennial, rhizomatous herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships type: montane hardwood. It is threatened by development and non-native plants (CNPS 2011).

Red Mountain catchfly (Silene campanulata ssp. campanulata)

Red Mountain catchfly is a perennial herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. Threats to this species are unknown (CNPS 2011).

Robust false lupine (Thermopsis robusta)

Robust false lupine is a perennial, rhizomatous herb. It **is not** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: montane hardwood, montane hardwood-conifer, Douglas-fir, and redwood. It is threatened by road maintenance, timber harvest and associated road usage (CNPS 2011).

Santa Cruz clover (Trifolium buckwestiorum)

Santa Cruz clover is an annual herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships type: montane hardwood. It is threatened by land clearing and non-native plants and possibly by road maintenance (CNPS 2011).

Oval-leaved viburnum (Viburnum ellipticum)

Oval-leaved viburnum is a perennial, deciduous shrub. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir and redwood. It is threatened by habitat alteration (CNPS 2011).

Running-pine (Lycopodium clavatum)

Running pine is a perennial, rhizomatous herb. It **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir, redwood, montane hardwood, and montane hardwood-conifer. It is threatened by timber harvest, herbicide application, road construction, and road maintenance (CNPS 2011).

Long-beard lichen (Usnea longissima)
Long-beard lichen **is** covered in MRC's HCP/NCCP. It is potentially found within the following timber-associated California Wildlife Habitat Relationships types: Douglas-fir, redwood, montane hardwood, and montane hardwood-conifer. Threats to this species include pollution (i.e., it is sensitive to air quality), illegal harvesting, loss of host trees, and forest fragmetnation (Ponzetti and Wittmann 2006).

3.5.2 Environmental effects and mitigation

Effects on vegetation and plant species of concern are considered significant if the Proposed Action or alternatives would:

- Potentially threaten to eliminate a plant community, or substantially reduce the number or restrict the range of an endangered, rare, or threatened species.
- Have a substantial adverse effect, either directly or through habitat modifications, on any rare/unique plant communities, including California Natural Diversity Database-listed communities present within the assessment area.
- Have a substantial, adverse effect on wetlands as defined by this EIS/PTEIR (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
- Have a substantial adverse effect, either directly or through habitat modifications, on any plant species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFG or USFWS.
- Conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.
- Conflict with any local governmental policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

There are two other small HCPs in the assessment area. As discussed in Section 3.4.2 (Aquatic and Riparian Habitats and Species of Concern, Environmental effects and mitigation), there is no known conflict between the provisions of these two HCPs and the Proposed Action or alternatives, since the area covered by these HCPs is not directly adjacent to the primary assessment area and does not include forest habitats that would be subject to future acquisition by MRC. Additionally, there are no known tree preservation policies or ordinances in place that would conflict with the Proposed Action or alternatives.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.5.2.7.

3.5.2.1 Analysis approach and impact mechanisms

Analysis approach
The potential for effects on vegetation and plant species of concern under the Proposed Action or alternatives was assessed through: (1) an analysis of change in acreage in each California Wildlife Habitat Relationships habitat type and size class over time under each alternative; (2) an assessment of the level of protection for each rare/unique plant community under each alternative; and (3) an analysis of potential effects on plant species of concern under each alternative. A more limited analysis is performed for the secondary assessment area to describe potential project-related and cumulative effects at regional and population levels. The analysis is limited by the extent of knowledge on (1) each species' actual extent within the project area (i.e.,

instead the focus is on where the plants may potentially occur); and (2) each species' habitat preferences, including sensitivity to various disturbances (this information is not available for most species).

Under each of the alternatives, MRC's response to wildfire would follow its current (2011) Fire Suppression Plan or future updates to this plan (Section 3.10, Hazards and Hazardous Substances). Because the potential effects of wildfire on vegetation and plant species of concern are varied and unpredictable due to the stochastic nature of wildfires, an analysis of the effects would be speculative in nature. Accordingly, effects of wildfire on vegetation and plant species of concern are not analyzed in this EIS/PTEIR. However, post-fire timber salvage may occur in burned areas to salvage trees that are likely to die or that are not viable for timber production. The effects of post-fire timber salvage on vegetation and plant species of concern may differ by alternative based on the conservation and management measures that would be implemented under each alternative. The EIS/PTEIR therefore includes a qualitative analysis of the effects of post-fire timber salvage.

Analysis of climate change and cumulative effects are discussed separately under Section 3.8 (Climate and Climate Change) and Section 4 (Cumulative Effects), respectively.

Impact mechanisms

MRC's forest management activities include but are not limited to harvesting, road and landing construction, site preparation, and herbicide treatment. These activities could result in effects on these vegetation communities or species either directly (e.g., reduction in local population size, habitat fragmentation) or indirectly (e.g., habitat alteration such as a change in the shading or hydrology of the site). Potential effects for each of the covered activities are discussed below. Potential effects of herbicide treatment (not a covered activity) are addressed in Section 3.10.2 (Hazards and Hazardous Substances, Environmental effects and mitigation).

3.5.2.2 No Action alternative

Analysis of trends in vegetation communities

Primary Assessment Area California Wildlife Habitat Relationships Habitat Types and Size Classes

Figure 3.5-1 displays timber modeling results for dominant California Wildlife Habitat Relationships habitat types in the primary assessment area under the No Action alternative. Under this alternative, it is expected that the amount of Montane Hardwood would increase up to year 20 and then decrease to less than 1% by year 70. It is also predicted that the amount of Montane Hardwood-Conifer would continually decrease from approximately 40% of the total area to approximately 1% of the total area by year 80. Finally, it is predicted that the percentage of Redwood in the primary assessment area would increase from approximately 55% to close to 100% by year 80. Therefore, the predicted overall trend in dominant California Wildlife Habitat Relationships habitat type under the No Action alternative is a decrease in Montane Hardwood and Montane Hardwood-Conifer and an increase in Redwood percent composition. The acres of California Wildlife Habitat Relationships habitat types in each inventory block over time under this alternative are provided in Appendix O. Appendix F, Figures F-6 and F-7 display the California Wildlife Habitat Relationships habitat types at year 40 and year 80.

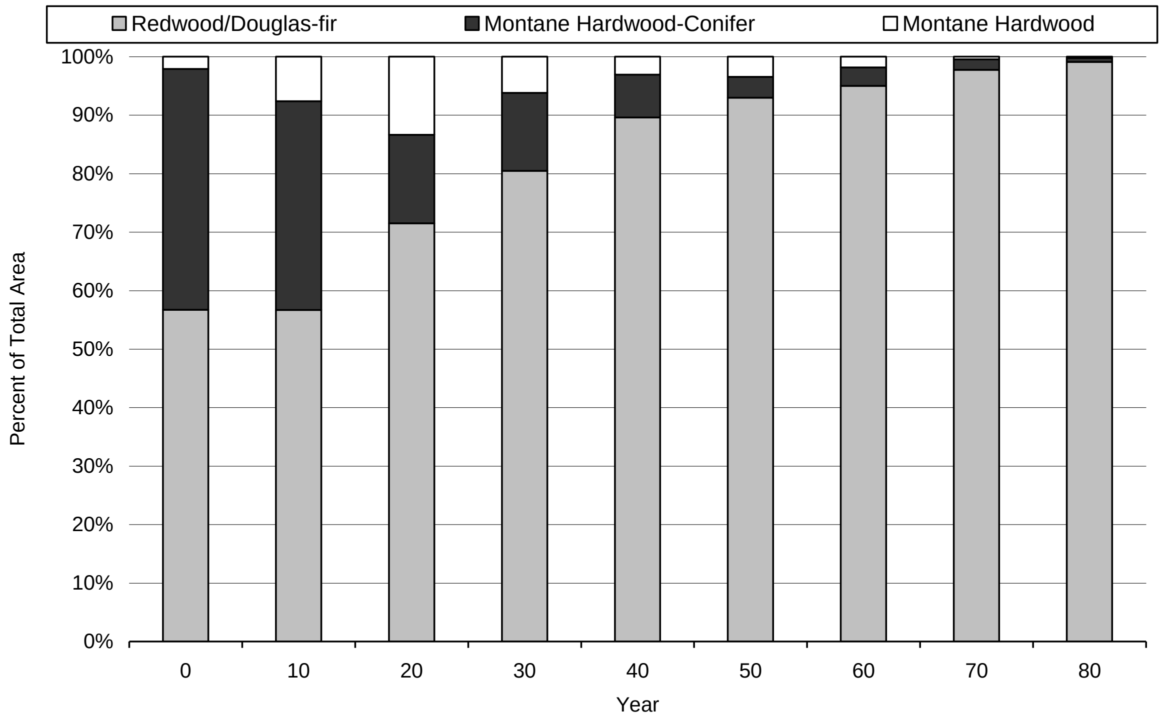


Figure 3.5-1. California Wildlife Habitat Relationships habitat type composition in the primary assessment area predicted under the No Action alternative.

Existing conditions, with a relatively high percentage of both Montane Hardwood-Conifer and Montane Hardwood, are largely presumed to be a result of past forest management. Hardwood-dominated stands naturally occur as an early-successional stage of redwood and Douglas-fir forests and they persist for many years before they are outcompeted by conifers. It is believed that past management practices have kept an artificially high percentage of stands in an early-successional condition. By one estimate, the hardwood contribution to standing volume increased by a factor of 3 from 1953 to 1994 due to fire suppression and heavy clearcutting without post-harvest control treatments (Regional Committee on Hardwood Retention 1996). Under the No Action alternative, MRC would seek to restore the balance of hardwoods and conifer to a state MRC believes to be more natural for this region, while retaining a hardwood component in conifer-dominated stands, and protecting hardwood forest at locations where site conditions favor hardwoods as the natural, late-successional habitat type (MRC 2000a).

Figure 3.5-2 displays timber modeling results for California Wildlife Habitat Relationships size classes in the primary assessment area under the No Action alternative. Under this alternative, it is predicted that the percentage of California Wildlife Habitat Relationships size classes 1 and 2 would initially increase from approximately 8 to 15%, but then decrease to less than 1% by year 70. The percentage of class size 3 is predicted to remain relatively stable, at approximately 20–30% from year 0 to year 70. The percentage of size class 4 is predicted to decrease slightly, from close to 70% at year 0 to approximately 55% by year 70. The percentage of class size 5 is predicted to increase steadily from less than 5% in year 0 to approximately 20% in year 70. Finally, the percentage of size class 6 is predicted to increase from less than 1% to approximately 2%. Therefore, the predicted overall trend in California Wildlife Habitat Relationships size class under the No Action alternative is a substantial decrease in the percentage composition of younger, class 1 and 2 stands, a relatively stable representation of classes 3 and 4 stands, and a substantial increase in the oldest stands, classes 5 and 6, with the highest increase in the class 5 stands percentage composition. California Wildlife Habitat Relationships size classes and MRC structure classes in each inventory block under this alternative are provided in Appendix O.

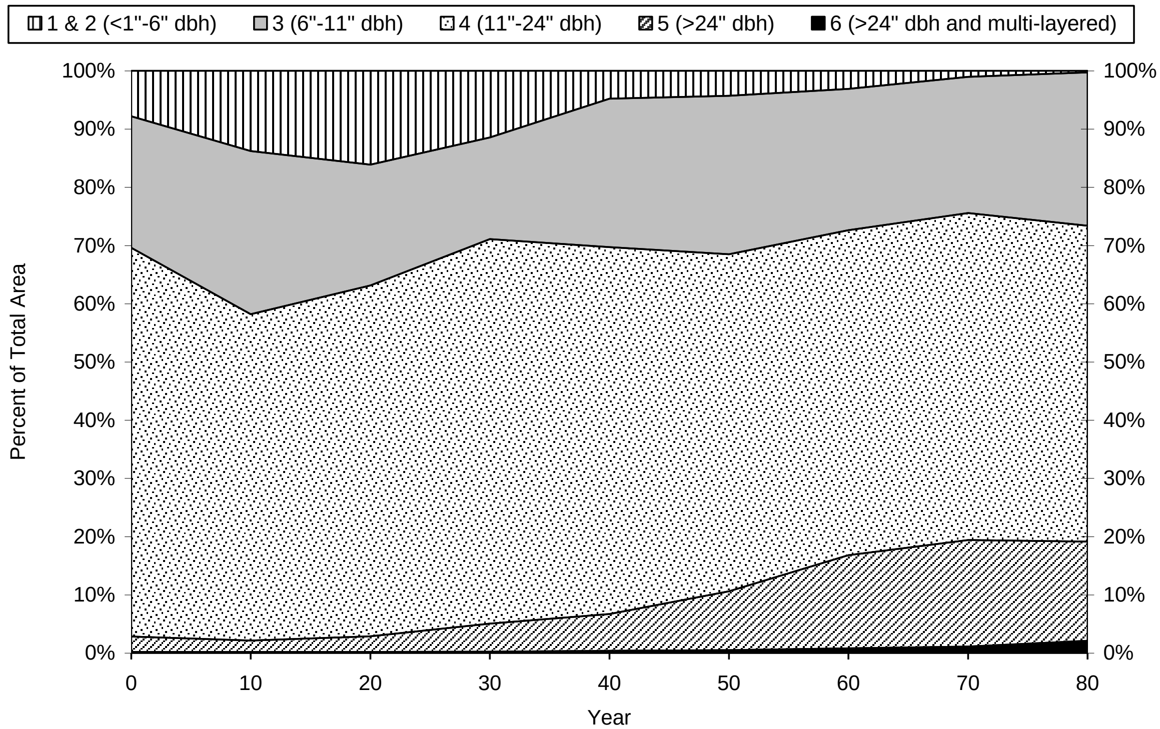


Figure 3.5-2. California Wildlife Habitat Relationships size class composition in the primary assessment area predicted under the No Action alternative.

Exisitng conditions, with a relatively higher percentage composition of the younger size class trees, are presumed to be an artificial state due to the past management practice of even-aged silviculture. This practice resulted in a high percentage of even-age stands, including a disproportionate percentage of stands in the younger size classes. Under the No Action alternative, MRC would practice uneven-aged silviculture, with the goal of restoring the forest to a more mixed-size condition, such that within a given stand the mean size class is more likely size classes 4 and 5. At the same time, the amount of larger and mixed-sized tree stands (size class 6), would increase only slightly over time. This minor increase in California Wildlife Habitat Relationships size class 6 after prolonged treatments with uneven-aged silviculture is explained by: (1) multiple harvests, using selection silviculture, of trees before they reach the > 24-in (61-cm) size class (the critical size limit for designating size class 6), (2) the definition of California Wildlife Habitat Relationships size class 6 requiring the stand to be distinctly multilayered, and (3) nuances of the crosswalk from the timber model to California Wildlife Habitat Relationships types.

California Wildlife Habitat Relationships *habitat types and size classes in the Riparian Buffer Zone*

Figure 3.5-3 displays timber modeling results for dominant California Wildlife Habitat Relationships habitat type within the riparian buffer zone for the next 80 years under the No Action alternative. The trends are very similar to the predicted trends for forest-wide California Wildlife Habitat Relationships habitat types over time. Under this alternative, it is expected that the amount of Montane Hardwood would decrease from approximately 1% to less than 1% by year 40. It is also predicted that the amount of Montane Hardwood-Conifer would decrease from approximately 25% of the total area to around 1% of the total area by year 80. Finally, it is predicted that the forest-wide percentage of Redwood would increase from approximately 70% to close to 100% by year 80. Therefore, the predicted overall trend in dominant California Wildlife Habitat Relationships type within the riparian buffer zone under the No Action alternative is a decrease in both Montane Hardwood and Montane Hardwood-Conifer and an increase in Redwood percent composition. Acres of California Wildlife Habitat Relationships habitat types in each inventory block over time under this alternative are provided in Appendix O.

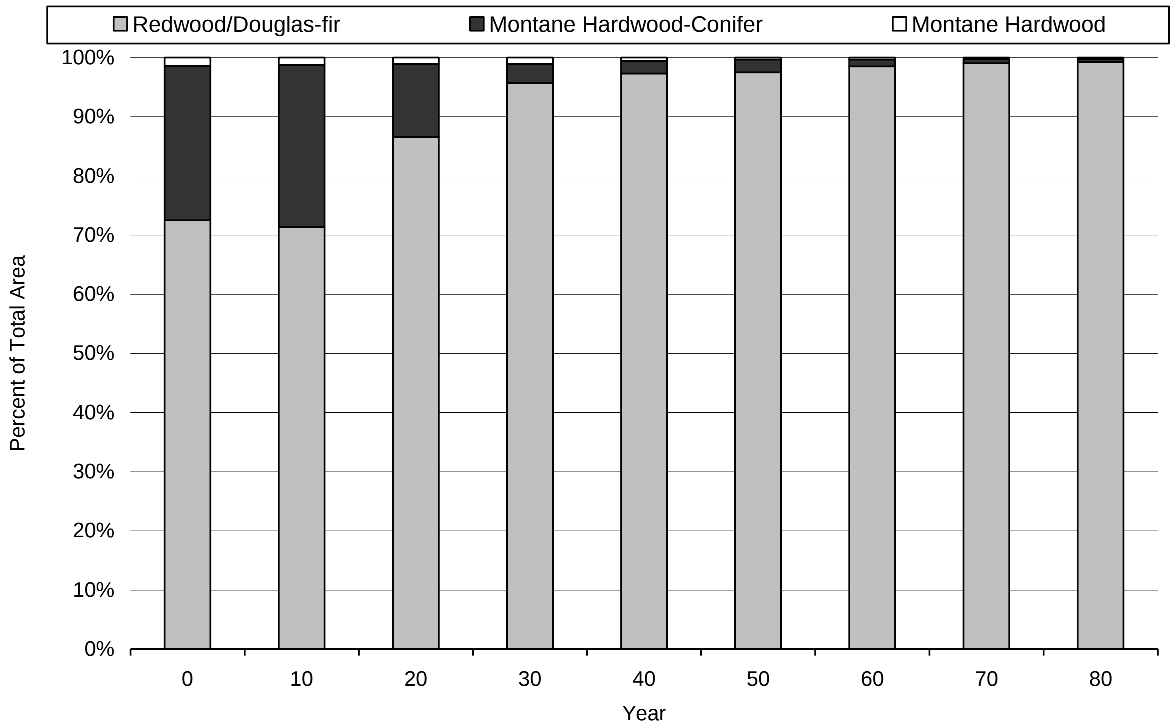


Figure 3.5-3. California Wildlife Habitat Relationships habitat type composition in riparian buffer zones predicted under the No Action alternative.

As described in Section 3.5.1.2, the riparian buffer zone includes the riparian forest adjacent to streams, which is most accurately described as the Montane Riparian California Wildlife Habitat Relationships habitat type, as well as a bounding portion of the upland forest, which is primarily composed of a combination of the Redwood California Wildlife Habitat Relationships habitat type. Within the narrow band of Montane Riparian, hardwoods are a dominant component of the vegetation type. Within coniferous-dominated uplands of the riparian buffer zone, however, hardwoods are a relatively minor component of the forest; where they now dominate it is presumed to be a result of past forest management. Under the No Action alternative, MRC would seek to restore the balance of hardwoods and conifer to a state MRC believes to be more natural within the riparian buffer zone.

Figure 3.5-4 displays timber modeling results for California Wildlife Habitat Relationships size class within the riparian buffer zone for the next 80 years under the No Action alternative. Under this alternative, it is predicted that the small percentage of California Wildlife Habitat Relationships size classes 1 and 2 would initially increase slightly but then decrease to less than

1% by year 20. The percentage of class size 3 is predicted to decrease from approximately 25% to less than 1% by year 40. The percentage of class size 4 is predicted to decrease from approximately 70% at year 0 to approximately 15% by year 70. The percentage of class size 5 is predicted to increase steadily from approximately 5% in year 0 to approximately 70% in year 80. Finally, the percentage of size class 6 is predicted to increase from less than 1% to close to 10% in year 80. Therefore, the predicted overall trend in California Wildlife Habitat Relationships size class under the No Action alternative is a substantial decrease in the percentage composition of younger, class 1, 2, 3, and 4 stands, and a substantial increase in the larger tree (class 5) and larger and mixed-size tree stands (class 6) percentage composition. The gradual shift from younger (smaller) to older (larger) size classes in the riparian buffer zone reflects the trend forest-wide, but is even more pronounced. California Wildlife Habitat Relationships size classes and MRC's structure classes in each inventory block under this alternative are provided in Appendix O.

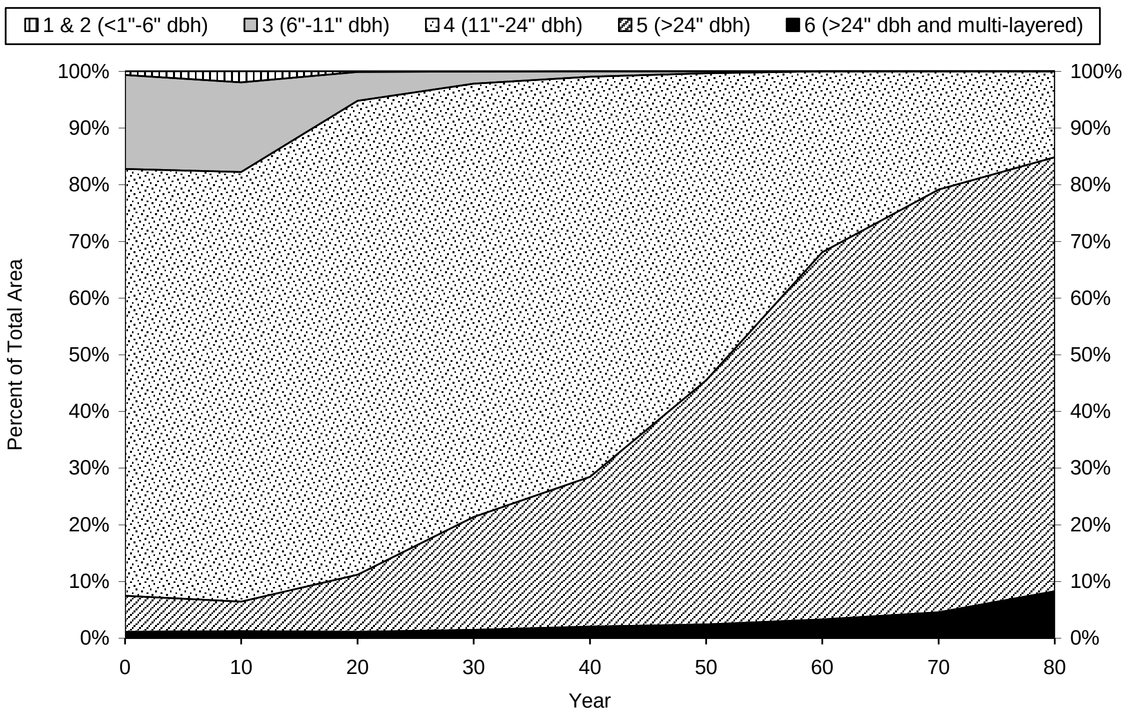


Figure 3.5-4. California Wildlife Habitat Relationships size class composition in riparian buffer zones predicted under the No Action alternative.

Similar to size class patterns in the primary assessment area, existing conditions within the riparian buffer zone, with a relatively higher percentage composition of the younger size class stands, are presumed to be an effect of past management practice of even-aged silviculture. Under the No Action alternative, MRC would practice uneven-aged silviculture, with the goal of restoring a more mixed-age condition, such that within a given stand the mean size class is more likely to be an intermediate size class (i.e., size classes 4 and 5).

Effects on California Natural Diversity Database Special Community Types and Habitat Elements

Under the No Action alternative, guidelines for protection of California Natural Diversity Database Special Community Types and Habitat Elements would be defined by protection measures outlined in 2012 CFPRs or MRC's 2000 Management Plan (MRC 2000a). Table 3.5-5 summarizes management strategies (per the 2012 CFPRs) and potential effects on California Natural Diversity Database Special Community Types in the primary and secondary assessment areas under the No Action alternative. Table 3.5-6 summarizes management strategies (per the 2012 CFPRs) and potential effects on Habitat Elements in the primary and secondary assessment areas under the No Action alternative.

Several California Natural Diversity Database Special Community Types occur in the secondary assessment area but not in the primary assessment area: Grand Fir Forest, Upland Douglas-fir Forest, Northern Coastal Bluff Scrub, Coastal and Valley Freshwater Marsh, Coastal Brackish Marsh, Coastal Terrace Prairie, Fen, and Sphagnum Bog. If, in the future, MRC acquires land in the secondary assessment area with one of these plant communities, MRC would not implement forest management activities on these community types; there are conservation measures in the 2012 CFPRs that apply for wetlands (i.e., no construction, retain and protect non-commercial vegetation, protect soil to the maximum extent possible) and old-growth habitat (Section 3.6.2 Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation). Therefore, it is anticipated that there would be **no effects** on these communities.

Of the California Natural Diversity Database Special Community Types that do occur within the primary assessment area, there are wetlands protection measures (i.e., no construction, retain and protect non-commercial vegetation, protect soil to the maximum extent possible) and Class I watercourse protection measures under (i.e., buffers, restrictions on the amount and type of harvest and the types of activities that can and cannot occur in the Watercourse and Lake Protection Zones) under the CFPR's (14 CCR §916.3) that would apply and protect Northern Coastal Salt Marsh. Therefore, there would be **less than significant effects** on California Natural Diversity Database Special Community Types that occur in the secondary assessment area but not in the primary assessment area and on Northern Coastal Salt Marsh in the primary assessment area under the No Action alternative.

Impact 3.5-1: Effects on Mendocino Pygmy Cypress Forest due to removal of vegetation or habitat degradation. There is no clear management strategy under the CFPRs, and therefore the No Action alternative, for Mendocino Pygmy Cypress Forest in the primary assessment area. Therefore, there would be **potentially significant effects** on this California Natural Diversity Database Special Community Types under the No Action alternative due to the removal of vegetation or the alteration of local habitat conditions.

Of the Habitat Elements that do occur within the primary assessment area, there are management strategies under CFPRs (14 CCR §916.3) or MRC's 2000 Management Plan that apply to and would protect wetlands (i.e., no construction, retention and protection of non-commercial vegetation, and protection of soil to the maximum extent possible) and hardwoods (i.e., retention of all true oaks greater than 18 in (46 cm) diameter at breast height, retention of 15% of the total post-harvest basal area in hardwoods [or greater, based on the agency review of each THP] if hardwoods comprised at least 15% basal area prior to harvest, and review all THPs to identify and retain hardwood trees that enhance wildlife habitat) in the primary assessment area. Therefore, there would be **less than significant effects** on wetlands and hardwoods under the No Action alternative. Potential effects on old-growth forest are discussed in Section 3.6.2 (Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation).

Table 3.5-5. Effects on California Natural Diversity Database Special Community Types within the assessment areas under the No Action alternative.

California Natural Diversity Database Special Community Types	Primary assessment area (ac)[a]	Secondary assessment area (ac)[a]	Management strategy	Potential effects
Grand Fir Forest	0	509	Not in the primary assessment area.	**Less than significant effects**.
Mendocino Pygmy Cypress Forest	135[b]	4,316	No management strategy defined under the CFPRs to protect this community type.	**Potentially significant effects** due to the removal of vegetation or habitat degradation.
Upland Douglas-Fir Forest	0	2,775	Not in the primary assessment area.	**Less than significant effects**.
Northern Coastal Bluff Scrub	0	4		
Coastal and Valley Freshwater Marsh	0	326		
Coastal Brackish Marsh	0	175		
Coastal Terrace Prairie	0	18		
Fen	0	Approximately 70[c]		
Northern Coastal Salt Marsh	77	1,268	No defined management strategy specific to Northern Coastal Salt Marsh; however there are wetlands protection measures (i.e., no construction; retain and protect non-commercial vegetation; protect soil to the maximum extent possible) and Class I watercourse protection measures (i.e., buffers, restrictions on the amount and type of harvest and the types of activities that can and cannot occur in the Watercourse and Lake Protection Zones) under the CFPRs that would apply.	**Less than significant effects**.
Sphagnum Bog	0	Approximately 471 (1,165)[d]	Not in the primary assessment area.	**Less than significant effects**.

[a] Unless otherwise noted, source: CDFG 2009a.
[b] MRC's natural community data set, unpublished data.
[c] Source: California Natural Diversity Database (CDFG 2009a); the fen acreage is estimated based on a circle with 0.2-mi accuracy.
[d] Source: California Natural Diversity Database (CDFG 2009a); the bog acreage is estimated based on a circle with 1-mi accuracy.

Table 3.5-6. Effects on Habitat Elements within the assessment areas under the No Action alternative.

Habitat Elements	Primary assessment area (ac)	Secondary assessment area (ac)	Management strategy	Potential effects
Hardwoods	No estimate available	No estimate available	MRC's 2000 Management Plan: Retain all true oaks > 18 in diameter at breast height; retain 15% of the total post-harvest basal area in hardwoods if hardwoods comprised at least 15% basal area prior to harvest; review all THPs to identify and retain hardwood trees that enhance wildlife habitat.	**Less than significant effects**.
Old-growth Forest	Type I: 102[a] Type II: 520[a]	No estimate available	See Section 3.6 (Terrestrial Habitats and Wildlife Species of Concern).	
Wetlands	2,267[b]	14,733[b]	CFPR measures apply: no construction in wetlands; retain and protect non-commercial vegetation in wetlands; protect soil in wetlands to the maximum extent possible.	**Less than significant effects**.

[a] MRC's natural community data set, unpublished data.
[b] Source: National Wetlands Inventory (USFWS 2011b) (Table 3.5-4).

Effects on plant species of concern

Forty-five of the 104 plant species of concern have the potential to occur in at least one of the three California Wildlife Habitat Relationships timber habitat types (i.e., Douglas-fir and Redwood, hereafter referred to as Redwood for the purposes of analyses, Montane Hardwood, and Montane Hardwood-Conifer), with one additional species potentially occurring in the Montane Riparian California Wildlife Habitat Relationships habitat type (Appendix N) and therefore have the most potential to be affected. The protection of all of these 46 plant species of concern relates to their listing status as well as to the type of activity being conducted; therefore the analysis of potential effects on the species is broken down by these categories. Table 3.5-7 summarizes management strategies (per the 2012 CFPRs) and potential effects on these 46 plant species of concern under the No Action alternative. Additionally, potential effects on the 58 plant species of concern with the potential to occur in non-timber related California Wildlife Habitat Relationships habitat types are discussed below, where they may be impacted by non-THP activities.

Seven of the 46 species that have the potential to occur in timber-related California Wildlife Habitat Relationships habitat types are federally and/or state-listed species (i.e., listed as rare, threatened, or endangered under the ESA and/or CESA; Appendix N). For forest management activities covered under THPs (e.g., timber harvesting, yarding and transporting), CFPRs and CEQA guidelines as supported by agency policy apply. Seasonally-appropriate floristic surveys including for federally and/or state-listed plant species may be conducted if suitable habitat is present within the project area and has the potential to be impacted by proposed project activities. Management strategies for any documented species of concern including federally and/or state-listed plant species would be determined on a plan-by-plan basis to ensure that impacts are not significant. For CESA and federally and/or state-listed plant species, "take" is not prevented per se. However, the CFPRs (14 CCR §898.2) state that a THP would not be approved if:

> "Implementation of the plan would irreparably damage plant species listed as rare or endangered by the Department of Fish and Game and when the timber owner fails to comply with F&GC 1913."

Thirty-eight plant species of concern with the potential to occur in a timber-related habitat type are exclusively listed (i.e., not also listed under the ESA or CESA) as a California Rare Plant Rank species. For THP-related activities, the CFPRs do not mandate survey protocols or management strategies for these species. However, to support CAL FIRE impact determinations on THPs relative to the CEQA (14 CCR §15380[d]) and CFPR (14 CCR §919.4) standards, CAL FIRE would require surveys of all plant species of concern, not just federally and state-listed species, if necessary to avoid a significant impact (see Section 2.2.13, Alternatives, No Action Alternative, Listed and sensitive species management, Plant species of concern), which is addressed in the CFPRs (14 CCR §919.4):

> "Where significant adverse impacts to non-listed species are identified, the RPF [Registered Professional Forester] and Director shall incorporate feasible practices to reduce impacts as described in 14 CCR §898."

If potential impacts are identified, management measures would be developed in coordination with CDFG and implemented to ensure that impacts are mitigated. As a consequence, THP-related activities would result in **less than significant effects** on all 46 plant species of concern with the potential to occur in California Wildlife Habitat Relationships timber-related habitat types under the No Action alternative.

Impact 3.5-2: Effects on all plant species of concern during non-THP activities due to removal of a population or degradation of habitat. Forest management activities not subject to the CFPRs (e.g., vegetation management, pre-commercial thinning, road maintenance, re-opening of old roads) are not subject to survey requirementsfor plant species of concern prior to the activity because there is no nexus to a CEQA permitting process to drive an impact assessment. Therefore, species of concern including federally and/or state-listed plant species that are present may go undetected and unprotected. Furthermore, there is no obligation to protect (i.e., avoid and/or mitigate for if located) non-CESA listed (i.e., federally listed and California Rare Plant Rank) plants when conducting these activities. As a consequence, under the No Action alternative, non-THP activities would result in **potentially significant effects** on the 46 plant species with the potential to occur in California Wildlife Habitat Relationships timber habitat types, plant species of concern that potentially occur only in non-timber California Wildlife Habitat Relationships habitat types, and any additional plant species of concern that may be added to federal, state or California Rare Plant Rank lists in the future due to loss of a population or part of a population, or degradation of habitat for a species.

Under the No Action alternative, post-fire timber salvage would be conducted in accordance with the CFPRs and the measures included in MRC's 2000 Management Plan (MRC 2000a). Because management measures for post-fire timber salvage would not differ substantially from current practices, there would be no effect on vegetation and plant species of concern compared with existing conditions.

Table 3.5-7. Effects on plant species of concern in timber-related California Wildlife Habitat Relationships habitat types within the assessment areas under the No Action alternative.

Scientific name	Federal status[a]	State status[a]	California rare plant rank status[a]	Management strategy	Potential effects
Arabis mcdonaldiana	Endangered	Endangered	1B.1	*THP-related activities*: Species surveyed for if necessary to avoid a significant impact[(b)] and if located, management strategy determined on a case-by-case basis. *Non-THP activities*: Surveysand mitigation protocols not in place.	*THP-related activities*: **Less than significant effects**. *Non-THP activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Astragalus agnicidus	None	Endangered	1B.1		
Calamagrostis foliosa	None	Rare	4.2		
Eriogonum kelloggii	Candidate	Endangered	1B.2		
Pleuropogon hooverianus	None	Threatened	1B.1		
Sedum laxum ssp. *eastwoodiae*	Candidate	None	1B.2		
Silene campanulata ssp. *campanulata*	None	Endangered	4.2		
Arctostaphylos canescens ssp. *sonomensis*	None	None	1B.2	*THP-related activities*: Species surveyed for if necessary to avoid a significant impact[(b)] and if located, management strategy determined on a case-by-case basis. *Non-THP activities*: Surveysand mitigation protocols not in place.	*THP-related activities*: **Less than significant effects**. *Non-THP activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Arctostaphylos stanfordiana ssp. *raichei*	None	None	1B.1		
Kopsiopsis hookeri [*Boschniakia hookeri* in Hickman 1993]	None	None	2.3		
Calystegia purpurata ssp. *saxicola*	None	None	1B.2		
Campanula californica	None	None	1B.2		
Cardamine pachystigma var. *dissectifolia*	None	None	3		
Carex californica	None	None	2.3		
Carex comosa	None	None	2.1		
Carex lenticularis var. *limnophila*	None	None	2.2		
Carex viridula var. *viridula*	None	None	2.3		
Coptis laciniata	None	None	2.2		
Didymodon norrisii	None	None	2.2		

Scientific name	Federal status[a]	State status[a]	California rare plant rank status[a]	Management strategy	Potential effects
Erigeron biolettii	None	None	3	*THP-related activities*: Species surveyed for if necessary to avoid a significant impact[(b)] and if located, management strategy determined on a case-by-case basis. *Non-THP activities*: Surveysand mitigation protocols not in place.	*THP-related activities*: **Less than significant effects**. *Non-THP activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Erythronium revolutum	None	None	2.2		
Fissidens pauperculus	None	None	1B.2		
Gentiana setigera	None	None	1B.2		
Glyceria grandis	None	None	2.3		
Lupinus sericatus	None	None	1B.2		
Microseris borealis	None	None	2.1		
Monardella villosa ssp. *globosa*	None	None	1B.2		
Montia howellii	None	None	2.2		
Oenothera wolfii	None	None	1B.1		
Packera bolanderi var. *bolanderi*	None	None	2.2		
Horkelia bolanderi	None	None	1B.2		
Horkelia tenuiloba	None	None	1B.2		
Navarretia leucocephala ssp. *bakeri*	None	None	1B.1		
Lathyrus palustris	None	None	2.2		
Lilium maritimum	None	None	1B.1		
Lycopodium clavatum	None	None	4.1		
Mitella caulescens	None	None	4.2		
Piperia candida	None	None	1B.2		
Sanguisorba officinalis	None	None	2.2		
Sidalcea malachroides	None	None	4.2		
Sidalcea malviflora ssp. *patula*	None	None	1B.2		
Sidalcea malviflora ssp. *purpurea*	None	None	1B.2		
Thermopsis robusta	None	None	1B.2		

Scientific name	Federal status[a]	State status[a]	California rare plant rank status[a]	Management strategy	Potential effects
Trifolium buckwestiorum	None	None	1B.1	*THP-related activities*: Species surveyed for if necessary to avoid a significant impact[(b)] and if located, management strategy determined on a case-by-case basis. *Non-THP activities*: Surveys and mitigation protocols not in place.	*THP-related activities*: **Less than significant effects**. *Non-THP activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Viburnum ellipticum	None	None	2.3		
Usnea longissima	None	None	None		

[a] Status codes:

California Rare Plant Rank
- 1A = plants presumed extinct in California
- 1B = plants rare, threatened, or endangered in California, and elsewhere
- 2 = plants rare, threatened, or endangered in California, but more common elsewhere
- 3 = plants about which we need more information, a review list
- 4 = plants of limited distribution, a watch list

California Rare Plant Threat Rank
- 0.1= Seriously threatened in California (high degree/immediacy of threat)
- 0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
- 0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

[b] Surveys would be necessary in cases when not enough is known about a plant's location or habitat requirements to avoid a significant impact. In lieu of surveys, CAL FIRE may require other measures that ensure avoidance, such as on-site training and plant/habitat identification tools for licensed timber operators, "walk-through surveys" prior to operations, or project-specific mitigation. Examples where a survey may not be necessary include sites where the scoping did not discover any sensitive species in the project area, where the project area includes no suitable habitat, or when a timber operation has been planned in a manner that clearly avoids potential impacts.

3.5.2.3 Proposed Action

Analysis of trends in vegetation communities

Primary assessment area California Wildlife Habitat Relationships habitat types and size classes

Figure 3.5-5 displays timber modeling results for dominant California Wildlife Habitat Relationships habitat types in the primary assessment area under the Proposed Action. Under the Proposed Action, it is expected that the amount of Montane Hardwood would decrease to less than 1% by year 40. The amount of Montane Hardwood-Conifer would also decrease from approximately 40% of the total area to around 1% of the total area by year 60. Finally, it is predicted that the percentage of Redwood in the primary assessment area would increase from approximately 55% to close to 100% by year 80. Therefore, the predicted overall trend in dominant California Wildlife Habitat Relationships habitat type under the Proposed Action is a decrease in both Montane Hardwood and Montane Hardwood-Conifer and an increase in Redwood percent composition. The acres of California Wildlife Habitat Relationships habitat types in each inventory block over time under the Proposed Action are provided in Appendix O. Appendix F, Figures F-8 and F-9 display the California Wildlife Habitat Relationships habitat types at year 40 and year 80.

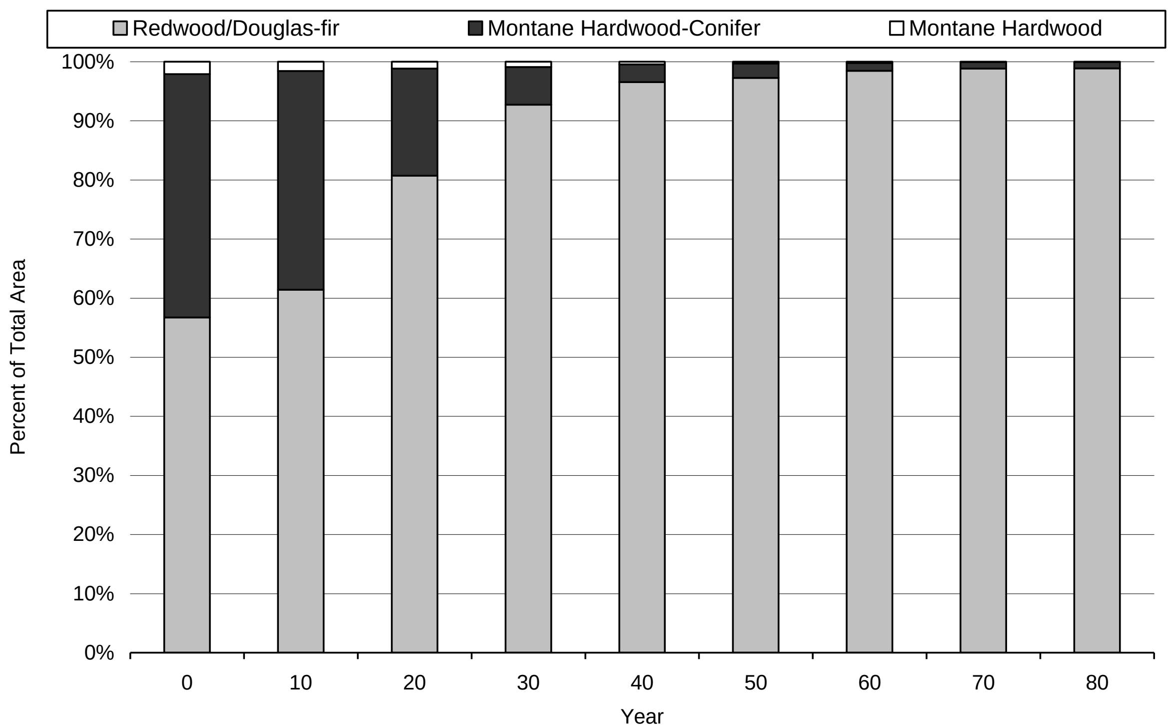


Figure 3.5-5. California Wildlife Habitat Relationships habitat type composition in the primary assessment area predicted under the Proposed Action.

As described in Section 3.5.2.2, existing conditions (i.e., a high percentage of both Montane Hardwood-Conifer and Montane Hardwood) are presumed largely to be a result of past forest management. MRC seeks to restore the balance of hardwoods and conifer to a state MRC believes to be more natural. Under the Proposed Action, MRC would retain a hardwood component in conifer-dominated stands and protect hardwood forest at locations where site conditions favor hardwoods as the natural, late-successional habitat type, as well as retaining representative areas of hardwood dominated conifer sites (MRC 2012).

Figure 3.5-6 displays modeling results for California Wildlife Habitat Relationships size classes in the primary assessment area under the Proposed Action. Under the Proposed Action, it is predicted that the percentage of California Wildlife Habitat Relationships size classes 1 and 2 would decrease from approximately 8% to less than 1% by year 40. The percentage of class size 3 is predicted to initially increase in the first ten years from approximately 20% to 30% but then decrease to approximately 5% by year 70. The percentage of class size 4 is predicted to initially decrease from approximately 70% to 60% but then steadily increase to about 80% by year 80. The percentage of class size 5 is predicted to increase from less than 5% in year 0 to approximately 10% in year 70. Finally, the percentage of size class 6 is predicted to increase from less than 1% to approximately 5% by year 80. Therefore, the predicted overall trend in California Wildlife Habitat Relationships size class under the Proposed Action is a substantial decrease in the percentage composition of stages dominated by grasses, forbs, brush and younger trees (i.e., classes 1, 2 and 3) countered by a substantial increase in the percentage composition of classes 4 and 5 stands, and an increase in the percentage composition of the larger and mixed-size tree stands (size class 6). This increase in California Wildlife Habitat Relationships size class 6 after prolonged treatments with uneven-aged silviculture is explained by: (1) multiple harvests, using selection silviculture, of trees before they reach the > 24-in (61-cm) size class (the critical size limit for designating size class 6), (2) the definition of California Wildlife Habitat Relationships size class 6 requiring the stand to be distinctly multilayered, and (3) nuances of the crosswalk from the timber model to California Wildlife Habitat Relationships types. California Wildlife Habitat Relationships size classes and MRC structure classes in each inventory block under the Proposed Action are provided in Appendix O.

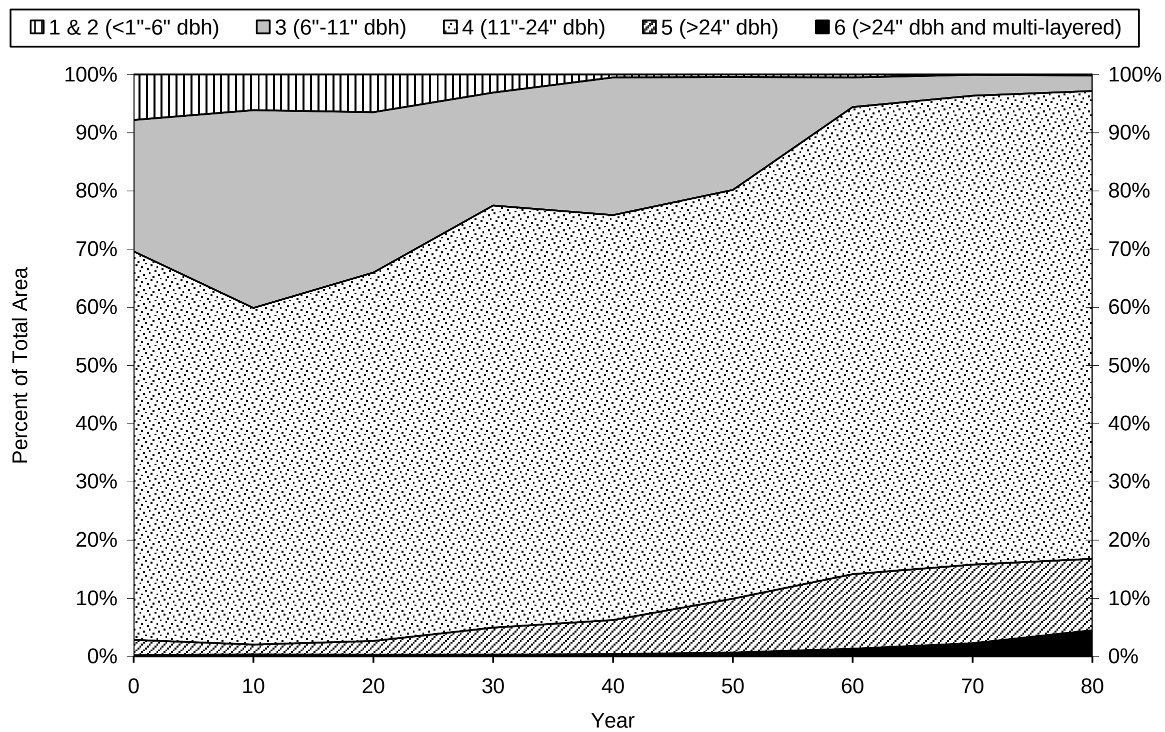


Figure 3.5-6. California Wildlife Habitat Relationships size class composition in the primary assessment area predicted under the Proposed Action.

As described in Section 3.5.2.2, existing conditions, with a relatively high percentage composition of the younger size class trees, are largely presumed to be an artificial state due to the past management practice of even-aged silviculture. MRC has a goal of restoring the forests to a more mixed-age condition, such that within a given stand the mean size class is more likely to be size classes 4 and 5. At the same time, the amount of the larger and mixed-size tree stands (class 6) would increase over time.

California Wildlife Habitat Relationships habitat types and size classes in the Riparian Buffer Zone

Figure 3.5-7 displays timber modeling results for dominant California Wildlife Habitat Relationships habitat type within the riparian buffer zone for the next 80 years under the Proposed Action. Under this alternative, the amount of Montane Hardwood is modeled to decrease from approximately 1% to less than 1% by year 40. It is also predicted that the amount of Montane Hardwood-Conifer would initially increase slightly and then decrease from approximately 25% of the total area to approximately 1% of the total area by year 60. Finally, it is predicted that the forest-wide percentage of Redwood would increase from approximately 70% to close to 100% by year 80. Therefore, the predicted overall trend in dominant California Wildlife Habitat Relationships type within the riparian buffer zone under the Proposed Action is a decrease in both Montane Hardwood and Montane Hardwood-Conifer and an increase in Redwood percent composition. Acres of California Wildlife Habitat Relationships habitat types in each inventory block over time under the Proposed Action are provided in Appendix O.

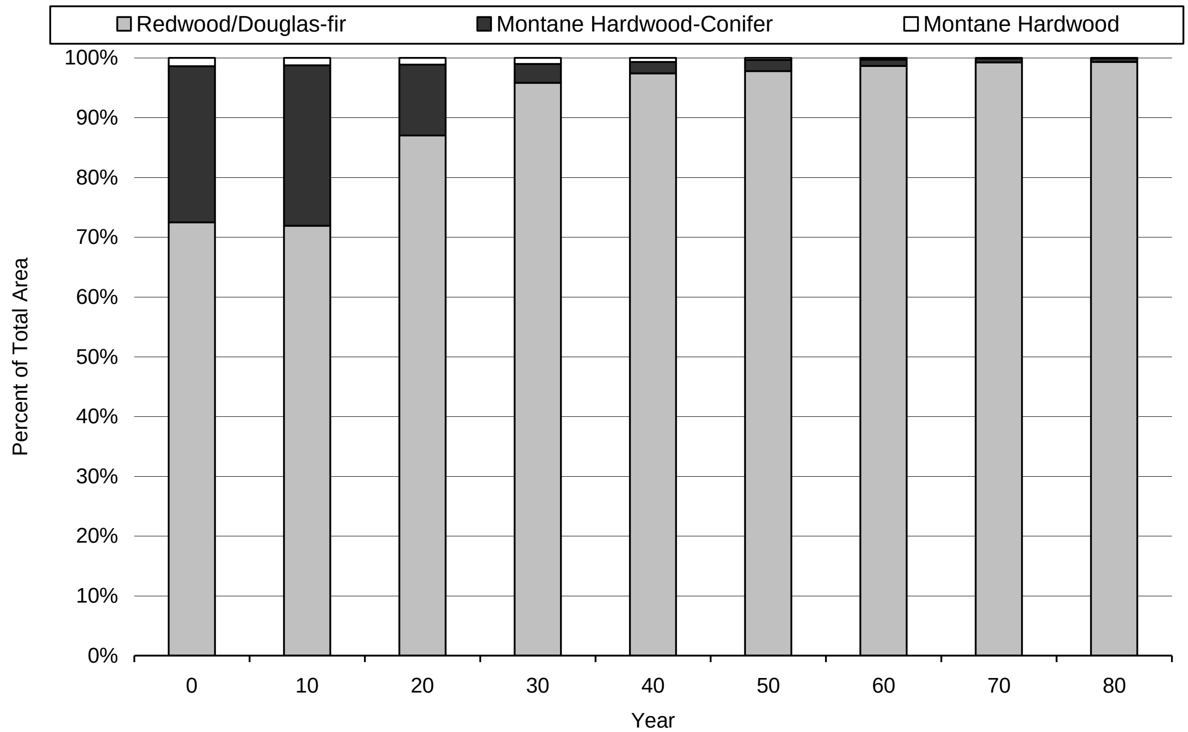


Figure 3.5-7. California Wildlife Habitat Relationships habitat type composition in riparian buffer zones predicted under the Proposed Action.

Existing conditions within the riparian buffer zone (which is primary dominated by upland, coniferous forest), with a higher percentage composition of Montane Hardwood-Conifer as compared with year 80 of the Proposed Action, are presumed to be a result of past forest management. Under the Proposed Action, MRC would seek to restore the balance of hardwoods and conifer to a state MRC believes to be more natural.

Figure 3.5-8 displays timber modeling results for California Wildlife Habitat Relationships size class within the riparian buffer zone for the next 80 years under the Proposed Action. Under the Proposed Action, it is predicted that the very small percentage of California Wildlife Habitat Relationships size classes 1 and 2 would rapidly decrease to close to 0%. The percentage of class size 3 is predicted to decrease from approximately 25% to less than 1% by year 40. The percentage of size class 4 is predicted to slowly decrease from approximately 70% at year 0 to approximately 20% by year 80. The percentage of class size 5 is predicted to increase steadily from approximately 5% in year 0 to approximately 50% in year 80. Finally, the percentage of size class 6 is predicted to increase from approximately 1% to close to 30% in year 80. Therefore, the predicted overall trend in California Wildlife Habitat Relationships size class under the Proposed Action is a substantial decrease in the percentage composition of younger, class 1, 2, 3, and 4 stands, and a substantial increase in class 5 and class 6 stands percentage composition. The gradual shift from younger (smaller) to older (larger) size classes in the riparian buffer zone reflects the trend forest-wide, but is even more pronounced. California Wildlife Habitat Relationships size classes and MRC's structure classes in each inventory block under the Proposed Action are provided in Appendix O.

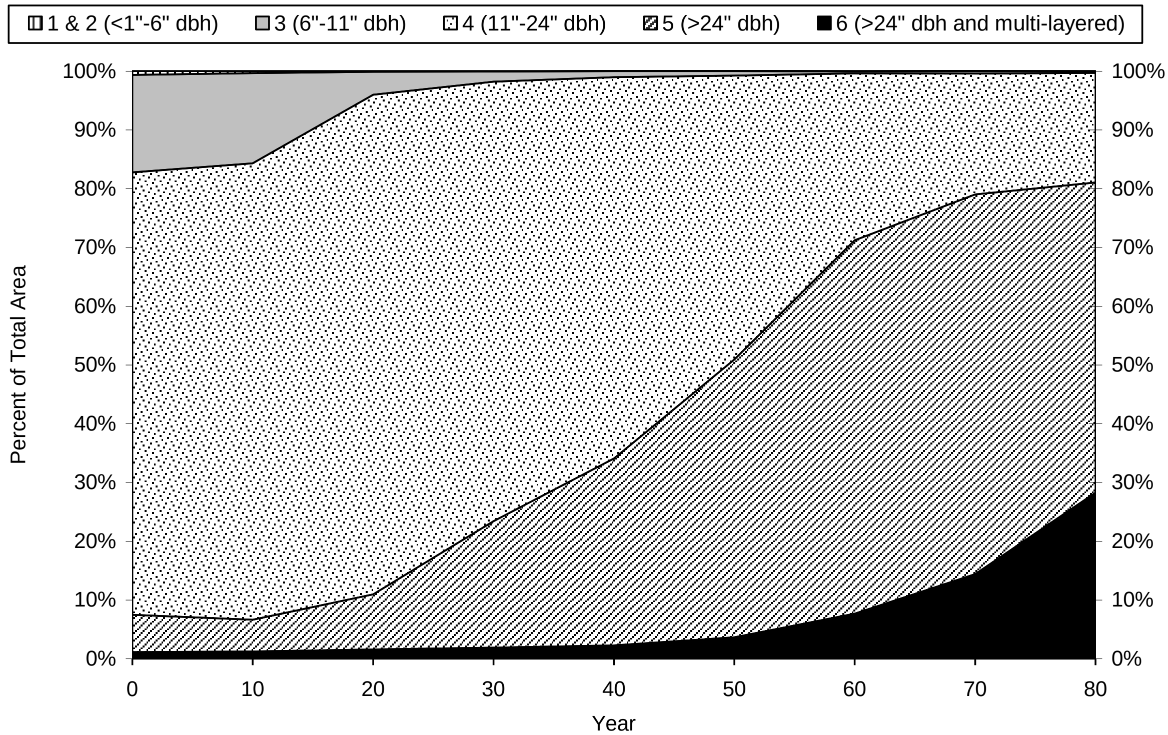


Figure 3.5-8. California Wildlife Habitat Relationships size class composition in riparian buffer zones predicted under the Proposed Action.

Similar to size class patterns in the primary assessment area, existing conditions within the riparian buffer zone, with a relatively higher percentage composition of the younger size class stands are presumed to be an effect of past management practice of even-aged silviculture. Under the Proposed Action, MRC would practice uneven-aged silviculture within the Aquatic Management Zone's, with the goal of restoring a more mixed-age condition, such that within a given stand the mean size class is more likely to be size classes 4 and 5.

Effects on California Natural Diversity Database Special Community Types and Habitat Elements

Under the Proposed Action, guidelines for protection of California Natural Diversity Database Special Community Types and Habitat Elements would be defined by protection measures outlined in the HCP/NCCP. Table 3.5-8 summarizes HCP/NCCP conservation strategies and potential effects on California Natural Diversity Database Special Community Types in the primary and secondary assessment areas under the Proposed Action. Table 3.5-9 summarizes HCP/NCCP conservation strategies and potential effects on Habitat Elements in the primary and secondary assessment areas under the Proposed Action.

Several California Natural Diversity Database Special Community Types occur in the secondary assessment area but not in the primary assessment area: Grand Fir Forest, Upland Douglas-fir Forest, Northern Coastal Bluff Scrub, Coastal and Valley Freshwater Marsh, Coastal Brackish Marsh, Coastal Terrace Prairie, Fen, and Sphagnum Bog. If, in the future, MRC acquires land in the secondary assessment area with one of these plant communities, MRC would not implement forest management activities on these community types; there are conservation measures in the HCP/NCCP that apply for either wetlands (i.e., no construction, retain and protect non-commercial vegetation, protect soil to the maximum extent possible) and old-growth habitat

(Section 3.6.2 [Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation]). Therefore, it is anticipated that there would be **no effects** on these communities. There are protection measures under the HCP/NCCP that apply to and would protect Northern Coastal Salt Marsh (i.e., wetland protection measures, which include buffers around wetland and special protections within those buffers; and Class I watercourse protection measures, which include buffers, restrict the amount and type of harvest, and specify the types of activities that can and cannot occur in the Aquatic Management Zones), and Mendocino Pygmy Cypress Forest (i.e., management is limited to existing infrastructure, a maximum of 5% of the total acreage can be impacted by new roads, and historical roads would be decommissioned and revegetated) in the primary assessment area. Therefore, it is anticipated that there would be **no effects** on these communities.

Under the Proposed Action, there are management strategies under the HCP/NCCP that apply to and would protect hardwoods (i.e., Class I: no harvest except for limited rehab; Class II: harvest only if stand is re-classified as Class 3 following on-the-ground assessment, retention of representative mid-successional hardwood stands, increased hardwood for northern spotted owls based on monitoring and adaptive management guidelines) and wetlands (i.e., maintenance of a 25-ft (8-m) buffer around wetlands that are < 50 ft^2 in (4.6 m^2) surface area, or 50-ft buffer (15-m) if > 50 ft^2 (4.6 m^2) in surface area, and, within the buffer, only partial harvest allowed, no sanitation or salvage, retention of downed large woody debris, and basal area retention of 50 ft^2 (4.6 m^2) or 50% of the pre-harvest basal area, whichever is greater) in the primary assessment area. Therefore, there would be **less than significant effects** on all California Natural Diversity Database Special Community Types and Habitat Elements under the Proposed Action. Potential effects on old-growth forest are discussed in Section 3.6.2 (Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation).

Table 3.5-8. Effects on California Natural Diversity Database Special Community Types within the assessment areas under the Proposed Action.

California Natural Diversity Database Special Community Types	Primary assessment area (ac)[a]	Secondary assessment area (ac)[a]	Management strategy	Potential effects
Grand Fir Forest	0	509	Not in the primary assessment area.	**Less than significant effects**.
Mendocino Pygmy Cypress Forest	135[b]	4,316	No harvest; management limited to existing infrastructure; a maximum of 5% of the total acreage can be impacted by new roads; and decommission and revegetate historical roads.	**Less than significant effects**.
Upland Douglas-Fir Forest	0	2,775	Not in the primary assessment area.	**Less than significant effects**.
Northern Coastal Bluff Scrub	0	4		
Coastal and Valley Freshwater Marsh	0	326		
Coastal Brackish Marsh	0	175		
Coastal Terrace Prairie	0	18		
Fen	0	Approximately 70[c]		
Northern Coastal Salt Marsh	77	1,268	No defined management strategy specific to Northern Coastal Salt Marsh; however there are protection measures for wetlands (include buffers around wetland and special protections within those buffers) and Class I watercourses (buffers, restrictions on the amount and type of harvest, and specifications on the types of activities that can and cannot occur in the Aquatic Management Zones) that would apply.	**Less than significant effects**.
Sphagnum Bog	0	Approximately 1,165[d]	Not in the assessment primary area.	**Less than significant effects**.

[a] Unless otherwise noted, source: CDFG 2009a.
[b] MRC's natural community data set, unpublished data.
[c] Source: California Natural Diversity Database (CDFG 2009a); the fen acreage is estimated based on a circle with 0.2-mi accuracy.
[d] Source: California Natural Diversity Database (CDFG 2009a); the bog acreage is estimated based on a circle with 1-mi accuracy.

Table 3.5-9. Effects on Habitat Elements within the assessment areas under the Proposed Action.

Habitat Elements	Primary assessment area (ac)	Secondary assessment area (ac)	Management strategy	Potential effects
Hardwoods	No estimate available	No estimate available	*Class I and II treatment*: Class I: no harvest except for limited rehab; Class II: harvest only if stand is re-classified as Class 3 following on-the-ground assessment. *Hardwood retention rules apply to the following*: • all trees of the true oak and madrone species > 18 in diameter at breast height; • ≥ 15 ft^2 of hardwood trees > 6 in diameter at breast height, provided they made up at least that amount pre-harvest; • all hardwoods > 6 in diameter at breast height when < 15 ft^2 basal area of hardwoods per acre is present before harvest; • all hardwoods ≥ 24 in diameter at breast height if those ≥ 24 in comprise less than 20% of the hardwoods pre-harvest; • retention areas, and clusters of mast-producing hardwoods; and • potential increases in hardwood basal area for northern spotted owls based on monitoring and adaptive management guidelines.	**Less than significant effects**.
Old-growth Forest	Type I: 102[a] Type II: 520[a]	No estimate available	See Section 3.6 (Terrestrial Habitats and Wildlife Species of Concern)	
Wetlands	2,267[b]	14,733[b]	Maintain a 25-ft buffer around wetlands that are < 50 ft^2 in surface area, or 50-ft buffer if > 50 ft^2 in surface area. Within the buffer, only partial harvest allowed; no sanitation or salvage; retain downed large woody debris; and basal area retention of 50 ft^2 or 50% of the pre-harvest basal area, whichever is greater.	**Less than significant effects**.

[a] MRC's natural community data set, unpublished data.
[b] Source: National Wetlands Inventory (USFWS 2011b) (Table 3.5-4)

Effects on plant species of concern

Forty-six of the 104 plant species of concern have the potential to occur in timber-related California Wildlife Habitat Relationships habitat types (i.e., 45 in at least one of the three California Wildlife Habitat Relationships timber habitat types and one in the Montane Riparian California Wildlife Habitat Relationships habitat type; Appendix N) and therefore have the most potential to be affected. The protections provided to each of these 46 plant species of concern are dependent on MRC's conservation and management measures under the HCP/NCCP, the species' listing status, and the type of activity being conducted; therefore the analysis of potential effects on the species is broken down by these categories. Table 3.5-10 summarizes management strategies and potential effects on plant species of concern in California Wildlife Habitat Relationships timber-related habitat types under the Proposed Action. Additionally, potential effects on the 58 plant species of concern with the potential to occur in non-timber related California Wildlife Habitat Relationships habitat types are discussed below, where they may be impacted by non-PTHP activities.

Twenty-one of the 46 species of concern with the potential to occur in timber-related California Wildlife Habitat Relationships habitat types would be covered by the HCP/NCCP under the Proposed Action. Protection for covered species would be provided through either the application of species-specific HCP/NCCP conservation measures or programmatic measures particular to a management category. Management categories provide standardized protection for species within that category, under all covered activities, by taking into account the following: statewide rarity and threat status; sensitivity to disturbance; type of communities the species is found in the primary assessment area; viability; geographic range; distribution in the primary assessment area; and documented trends in the primary assessment area. A specific category assignment is then made for each species with all of these factors taken into account, such that potential impacts (i.e., loss of a population or part of a population or habitat degradation) are avoided or minimized. Nine species have already been assigned management categories, and the remainder would be assigned management categories once they have been confirmed on covered lands. MRC would conduct a floristic survey for covered species at least twice during the term of HCP/NCCP, the first survey being within a three-year window prior to any covered management activities (i.e., PTHP-related or non-PTHP related). Management Category 1 provides the highest level of protection (i.e., with little impact allowed to the core population and buffer area and a lower take allowance) and Management Category 4 the least specified protection. Adaptive management and monitoring can adjust the management category up or down to which a plant has been assigned.

Ten covered plant species of concern potentially occur only in non-timber habitat types. MRC's floristic survey standards and protections for covered species would still apply. For those that inhabit covered communities, the HCP/NCCP defines community-based measures that would assist in the protection of these species by the avoiding or minimizing the potential for loss of a population or part of a population, or degradation of its habitat. For those species that inhabit communities that are not covered, covered species would be protected under the developed survey protocol and mitigation measures. Given the protocols and protections provided to all covered plant species of concern and a monitoring/adaptive management framework to provide feedback to improve future management, the potential for loss of a population or part of a population, or habitat degradation, would be substantially avoided or minimized. As a result, for all covered management activities, there would be **less than significant effects** on all covered plant species of concern under the Proposed Action.

Impact 3.5-3: Effects on non-covered plant species of concern for all activities due to removal of a population or degradation of habitat. Twenty-five of the species of concern with the potential to occur in timber-related California Wildlife Habitat Relationships habitat types would not be covered by the HCP/NCCP under the Proposed Action but are either federally and/or state-listed or exclusively designated as a California Rare Plant Rank species. When conducting any covered management activities (i.e., PTHP-related or non-PTHP related), MRC would conduct a floristic survey for covered species at least twice during the term of HCP/NCCP; however, this survey may or may not document the presence of non-covered species. Standards for the floristic survey in the HCP/NCCP (2012) include the following:

> "An acceptable floristic survey may include a plant list containing some plants that are identified only to genus, if those plants are in genera or families that do not include any covered rare plants. The wildlife agencies will consider floristic surveys acceptable even if they do not include every non-covered species found in the survey area." (Emphasis added)

For PTHP-related management activities, if one of these 25 species is documented, CAL FIRE would consult with CDFG in a project-specific review to ensure that operations are conducted to meet the CEQA (14 CCR §15380[d]) and CFPR (14 CCR §919.4) standards, and therefore potential effects would be avoided or minimized. However, a non-covered plant species of concern may go undetected if they are in a taxonomic group (e.g., family and in some cases genus) other than those of the covered species, resulting in the potential for loss of a population or part of a population, or degradation of habitat for a species.

When conducting activities other than those associated with a PTHP or maintenance of an existing road (activities for which CESA exempts take restrictions), measures to avoid impacts on all non-covered but CESA-listed species would be developed with CDFG. For federally listed plant species, there is no prohibition of take on private lands when the action incidentally taking the plants is otherwise legal (including state laws). However, a non-covered plant species of concern may go undetected. Given the survey and mitigation protocol's limitations of identification to only the taxa of covered species, non-covered species in other taxa could experience the loss of a population or part of a population, or degradation of habitat under the Proposed Action for all activities. Therefore, under the Proposed Action, for both PTHP-related and non-PTHP activities, there would be **potentially significant effects** on non-covered species of concern (i.e., the 46 plant species with the potential to occur in California Wildlife Habitat Relationships timber habitat types, plant species of concern that potentially occur only in non-timber California Wildlife Habitat Relationships habitat types, and any additional plant species of concern that may be added to federal, state or California Rare Plant Rank lists in the future) that are not of the covered species taxa due to loss of a population or part of a population, or degradation of habitat.

Mitigation Measure 3.5-1: Adopt the CDFG survey protocol and guidance for all covered activities, and for non-PTHP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all plant species of concern. The protocol for surveying an area prior to forest management should include all potentially occurring plant species of concern (Appendix N), according to CDFG's guidelines (CDFG 2005b) and protocols (CDFG 2009c). Furthermore, if a plant species of concern that is not a covered species is discovered where it may be impacted by a non-PTHP activity, MRC would consult with CDFG to develop feasible site-specific mitigation measures to assure that potential significant project impacts (14 CCR §15382) would be avoided. With implementation of this mitigation measure, there would be **less than significant effects** on all plant species of concern under the Proposed Action.

Under the Proposed Action, post-fire timber salvage would follow the prescriptions in MRC's proposed HCP/NCCP, which include: (1) conducting a rare plant survey during the blooming season if the burned area has over-wintered since the fire event; (2) protecting known and newly detected rare plants according to the proposed HCP/NCCP conservation measures for rare plants; and (3) after consulting and concurring with the wildlife agencies, suspend efforts at reforestation and erosion control (unrelated to watercourses) at the site of a rare plant occurrence for two years to allow its seed bank to replenish. These HCP/NCCP measures would provide additional protections for rare plants in burned areas and would reduce the potential for effects on plant species of concern compared with existing conditions and the No Action alternative.

Table 3.5-10. Effects on plant species of concern in timber-related California Wildlife Habitat Relationships habitat types within the assessment areas under the Proposed Action.

Scientific name	Federal Status	State Status	California Rare Plant Rank Status[a]	Management strategy[b]	Potential effects
Kopsiopsis hookeri [*Boschniakia hookeri* in Hickman 1993]	None	None	2.3	*All activities*: Covered; Management Category 1 assigned.	*All activities*: **Less than significant effects**.
Lilium maritimum	None	None	1B.1		
Pleuropogon hooverianus	None	Threatened	1B.1		
Coptis laciniata	None	None	2.2	*All activities*: Covered; Management Category 2 assigned.	
Piperia candida	None	None	1B.2		
Campanula californica	None	None	1B.2	*All activities*: Covered; Management Category 3 assigned.	
Sidalcea malachroides	None	None	4.2	*All activities*: Covered; Management Category 4 assigned.	
Astragalus agnicidus	None	Endangered	1B.1	*All activities*: Covered; species-specific management strategy assigned.	
Usnea longissima	None	None	None		

Scientific name	Federal Status	State Status	California Rare Plant Rank Status[a]	Management strategy[b]	Potential effects
Carex californica	None	None	2.3	*All activities*: Covered; management category assigned once they have been confirmed on covered lands.	*All activities*: **Less than significant effects**.
Carex comosa	None	None	2.1		
Carex viridula var. *viridula*	None	None	2.3		
Erigeron biolettii	None	None	3		
Erythronium revolutum	None	None	2.2		
Horkelia tenuiloba	None	None	1B.2		
Lycopodium clavatum	None	None	4.1		
Packera bolanderi var. *bolanderi*	None	None	2.2		
Sanguisorba officinalis	None	None	2.2		
Sidalcea malviflora ssp. *patula*	None	None	1B.2		
Trifolium buckwestiorum	None	None	1B.1		
Viburnum ellipticum	None	None	2.3		
Arabis mcdonaldiana	Endangered	Endangered	1B.1	*All activities*: Not covered, may go undetected during surveys.	*All activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Calamagrostis foliosa	None	Rare	4.2		
Eriogonum kelloggii	Candidate	Endangered	1B.2		
Silene campanulata ssp. *campanulata*	None	Endangered	4.2		
Sedum laxum ssp. *eastwoodiae*	Candidate	None	1B.2	*All activities*: Not covered, may go undetected during surveys.	*All activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Arctostaphylos canescens ssp. *sonomensis*	None	None	1B.2	*All activities*: Not covered, may go undetected during surveys.	*All activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Arctostaphylos stanfordiana ssp. *raichei*	None	None	1B.1		

Scientific name	Federal Status	State Status	California Rare Plant Rank Status[a]	Management strategy[b]	Potential effects
Calystegia purpurata ssp. *saxicola*	None	None	1B.2	*All activities*: Not covered, may go undetected during surveys.	*All activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Cardamine pachystigma var. *dissectifolia*	None	None	3		
Carex lenticularis var. *limnophila*	None	None	2.2		
Didymodon norrisii	None	None	2.2		
Fissidens pauperculus	None	None	1B.2		
Gentiana setigera	None	None	1B.2		
Glyceria grandis	None	None	2.3		
Horkelia bolanderi	None	None	1B.2		
Lathyrus palustris	None	None	2.2		
Lupinus sericatus	None	None	1B.2		
Microseris borealis	None	None	2.1		
Mitella caulescens	None	None	4.2		
Monardella villosa ssp. *globosa*	None	None	1B.2		
Montia howellii	None	None	2.2		
Navarretia leucocephala ssp. *bakeri*	None	None	1B.1		
Oenothera wolfii	None	None	1B.1		
Sidalcea malviflora ssp. *purpurea*	None	None	1B.2		
Thermopsis robusta	None	None	1B.2		

[a] Status codes:

California Rare Plant Rank
1A = plants presumed extinct in California
1B = plants rare, threatened, or endangered in California, and elsewhere
2 = plants rare, threatened, or endangered in California, but more common elsewhere
3 = plants about which we need more information, a review list
4 = plants of limited distribution, a watch list

California Rare Plant Threat Rank
0.1= Seriously threatened in California (high degree/immediacy of threat)
0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

[b] For a description of the four management categories plus the species-specific management strategies for the species indicated above, see MRC 2012, Chapter 11.

3.5.2.4 Alternative A

Analysis of trends in vegetation communities

Primary assessment area California Wildlife Habitat Relationships habitat types and size classes

Figure 3.5-9 displays timber modeling results for dominant California Wildlife Habitat Relationships habitat types in the primary assessment area under Alternative A. Under this alternative, it is expected that the amount of Montane Hardwood would decrease to less than 1% by year 20. The amount of Montane Hardwood-Conifer would also decrease from approximately 40% of the total area to around 1% of the total area by year 50. Finally, it is predicted that the percentage of Redwood in the primary assessment area would increase from approximately 55% to close to 100% by year 80. Therefore, the predicted overall trend in dominant California Wildlife Habitat Relationships habitat type under Alternative A is a decrease in both Montane Hardwood and Montane Hardwood-Conifer and an increase in Redwood percent composition. The acres of California Wildlife Habitat Relationships habitat types in each inventory block over time under Alternative A are provided in Appendix O. Appendix F, Figures F-10 and F-11 display the California Wildlife Habitat Relationships habitat types at year 40 and year 80.

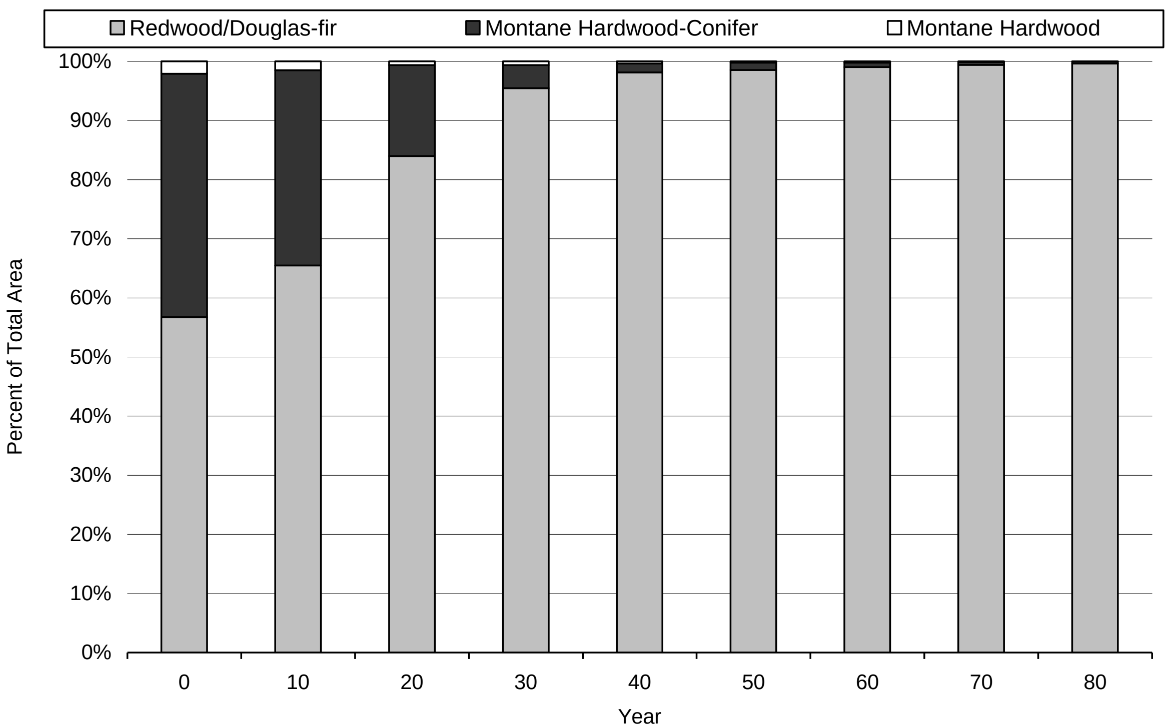


Figure 3.5-9. California Wildlife Habitat Relationships habitat type composition in the primary assessment area predicted under Alternative A.

As described in Section 3.5.2.2, existing conditions—with a relatively higher percentage of both Montane Hardwood-Conifer and Montane Hardwood—are presumed to be a result of past forest management. MRC seeks to restore the balance of hardwoods and conifer to a state MRC believes to be more natural. Under Alternative A, MRC would retain a hardwood component in conifer-dominated stands and protect hardwood forest at locations where site conditions favor hardwoods as the natural, late-successional habitat type (MRC 2012).

Figure 3.5-10 displays timber modeling results for California Wildlife Habitat Relationships size classes in the primary assessment area under Alternative A. Under this alterative, it is predicted that the percentage of California Wildlife Habitat Relationships size classes 1 and 2 would decrease from approximately 8% to less than 1% by year 40. The percentage of class size 3 is predicted to initially increase in the first ten years from approximately 20% to 30% but then decrease to approximately 2% by year 70. The percentage of class size 4 is predicted to initially decrease from approximately 70% to 60% but then steadily increase to about 80% by year 80. The percentage of class size 5 is predicted to increase from less than 5% in year 0 to approximately 15% in year 70. Finally, the percentage of size class 6 is predicted to increase from less than 1% to approximately 5% by year 80. Therefore, the predicted overall trend in California Wildlife Habitat Relationships size class under Alternative A is a substantial decrease in the percentage composition of younger stands (i.e., classes 1, 2 and 3) a substantial increase in the percentage composition of classes 4 and 5 stands, and an increase in the percentage composition of the larger and mixed-size tree stands (class 6). California Wildlife Habitat Relationships size classes and MRC structure classes in each inventory block under Alternative A are provided in Appendix O.

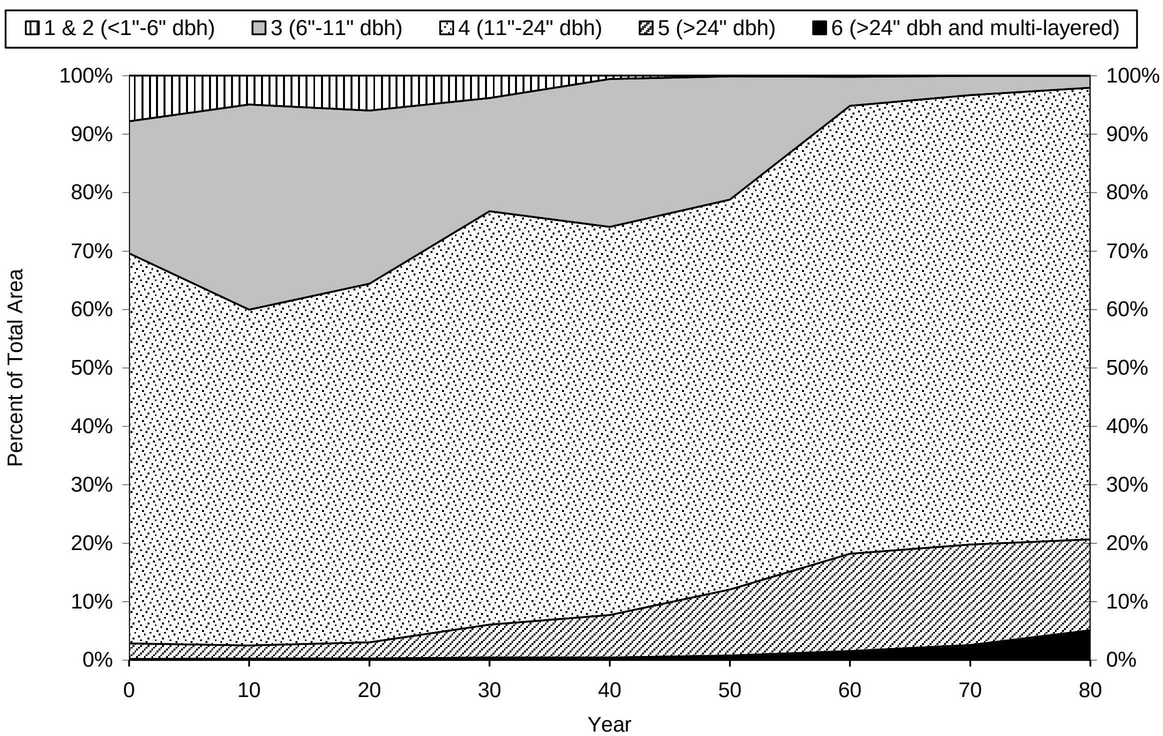


Figure 3.5-10. California Wildlife Habitat Relationships size class composition in the primary assessment area predicted under Alternative A.

As described in Section 3.5.2.2, existing conditions—with a relatively higher percentage composition of the younger size class trees—are presumed to be an artificial state due to the past management practice of even-aged silviculture. MRC has a goal of restoring the forests to a more mixed-age condition, such that within a given stand the mean size class is more likely to be size classes 4 and 5. At the same time, the amount of the larger and mixed-size tree stands (class 6) would increase over time.

California Wildlife Habitat Relationships habitat types and size classes in the Riparian Buffer Zone

Figure 3.5-11 displays timber modeling results for dominant California Wildlife Habitat Relationships habitat type within the riparian buffer zone for the next 80 years under Alternative A. Under this alternative, it is expected that the amount of Montane Hardwood would decrease from approximately 1% to less than 1% by year 40. It is also predicted that the amount of Montane Hardwood-Conifer would initially increase slightly and then decrease from approximately 25% of the total area to approximately 1% of the total area by year 60. Finally, it is predicted that the forest-wide percentage of Redwood would increase from approximately 70% to close to 100% by year 80. Therefore, the predicted overall trend in dominant California Wildlife Habitat Relationships type within the riparian buffer zone under Alternative A is a decrease in both Montane Hardwood and Montane Hardwood-Conifer and an increase in Redwood percent composition. Acres of California Wildlife Habitat Relationships habitat types in each inventory block over time under Alternative A are provided in Appendix O.

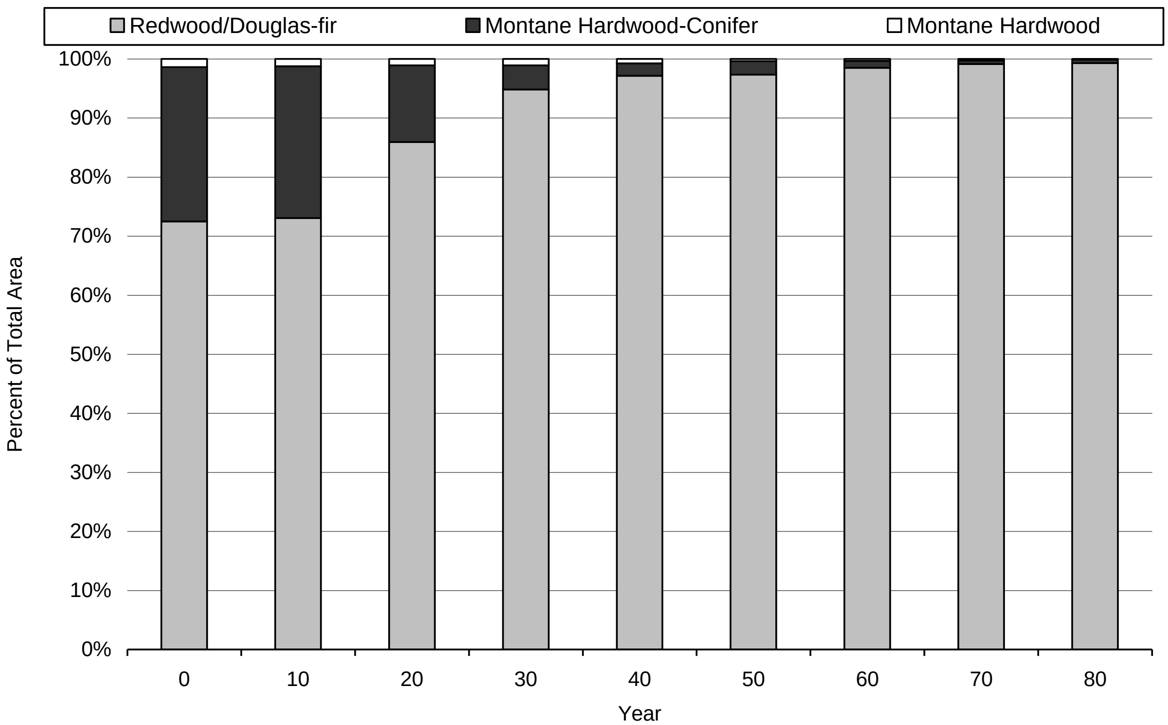


Figure 3.5-11. California Wildlife Habitat Relationships habitat type composition in riparian buffer zones predicted under Alternative A.

Existing conditions within the riparian buffer zone (which is primary dominated by upland, coniferous forest), with a higher percentage composition of Montane Hardwood-Conifer as compared with year 80 under Alternative A, are presumed to be a result of past forest management. Under Alternative A, MRC would seek to restore the balance of hardwoods and conifer to a state MRC believes to be more natural.

Figure 3.5-12 displays timber modeling results for California Wildlife Habitat Relationships size class within the riparian buffer zone for the next 80 years under Alternative A. Under this alternative, it is predicted that the very small percentage of California Wildlife Habitat Relationships size classes 1 and 2 would rapidly decrease to close to 0%. The percentage of class size 3 is predicted to decrease from approximately 25% to less than 1% by year 40. The percentage of size class 4 is predicted to slowly decrease from approximately 70% at year 0 to approximately 20% by year 80. The percentage of class size 5 is predicted to increase steadily from approximately 5% in year 0 to approximately 50% in year 80. Finally, the percentage of size class 6 is predicted to increase from approximately 1% to close to 30% in year 80. Therefore, the predicted overall trend in California Wildlife Habitat Relationships size class under Alternative A is a substantial decrease in the percentage composition of class 1, 2, 3, and 4 stands, and a substantial increase in class 5 and class 6 stands percentage composition. California Wildlife Habitat Relationships size classes and MRC's structure classes in each inventory block under Alternative A are provided in Appendix O.

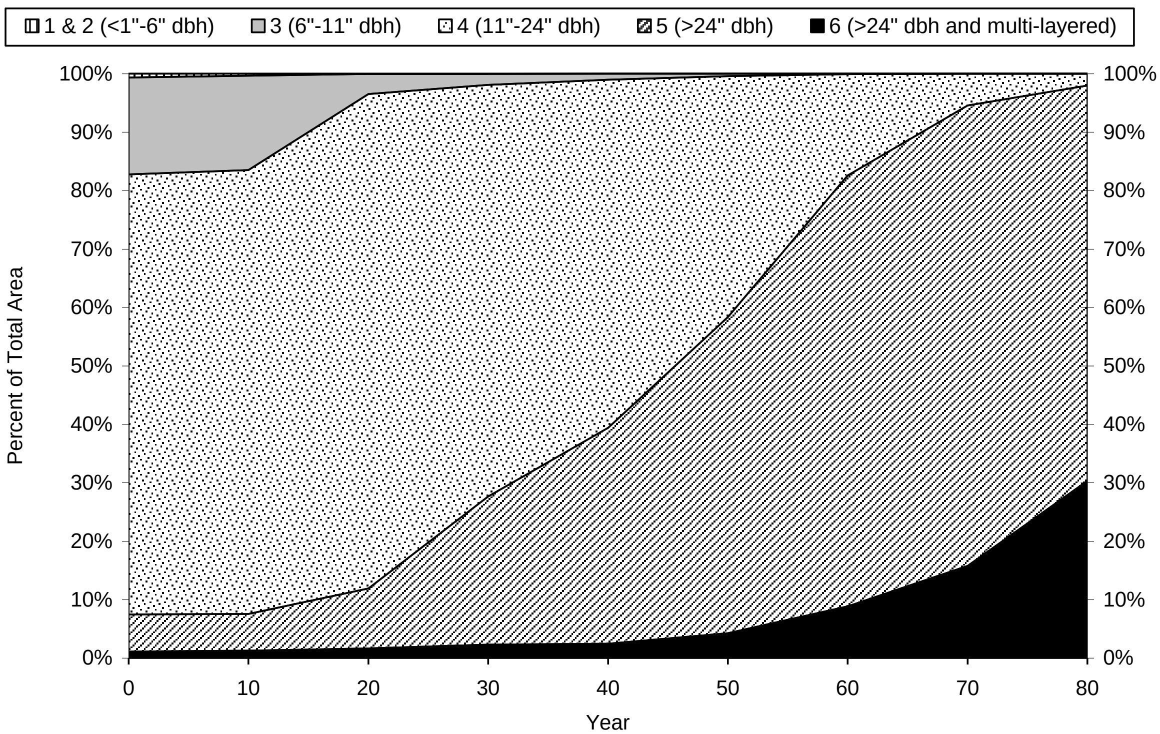


Figure 3.5-12. California Wildlife Habitat Relationships size class composition in riparian buffer zones predicted under Alternative A.

Similar to size class patterns in the primary assessment area, existing conditions within the riparian buffer zone, with a relatively higher percentage composition of the younger size class stands are presumed to be an effect of past management practice of even-aged silviculture. The gradual shift from younger (smaller) to older (larger) size classes in the riparian buffer zone reflects the trend forest-wide, but is even more pronounced in the riparian buffer zone. Under Alternative A, MRC would practice uneven-aged silviculture, with the goal of restoring a more mixed-age condition, such that within a given stand the mean size class is more likely to be size classes 4 and 5.

Effects on California Natural Diversity Database Special Community Types and Habitat Elements

Under Alternative A, guidelines for protection of California Natural Diversity Database Special Community Types and Habitat Elements would be defined by protection measures outlined in the HCP/NCCP. Table 3.5-11 summarizes management strategies and potential effects on California

Natural Diversity Database Special Community Types in the primary and secondary assessment areas under Alternative A. Table 3.5-12 summarizes management strategies and potential effects on Habitat Elements in the primary and secondary assessment areas under Alternative A.

Several California Natural Diversity Database Special Community Types occur in the secondary assessment area but not in the primary assessment area: Grand Fir Forest, Upland Douglas-fir Forest, Northern Coastal Bluff Scrub, Coastal and Valley Freshwater Marsh, Coastal Brackish Marsh, Coastal Terrace Prairie, Fen, and Sphagnum Bog. If, in the future, MRC acquires land in the secondary assessment area with one of these plant communities, MRC would not implement forest management activities on these community types; there are conservation measures in the HCP/NCCP that apply for wetlands (i.e., no construction, retain and protect non-commercial vegetation, protect soil to the maximum extent possible) and old-growth habitat (Section 3.6.2, Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation). Therefore, it is anticipated that there would be **no effects** on these communities. There are protection measures under the HCP/NCCP that apply to and would protect Northern Coastal Salt Marsh (i.e., wetland protection measures, which include buffers around wetland and special protections within those buffers; and Class I watercourse protection measures, which include buffers, restrict the amount and type of harvest, and specify the types of activities that can and cannot occur in the Aquatic Management Zones), and Mendocino Pygmy Cypress Forest (i.e., management is limited to existing infrastructure, a maximum of 5% of the total acreage can be impacted by new roads, and historical roads would be decommissioned and revegetated) in the primary assessment area. Therefore, it is anticipated that there would be **no effects** on these communities.

Under Alternative A, there are management strategies under the HCP/NCCP that apply to and would protect hardwoods (i.e., Class I: no harvest except for limited rehab; Class II: harvest only if stand is re-classified as Class 3 following on-the-ground assessment, retention of representative mid-successional hardwood stands, increased hardwood for northern spotted owls based on monitoring and adaptive management guidelines) and wetlands (i.e., maintenance of a 25-ft [8-m) buffer around wetlands that are < 50 ft^2 (4.6 m^2) in surface area, or 50-ft (15-m) buffer if > 50 ft^2 (4.6 m^2) in surface area, and, within the buffer, only partial harvest allowed, no sanitation or salvage, retention of downed large woody debris, and basal area retention of 50 ft^2 (4.6 m^2) or 50% of the pre-harvest basal area, whichever is greater) in the primary assessment area. Therefore, there would be **less than significant effects** on all California Natural Diversity Database Special Community Types and Habitat Elements under Alternative A. Potential effects on old-growth forest are discussed in Section 3.6.2 (Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation).

Table 3.5-11. Effects on California Natural Diversity Database Special Community Types within the assessment areas under Alternative A.

California Natural Diversity Database Special Community Types	Primary assessment area (ac)[a]	Secondary assessment area (ac)[a]	Management strategy	Potential impacts
Grand Fir Forest	0	509	Not in the primary assessment area.	**Less than significant effects.**
Mendocino Pygmy Cypress Forest	135[b]	4,316	No harvest; management limited to existing infrastructure; no new road construction; and decommission and revegetate historical and unused roads.	**Less than significant effects.**
Upland Douglas-Fir Forest	0	2,775	Not in the primary assessment area.	**Less than significant effects.**
Northern Coastal Bluff Scrub	0	4		
Coastal and Valley Freshwater Marsh	0	326		
Coastal Brackish Marsh	0	175		
Coastal Terrace Prairie	0	18		
Fen	0	Approximately 70[c]		
Northern Coastal Salt Marsh	77	1,268	No defined management strategy specific to Northern Coastal Salt Marsh; however there are protection measures for wetlands and Class I watercourses that would apply.	**Less than significant effects.**
Sphagnum Bog	0	Approximately 1,165[d]	Not in the primary assessment area.	**Less than significant effects.**

[a] Unless otherwise noted, source: CDFG 2009a
[b] MRC's natural community data set, unpublished data.
[c] Source: California Natural Diversity Database (CDFG 2009a); the fen acreage is estimated based on a circle with 0.2-mi accuracy.
[d] Source: California Natural Diversity Database (CDFG 2009a); the bog acreage is estimated based on a circle with 1-mi accuracy.

Table 3.5-12. Effects on Habitat Elements within the assessment areas under Alternative A.

Habitat Elements	Primary assessment area (ac)	Secondary assessment area (ac)	Management strategy	Potential impacts
Hardwoods	No estimate available	No estimate available	*Class I and II treatment*: Class I: no harvest; Class II: harvest only if stand is re-classified as Class 3 following on-the-ground assessment. *Hardwood retention rules apply to the following*: • all trees of the true oak and madrone species > 18 in diameter at breast height; ≥ 15 ft^2 of hardwood trees > 6 in diameter at breast height, provided they made up at least that amount pre-harvest; • all hardwoods > 6 in diameter at breast height when < 15 ft^2 basal area of hardwoods per acre is present before harvest; • all hardwoods ≥ 24 in diameter at breast height if those ≥ 24 in comprise less than 20% of the hardwoods pre-harvest; • retention areas, and clusters of mast-producing hardwoods; and • potential increases in hardwood basal area for northern spotted owls based on monitoring and adaptive management guidelines.	**Less than significant effects**.
Old-growth Forest	Type I: 102[a] Type II: 520[a]	No estimate available	See Section 3.6 (Terrestrial Habitats and Wildlife Species of Concern).	
Wetlands	2,267[b]	14,733[b]	Maintain a 50-ft buffer around wetlands. Within the buffer, only partial harvest allowed; no sanitation or salvage; and retain downed large woody debris.	**Less than significant effects**.

[a] MRC's natural community data set, unpublished data.
[b] Source: National Wetlands Inventory (USFWS 2011b) (Table 3.5-4)

Effects on plant species of concern

Forty-six of the 104 plant species of concern have the potential to occur in timber-related California Wildlife Habitat Relationships habitat types (i.e., 45 in at least one of the three California Wildlife Habitat Relationships timber habitat types and one in the Montane Riparian California Wildlife Habitat Relationships habitat type; Appendix N) and therefore have the most potential to be impacted. As with the Proposed Action, protections provided to each of these 46 species are dependent on MRC's conservation and management measures under the HCP/NCCP, the species' listing status, and the type of activity being conducted; therefore the analysis of potential effects on the species is broken down by these categories. Table 3.5-13 summarizes management strategies and potential effects on plant species of concern in California Wildlife Habitat Relationships timber-related habitat types under Alternative A. Additionally, potential effects on the 58 plant species of concern with the potential to occur in non-timber related California Wildlife Habitat Relationships habitat types are discussed below, where they may be impacted by non-PTHP activities.

Twenty-one of the 46 species of concern with the potential to occur in timber-related California Wildlife Habitat Relationships habitat types would be covered by the HCP/NCCP under Alternative A. Protection for covered species would be provided through either the application of species-specific HCP/NCCP conservation measures or programmatic measures particular to a management category. MRC would conduct a floristic survey for covered species at least twice during the term of HCP/NCCP, the first survey being within a three-year window prior to any covered management activities (i.e., PTHP-related or non-PTHP related). Ten covered plant species of concern potentially occur only in non-timber habitat types. MRC's floristic survey standards and protections for covered species would still apply. For those that inhabit covered communities, the HCP/NCCP defines community-based measures that would assist in the protection of these species by the avoiding or minimizing the potential for loss of a population or part of a population, or degradation of its habitat. For those species that inhabit communities that are not covered, covered species would be protected under the developed survey protocol and mitigation measures. Given the protocols and protections provided to all covered plant species of concern and a monitoring/adaptive management framework to provide feedback to improve future management, the potential for loss of a population or part of a population, or habitat degradation, would be substantially avoided or minimized. As a result, for all covered management activities, there would be **less than significant effects** on all covered plant species of concern under Alternative A.

Impact 3.5-4: Effects on non-covered plant species of concern for all activities due to removal of a population or degradation of habitat. Twenty-five of the species of concern with the potential to occur in timber-related California Wildlife Habitat Relationships habitat types would not be covered by the HCP/NCCP under Alternative A but are either federally and/or state-listed or exclusively designated as a California Rare Plant Rank species. When conducting any covered management activities (i.e., PTHP-related or non-PTHP related), MRC would conduct a floristic survey for covered species at least twice during the term of HCP/NCCP; however, this survey may or may not document the presence of non-covered species. Standards for the floristic survey in the HCP/NCCP (2012) include the following:

> "An acceptable floristic survey may include a plant list containing some plants that are identified only to genus, if those plants are in genera or families that do not include <u>any covered rare plants</u>. The wildlife agencies will consider floristic surveys acceptable even if they do not include every non-covered species found in the survey area." (Emphasis added)

For PTHP-related management activities, if one of these 25 species is documented, CAL FIRE would consult with CDFG in a project-specific review to ensure that operations are conducted to meet the CEQA (14 CCR §15380[d]) and CFPR (14 CCR §919.4) standards, and therefore potential effects would be avoided or minimized. However, a non-covered plant species of concern may go undetected if they are in a taxonomic group (e.g., family and in some cases genus) other than those of the covered species, resulting in the potential for loss of a population or part of a population, or degradation of habitat for a species.

When conducting activities other than those associated with a PTHP or maintenance of an existing road (activities for which CESA exempts take restrictions), measures to avoid impacts on all non-covered but CESA-listed species would be developed with CDFG. For federally listed plant species, there is no prohibition of take on private lands when the action incidentally taking the plants is otherwise legal (including state laws). However, a non-covered plant species of concern may go undetected. Given the survey and mitigation protocol's limitations of identification to only the taxa of covered species, non-covered species in other taxa could experience the loss of a population or part of a population, or degradation of habitat under the under Alternative A for all activities. Therefore, under Alternative A, for both PTHP-related and non-PTHP activities, there would be **potentially significant effects** on non-covered species of concern that are not of the covered species taxa due to loss of a population or part of a population, or degradation of habitat. With implementation of **Mitigation Measure 3.5-1** (Adopt the CDFG survey protocol and guidance for all covered activities, and for non-PTHP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all plant species of concern), there would be **less than significant effects** on all plant species of concern under Alternative A.

Under Alternative A, the effects of post-fire timber salvage on plant species of concern would be the same as under the Proposed Action, with measures to survey and protect rare plants in association with erosion control. These measures would provide additional protections for rare plants in burned areas and would reduce the potential for effects on plant species of concern compared with existing conditions and the No Action alternative.

Table 3.5-13. Effects on plant species of concern in timber-related California Wildlife Habitat Relationships habitat types within the assessment areas under Alternative A.

Scientific name	Federal status	State status	California rare plant rank status[a]	Management strategy[b]	Potential effects
Kopsiopsis hookeri [*Boschniakia hookeri* in Hickman 1993]	None	None	2.3	*All activities*: Covered; Management Category 1 assigned.	*All activities*: **Less than significant effects**.
Lilium maritimum	None	None	1B.1		
Pleuropogon hooverianus	None	Threatened	1B.1		
Coptis laciniata	None	None	2.2	*All activities*: Covered; Management Category 2 assigned.	
Piperia candida	None	None	1B.2		
Campanula californica	None	None	1B.2	*All activities*: Covered; Management Category 3 assigned.	
Sidalcea malachroides	None	None	4.2	*All activities*: Covered; Management Category 4 assigned.	
Astragalus agnicidus	None	Endangered	1B.1	*All activities*: Covered; species-specific management strategy assigned.	
Usnea longissima	None	None	None		
Carex californica	None	None	2.3	*All activities*: Covered; management category assigned once they have been confirmed on covered lands.	*All activities*: **Less than significant effects**.
Carex comosa	None	None	2.1		
Carex viridula var. *viridula*	None	None	2.3		
Erigeron biolettii	None	None	3		
Erythronium revolutum	None	None	2.2		
Horkelia tenuiloba	None	None	1B.2		
Lycopodium clavatum	None	None	4.1		
Packera bolanderi var. *bolanderi*	None	None	2.2		
Sanguisorba officinalis	None	None	2.2		
Sidalcea malviflora ssp. *patula*	None	None	1B.2		
Trifolium buckwestiorum	None	None	1B.1		
Viburnum ellipticum	None	None	2.3		

Scientific name	Federal status	State status	California rare plant rank status[a]	Management strategy[b]	Potential effects
Arabis mcdonaldiana	Endangered	Endangered	1B.1	*All activities*: Not covered, may go undetected during surveys.	*All activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Calamagrostis foliosa	None	Rare	4.2		
Eriogonum kelloggii	Candidate	Endangered	1B.2		
Silene campanulata ssp. *campanulata*	None	Endangered	4.2		
Sedum laxum ssp. *eastwoodiae*	Candidate	None	1B.2		
Arctostaphylos canescens ssp. *sonomensis*	None	None	1B.2		
Arctostaphylos stanfordiana ssp. *raichei*	None	None	1B.1		
Calystegia purpurata ssp. *saxicola*	None	None	1B.2		
Cardamine pachystigma var. *dissectifolia*	None	None	3		
Carex lenticularis var. *limnophila*	None	None	2.2		
Didymodon norrisii	None	None	2.2		
Fissidens pauperculus	None	None	1B.2		
Gentiana setigera	None	None	1B.2		
Glyceria grandis	None	None	2.3		
Horkelia bolanderi	None	None	1B.2		
Lathyrus palustris	None	None	2.2		
Lupinus sericatus	None	None	1B.2		
Microseris borealis	None	None	2.1		
Mitella caulescens	None	None	4.2		
Monardella villosa ssp. *globosa*	None	None	1B.2		
Montia howellii	None	None	2.2		
Navarretia leucocephala ssp. *bakeri*	None	None	1B.1	*All activities*: Not covered, may go undetected during surveys.	*All activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Oenothera wolfii	None	None	1B.1		
Sidalcea malviflora ssp. *purpurea*	None	None	1B.2		
Thermopsis robusta	None	None	1B.2		

1 [a] Status codes:

California Rare Plant Rank
- 1A = plants presumed extinct in California
- 1B = plants rare, threatened, or endangered in California, and elsewhere
- 2 = plants rare, threatened, or endangered in California, but more common elsewhere
- 3 = plants about which we need more information, a review list
- 4 = plants of limited distribution, a watch list

California Rare Plant Threat Rank
- 0.1= Seriously threatened in California (high degree/immediacy of threat)
- 0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
- 0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

2 [b] For a description of the four management categories plus the species-specific management strategies for the species indicated above, see MRC 2012, Chapter 11.

3.5.2.5 Alternative B

Analysis of trends in vegetation communities

Primary assessment area California Wildlife Habitat Relationships habitat types and size classes

Figure 3.5-13 displays timber modeling results for dominant California Wildlife Habitat Relationships habitat types in the primary assessment area under Alternative B. Under this alternative, it is expected that the amount of Montane Hardwood would actually increase to more than 10% by year 30 and maintain around 8% by year 80. The amount of Montane Hardwood-Conifer would initially increase from approximately 40% to 50% but then decrease to approximately 5% by year 80. Finally, it is predicted that the percentage of Redwood in the primary assessment area would initially decrease from approximately 55% to 50% in year 10 but then increase to approximately 85% by year 80. Therefore, the predicted overall trend in dominant California Wildlife Habitat Relationships habitat type under Alternative B is a slight increase in Montane Hardwood and Redwood and a decrease in Montane Hardwood-Conifer percentage composition. The acres of California Wildlife Habitat Relationships habitat types in each inventory block over time under Alternative B are provided in Appendix O. Appendix F, Figures F-12 and F-13 display the California Wildlife Habitat Relationships habitat types at year 40 and year 80.

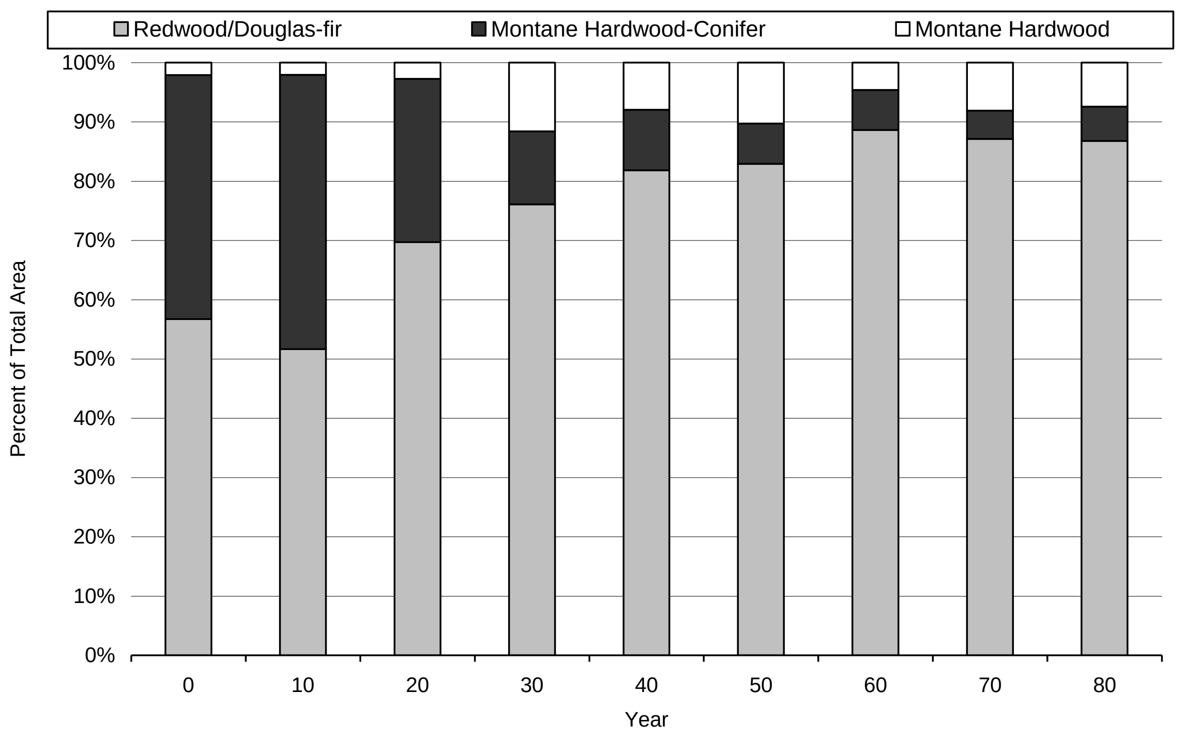


Figure 3.5-13. California Wildlife Habitat Relationships habitat type composition in the primary assessment area predicted under Alternative B.

As described in Section 3.5.2.2, MRC seeks to restore the balance of hardwoods and conifer to a state MRC considers more natural. Under Alternative B, the reserves are not managed to reduce the percentage composition of hardwoods, only the areas outside of the reserves. Therefore, some areas would remain dominated by hardwoods. However, the shift in percentage composition is a shift to a state MRC considers more natural.

Figure 3.5-14 displays modeling results for California Wildlife Habitat Relationships size classes in the primary assessment area under Alternative B. Under this alternative, it is predicted that the percentage of California Wildlife Habitat Relationships size classes 1 and 2 would increase from approximately 8% to more than 11% year 80. The percentage of class size 3 is predicted to increase from approximately 20% to approximately 28% by year 70. The percentage of class size 4 is predicted to decrease from approximately 68% to approximately 25% by year 80. The percentage of class size 5 is predicted to substantially increase from less than 5% in year 0 to close to 30% in year 70. Finally, the percentage of size class 6 is predicted to increase from less than 1% to approximately 8% by year 80. Therefore, the predicted overall trend in California Wildlife Habitat Relationships size class under Alternative B is a slight increase in the percentage composition of younger stands (i.e., classes 1, 2 and 3) a substantial decrease in the percentage composition of classes 4 stands, and a substantial increase in the classes 5 and 6 percentage composition. California Wildlife Habitat Relationships size classes and MRC structure classes in each inventory block under Alternative B are provided in Appendix O.

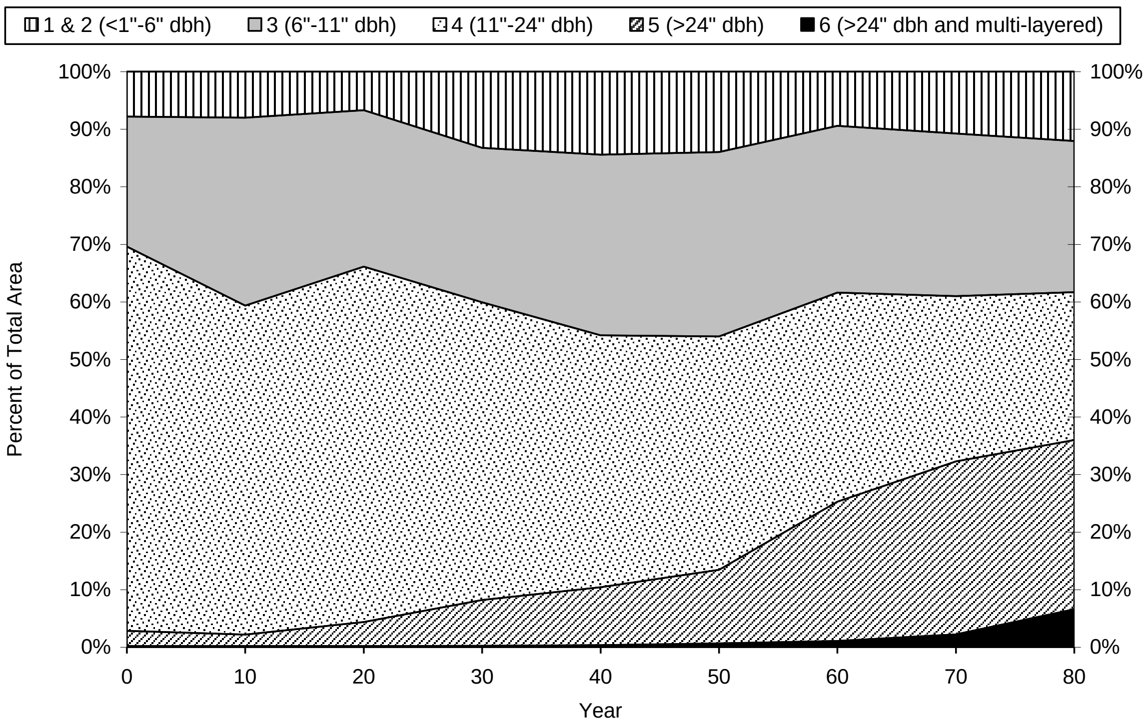


Figure 3.5-14. California Wildlife Habitat Relationships size class composition in the primary assessment area predicted under Alternative B.

As described in Section 3.5.2.2, existing conditions—with a relatively high percentage composition of the younger size class trees—are presumed to be an artificial state due to the past management practice of even-aged silviculture. MRC has the goal of restoring the forests to a more mixed-age condition; however, under Alternative B, management outside of the reserves would include even-aged silviculture, as allowable under CFPRs. Therefore, the shift in composition over time for this alternative is such that there is still a substantial component of smaller size class stands at year 80. At the same time, there is an increase in the larger class size stands; this shift is similar to the trend in the other alternatives.

California Wildlife Habitat Relationships habitat types and size classes in the Riparian Buffer Zone

Figure 3.5-15 displays timber modeling results for dominant California Wildlife Habitat Relationships habitat type within the riparian buffer zone for the next 80 years under Alternative B. Under this alternative, it is expected that the amount of Montane Hardwood would decrease from approximately 1% to less than 1% by year 40. It is also predicted that the amount of Montane Hardwood-Conifer would initially increase slightly and then decrease from approximately 25% of the total area to around 1% of the total area by year 60. Finally, it is predicted that the forest-wide percentage of Redwood would increase from approximately 70% to close to 100% by year 80. Therefore, the predicted overall trend in dominant California Wildlife Habitat Relationships type within the riparian buffer zone under Alternative B is a decrease in both Montane Hardwood and Montane Hardwood-Conifer and an increase in Redwood percent composition. Acres over time of California Wildlife Habitat Relationships habitat types in each inventory block over time under Alternative B are provided in Appendix O.

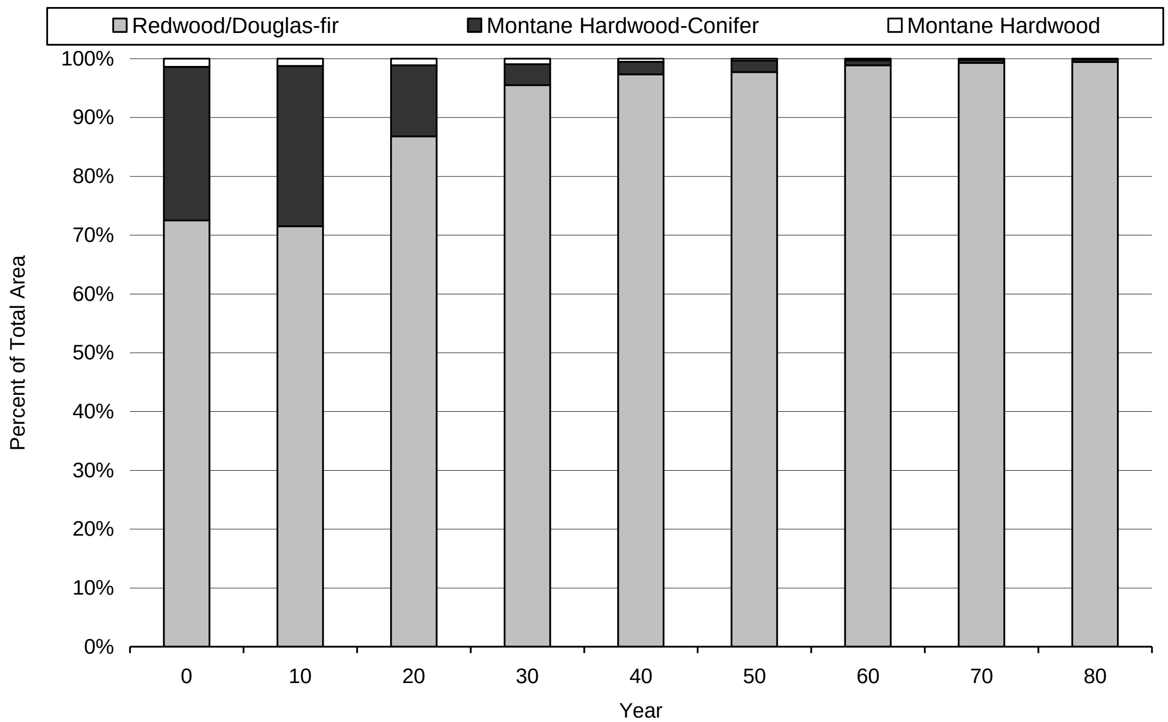


Figure 3.5-15. California Wildlife Habitat Relationships habitat type composition in riparian buffer zones predicted under Alternative B.

Existing conditions within the riparian buffer zone (which is primary dominated by upland, coniferous forest), with a relatively higher percentage composition of Montane Hardwood-Conifer as compared with year 80 of Alternative B, are presumed to be a result of past forest management. MRC would seek to restore the balance of hardwoods and conifer to a state MRC considers more natural state, which is believed look more like the year 80 of Alternative B.

Figure 3.5-16 displays timber modeling results for California Wildlife Habitat Relationships size class within the riparian buffer zone for the next 80 years under Alternative B. Under this alternative, it is predicted that the very small percentage of California Wildlife Habitat Relationships size classes 1 and 2 would initially increase slightly but then decrease to close to

0% by year 50. The percentage of class size 3 is predicted to decrease from approximately 25% to less than 1% by year 60. The percentage of size class 4 is predicted to slowly decrease from approximately 70% at year 0 to approximately 20% by year 80. The percentage of class size 5 is predicted to increase steadily from approximately 5% in year 0 to approximately 60% in year 80. Finally, the percentage of size class 6 is predicted to increase from approximately 1% to close to 18% in year 80. Therefore, the predicted overall trend in California Wildlife Habitat Relationships size class under Alternative B is a substantial decrease in the percentage composition of younger, class 1, 2, 3, and 4 stands, and a substantial increase in classes 5 and 6 percentage composition. California Wildlife Habitat Relationships size classes and MRC's structure classes in each inventory block under Alternative B are provided in Appendix O.

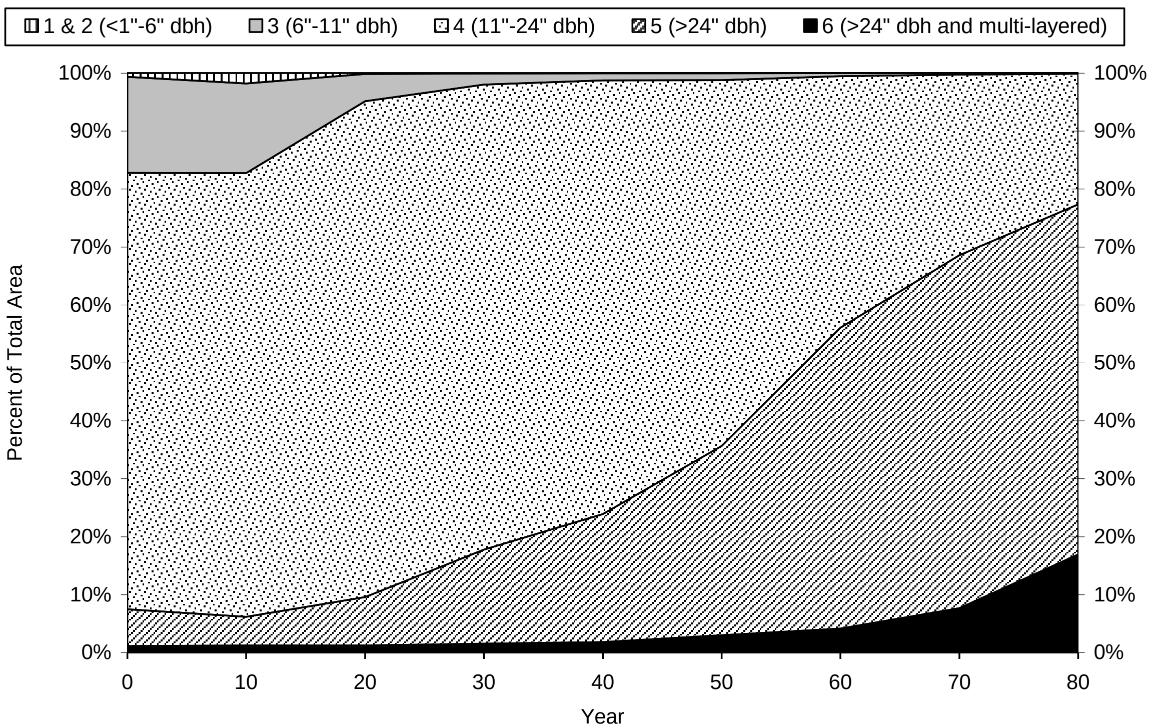


Figure 3.5-16. California Wildlife Habitat Relationships size class composition in riparian buffer zones predicted under Alternative B.

Existing conditions within the riparian buffer zone, with a relatively higher percentage composition of the younger size class stands, as compared with year 80 of Alternative B, are presumed to be an artificial state due to the past management practice of even-aged silviculture.

Effects on California Natural Diversity Database Special Community Types and Habitat Elements

Under Alternative B, no timber harvesting would occur in reserves. Therefore, there would be **no effects** on California Natural Diversity Database Special Community Types and Habitat Elements within the reserves. Outside of reserves, guidelines for protection of California Natural Diversity Database Special Community Types and Habitat Elements would be defined by protection measures outlined in the 2012 CFPRs. Table 3.5-14 summarizes management strategies and potential effects on California Natural Diversity Database Special Community Types in the primary and secondary assessment areas under Alternative B. Table 3.5-15 summarizes management strategies and potential effects on Habitat Elements in the primary and secondary assessment areas under Alternative B.

Several California Natural Diversity Database Special Community Types occur in the secondary assessment area but not in the primary assessment area: Grand Fir Forest, Upland Douglas-fir Forest, Northern Coastal Bluff Scrub, Coastal and Valley Freshwater Marsh, Coastal Brackish Marsh, Coastal Terrace Prairie, Fen, and Sphagnum Bog. If, in the future, MRC acquires land in the secondary assessment area with one of these plant communities, MRC would not implement forest management activities on these community types; there would presumably be conservation measures under the 2012 CFPRs that would apply for wetlands (i.e., no construction, retain and protect non-commercial vegetation, protect soil to the maximum extent possible) and old-growth habitat (Section 3.6.2, Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation). Therefore, it is anticipated that there would be **no effects** on these communities.

Of the California Natural Diversity Database Special Community Types that do occur within the primary assessment area, there are wetlands protection measures (i.e., no construction, retain and protect non-commercial vegetation, protect soil to the maximum extent possible) and Class I watercourse protection measures (i.e., buffers, restrictions on the amount and type of harvest and the types of activities that can and cannot occur in the Watercourse and Lake Protection Zones) under the CFPRs (14 CCR §916.3) that would apply and protect Northern Coastal Salt Marsh. Therefore, there would be **less than significant effects** on California Natural Diversity Database Special Community Types that occur in the secondary assessment area but not in the primary assessment area and on Northern Coastal Salt Marsh in the primary assessment area under Alternative B, outside of the reserves.

Impact 3.5-5: Effects on Mendocino Pygmy Cypress Forest, outside of the reserves, due to the removal of vegetation or habitat degradation. The CFPRs have no strategies to protect Mendocino Pygmy Cypress Forest. This California Natural Diversity Database Special Community Type occurs exclusively outside of the reserves (i.e., there are no acres inside of the reserves); therefore, there would be **potentially significant effects** on Mendocino Pygmy Cypress Forest outside of reserves under Alternative B due to the removal of vegetation or the alteration of local habitat conditions.

Mitigation Measure 3.5-2: Adopt Mendocino Pygmy Cypress Forest protection measures. Protection measures for Mendocino Pygmy Cypress Forest similar to those under the Proposed Action should be adopted (i.e., management is limited to existing infrastructure, a maximum of 5% of the total acreage can be impacted by new roads, and historical roads would be decommissioned and revegetated). Implementation of this mitigation measure would reduce effects reduce potential effects on Mendocino Pygmy Cypress Forest under Alternative B to **less than significant**.

The CFPRs (14 CCR §916.3) include management strategies for wetlands (i.e., no construction, retention and protection of non-commercial vegetation, and protection of soil to the maximum extent possible); therefore, there would be **less than significant effects** on wetlands under Alternative B, outside of reserves. Potential effects on old-growth forest are discussed in Section 3.6.2 (Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation).

Impact 3.5-6: Effects on hardwoods, outside of the reserves, due to the removal of vegetation or habitat degradation. The CFPRs have no management strategies for hardwoods;

therefore, there would be **potentially significant effects** on hardwoods outside of reserves under Alternative B due to the removal of vegetation or the alteration of local habitat conditions.

Mitigation Measure 3.5-3: Implement protection measures for hardwoods. In order to reduce potential effects on hardwoods under Alternative B to **less than significant**, hardwood retention and harvest rules similar to the Proposed Action should be adopted (i.e., implement the no harvest rule, restrictions on road construction, and restoration rules).

Table 3.5-14. Effects on California Natural Diversity Database Special Community Types within the assessment areas under Alternative B.

Rare/unique plant community	Primary assessment area (ac)[a]	Secondary assessment area (ac)[a]	Management strategy	Potential effects
Grand Fir Forest	0	509	Not in the primary assessment area.	**Less than significant effects**.
Mendocino Pygmy Cypress Forest	135[b]	4,316	*Within the reserves*: No harvesting allowed. *Outside of the reserves*: No management strategy defined under the CFPRs to protect this community type.	*Within the reserves*: **No effect**. *Outside of the reserves*: **Potentially significant effects** due to the removal of vegetation or habitat degradation.
Upland Douglas-Fir Forest	0	2,775	Not in the primary assessment area.	**Less than significant effects**.
Northern Coastal Bluff Scrub	0	4		
Coastal and Valley Freshwater Marsh	0	326		
Coastal Brackish Marsh	0	175		
Coastal Terrace Prairie	0	18		
Fen	0	Approximately 70[c]		
Northern Coastal Salt Marsh	77	1,268	*Within the reserves*: No harvesting allowed. *Outside of the reserves*: No defined management strategy specific to Northern Coastal Salt Marsh; however there are wetland protection measures and Class I watercourse protection measures under the CFPRs that would apply.	*Within the reserves*: **No effect**. *Outside of the reserves*: **Less than significant effects**.
Sphagnum Bog	0	Approximately 1,165[d]	Not in the primary assessment area.	**Less than significant effects**.

[a] Unless otherwise noted, source: CDFG 2009a.
[b] MRC's natural community data set, unpublished data.
[c] Source: California Natural Diversity Database (CDFG 2009a); the fen acreage is estimated based on a circle with 0.2-mi accuracy.
[d] Source: California Natural Diversity Database (CDFG 2009a); the bog acreage is estimated based on a circle with 1-mi accuracy.

Table 3.5-15. Effects on Habitat Elements within the assessment areas under Alternative B.

Habitat Elements	Primary assessment area (ac)	Secondary assessment area (ac)	Management strategy	Potential effects
Hardwoods	No estimate available	No estimate available	*Within the reserves*: No harvesting allowed. *Outside of the reserves*: No management strategy defined under the CFPRs to protect this community type.	*Within the reserves*: **No effect**. *Outside of the reserves*: **Potentially significant effects** due to the removal of vegetation or habitat degradation.
Old-growth Forest	Type I: 102[a] Type II: 520[a]	No estimate available	See Section 3.6 (Terrestrial Habitats and Wildlife Species of Concern).	
Wetlands	2,267[b]	14,733[b]	*Within the reserves*: No harvesting allowed. *Outside of the reserves*: CFPR measures apply: no construction in wetlands; retain and protect non-commercial vegetation in wetlands; protect soil in wetlands to the maximum extent possible.	**Less than significant effects**.

[a] MRC's natural community data set, unpublished data.
[b] Source: National Wetlands Inventory (USFWS 2011b) (Table 3.5-4).

Effects on plant species of concern

Forty-six of the 104 plant species of concern have the potential to occur in timber-related California Wildlife Habitat Relationships habitat types (i.e., 45 in at least one of the three California Wildlife Habitat Relationships timber habitat types and one in the Montane Riparian California Wildlife Habitat Relationships habitat type; Appendix N) and therefore have the most potential to be impacted. The protection of all of these species relates to whether the species is located within or outside of the reserves, their listing status, and the type of activity being conducted; therefore the analysis of potential effects on the species is broken down by these categories. Outside of the reserves, CFPR guidelines would apply under Alternative B; therefore, effects are similar to the No Action. Table 3.5-16 summarizes management strategies and potential effects on plant species of concern in California Wildlife Habitat Relationships timber habitat types under Alternative B. Additionally, potential effects on the 58 plant species of concern with the potential to occur in non-timber related California Wildlife Habitat Relationships habitat types are discussed below, where they may be affected by non-THP activities.

Under Alternative B, no commercial timber harvest would take place within the reserves. For most species, this lack of disturbance via management activities means that their habitat would be protected and the populations would remain unaffected; therefore, there would be **no effects** on these species. However, some species such as Humboldt milk-vetch are disturbance-adapted. The removal of any type of management activities by MRC does not preclude natural disturbance regimes (e.g., fire) or microhabitat changes (e.g., a fallen log). Therefore, given the lack of scientific literature pertaining to the 46 species of concern with the potential to occur in timber-related California Wildlife Habitat Relationships habitat types, it cannot be determined if there is a potential, adverse effect on these species or not.

Seven of the 46 species that have the potential to occur in timber-related California Wildlife Habitat Relationships habitat types are federally and/or state-listed species (Appendix N). For THP-related activities, CFPRs and CEQA guidelines as supported by agency policy apply. Seasonally-appropriate floristic surveys including for federally and/or state-listed plant species would be conductedif suitable habitat is present within the project area and has the potential to be impacted by proposed project activities. Management strategies for any documented species of concern including federally and/or state-listed plant species would be determined on a plan-by-plan basis to ensure that impacts are not significant. For CESA and federally and/or state-listed plant species, “take” is not prevented per se. However, the CFPRs (14 CCR §898.2) state that a THP would not be approved if:

> “Implementation of the plan would irreparably damage plant species listed as rare or endangered by the Department of Fish and Game and when the timber owner fails to comply with F&GC 1913.”

Thirty-nine plant species of concern with the potential to occur in a timber-related habitat type are exclusively designated as a California Rare Plant Rank species. For THP-related activities, the CFPRs do not mandate survey protocols or management strategies for these species. However, to support CAL FIRE impact determinations on THPs relative to the CEQA (14 CCR §15380[d]) and CFPR (14 CCR §919.4) standards, CAL FIRE would reqire surveys for all plant species of special concern if necessary to avoid a significant impact (see Section 2.5.13, Alternative B, Listed and sensitive species management), not just federally and state-listed species, which is addressed in the CFPRs (14 CCR §919.4):

> "Where significant adverse impacts to non-listed species are identified, the RPF [Registered Professional Forester] and Director shall incorporate feasible practices to reduce impacts as described in 14 CCR §898."

If potential impacts are identified, management measures would be developed in coordination with CDFG and implemented to ensure that impacts are mitigated. As a consequence, THP-related activities would result in **less than significant effects** on all 46 plant species of concern with the potential to occur in California Wildlife Habitat Relationships timber-related habitat types under Alternative B, outside of the reserves.

Impact 3.5-7: Effects on all plant species of concern during non-THP activities due to removal of a population or degradation of habitat, outside of reserves. Non-THP activities are not subject to survey requirementsor plant species of concern prior to the activity because there is no nexus to a CEQA permitting process to drive an impact assessment. Therefore, species of concern including federally and/or state-listed plant species that are present may go undetected and unprotected. Furthermore, there is no obligation to protect (i.e., avoid and/or mitigate for if located) non-CESA listed (i.e., federally listed and California Rare Plant Rank) plants when conducting these activities. As a consequence, under Alternative B, outside of reserves, non-THP activities would result in **potentially significant effects** on the 46 plant species with the potential to occur in California Wildlife Habitat Relationships timber habitat types, on plant species of concern that potentially occur only in non-timber California Wildlife Habitat Relationships habitat types, and any additional plant species of concern that may be added to federal, state or California Rare Plant Rank lists in the future due to loss of a population or part of a population, or degradation of habitat for a species.

Mitigation Measure 3.5-4: For non-THP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all species of concern. For non-THP activities, MRC would consult with CDFG to develop feasible site-specific mitigation measures to assure that potential significant project impacts (14 CCR §15382) would be avoided for all species of concern. If this mitigation measures is applied, there would be **less than significant effects** on all plant species of concern during non-THP activities under Alternative B.

Under Alternative B, post-fire timber salvage outside the reserves would be the same as under the No Action alternative, and there would be no effect on vegetation and plant species of concern compared with existing conditions. There would be no timber salvage operations in the reserves.

Table 3.5-16. Effects on plant species of concern in timber-related California Wildlife Habitat Relationships habitat types within the assessment areas under Alternative B.

Scientific name	Federal status	State status	California rare plant rank status[a]	Management strategy	Potential effects
Arabis mcdonaldiana	Endangered	Endangered	1B.1	*Within the reserves*: No harvesting allowed; therefore no management strategy necessary. *Outside of the reserves, THP-related activities*: Species surveyed for if necessary to avoid a significant impact[(b)] and if located, management strategy determined on a case-by-case basis. *Outside of the reserves, non-THP activities*: Surveysand mitigation protocols not in place.	*Within the reserves*: **No effects**. *Outside of the reserves, THP-related activities*: **Less than significant effects**. *Outside of the reserves, non-THP activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Astragalus agnicidus	None	Endangered	1B.1		
Calamagrostis foliosa	None	Rare	4.2		
Eriogonum kelloggii	Candidate	Endangered	1B.2		
Pleuropogon hooverianus	None	Threatened	1B.1		
Sedum laxum ssp. *eastwoodiae*	Candidate	None	1B.2		
Silene campanulata ssp. *campanulata*	None	Endangered	4.2		

Scientific name	Federal status	State status	California rare plant rank status[a]	Management strategy	Potential effects
Arctostaphylos canescens ssp. *sonomensis*	None	None	1B.2	*Within the reserves*: No harvesting allowed; therefore no management strategy necessary. *Outside of the reserves, THP-related activities*: Species surveyed for if necessary to avoid a significant impact[(b)] and if located, management strategy determined on a case-by-case basis. *Outside of the reserves, non-THP activities*: Surveys, and mitigation protocols not in place.	*Within the reserves*: **No effects**. *Outside of the reserves, THP-related activities*: **Less than significant effects**. *Outside of the reserves, non-THP activities:* **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Arctostaphylos stanfordiana ssp. *raichei*	None	None	1B.1		
Kopsiopsis hookeri [*Boschniakia hookeri* in Hickman 1993]	None	None	2.3		
Calystegia purpurata ssp. *saxicola*	None	None	1B.2		
Campanula californica	None	None	1B.2		
Cardamine pachystigma var. *dissectifolia*	None	None	3		
Carex californica	None	None	2.3		
Carex comosa	None	None	2.1		
Carex lenticularis var. *limnophila*	None	None	2.2		
Carex viridula var. *viridula*	None	None	2.3		
Coptis laciniata	None	None	2.2		
Didymodon norrisii	None	None	2.2		
Erigeron biolettii	None	None	3		
Erythronium revolutum	None	None	2.2		
Fissidens pauperculus	None	None	1B.2		
Gentiana setigera	None	None	1B.2		
Glyceria grandis	None	None	2.3		
Lupinus sericatus	None	None	1B.2		
Microseris borealis	None	None	2.1		
Monardella villosa ssp. *globosa*	None	None	1B.2		
Montia howellii	None	None	2.2		
Oenothera wolfii	None	None	1B.1		
Packera bolanderi var. *bolanderi*	None	None	2.2		
Horkelia bolanderi	None	None	1B.2		
Horkelia tenuiloba	None	None	1B.2		
Navarretia leucocephala ssp. *bakeri*	None	None	1B.1		

Scientific name	Federal status	State status	California rare plant rank status[a]	Management strategy	Potential effects
Lathyrus palustris	None	None	2.2	*Within the reserves*: No harvesting allowed; therefore no management strategy necessary. *Outside of the reserves, THP-related activities*: Species surveyed for if necessary to avoid a significant impact[(b)] and if located, management strategy determined on a case-by-case basis. *Outside of the reserves, non-THP activities*: Surveysand mitigation protocols not in place.	*Within the reserves*: **No effects**. *Outside of the reserves, THP-related activities*: **Less than significant effects**. *Outside of the reserves, non-THP activities:* **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Lilium maritimum	None	None	1B.1		
Lycopodium clavatum	None	None	4.1		
Mitella caulescens	None	None	4.2		
Piperia candida	None	None	1B.2		
Sanguisorba officinalis	None	None	2.2		
Sidalcea malachroides	None	None	4.2		
Sidalcea malviflora ssp. *patula*	None	None	1B.2		
Sidalcea malviflora ssp. *purpurea*	None	None	1B.2		
Thermopsis robusta	None	None	1B.2		
Trifolium buckwestiorum	None	None	1B.1		
Viburnum ellipticum	None	None	2.3		
Usnea longissima	None	None	None		

[a] Status codes:

California Rare Plant Rank
- 1A = plants presumed extinct in California
- 1B = plants rare, threatened, or endangered in California, and elsewhere
- 2 = plants rare, threatened, or endangered in California, but more common elsewhere
- 3 = plants about which we need more information, a review list
- 4 = plants of limited distribution, a watch list

California Rare Plant Threat Rank
- 0.1= Seriously threatened in California (high degree/immediacy of threat)
- 0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
- 0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

[b] Surveys would be necessary in cases when not enough is known about a plant's location or habitat requirements to avoid a significant impact. In lieu of surveys, CAL FIRE may require other measures that ensure avoidance, such as on-site training and plant/habitat identification tools for licensed timber operators, "walk-through surveys" prior to operations, or project-specific mitigation. Examples where a survey may not be necessary include sites where the scoping did not discover any sensitive species in the project area, where the project area includes no suitable habitat, or when a timber operation has been planned in a manner that clearly avoids potential impacts.

3.5.2.6 Alternative C

Analysis of trends in vegetation communities

Primary assessment area California Wildlife Habitat Relationships habitat types and size classes

Figure 3.5-17 displays timber modeling results for dominant California Wildlife Habitat Relationships habitat types in the primary assessment area for the next 40 years (as opposed to 80 years for the other alternatives) under Alternative C. Under this alternative, it is expected that the amount of Montane Hardwood would decrease to less than 1% by year 40. The amount of Montane Hardwood-Conifer would also decrease from approximately 40% of the total area to around 5% of the total area by year 40. Finally, it is predicted that the percentage of Redwood in the primary assessment area would increase from approximately 55% to close to 95% by year 40. Therefore, the predicted overall trend in dominant California Wildlife Habitat Relationships habitat type under Alternative C is a decrease in both Montane Hardwood and Montane Hardwood-Conifer and an increase in Redwood percent composition. The acres of California Wildlife Habitat Relationships habitat types in each inventory block over time under Alternative C are provided in Appendix O. Appendix F, Figure F-8, displays the California Wildlife Habitat Relationships habitat types at year 40.

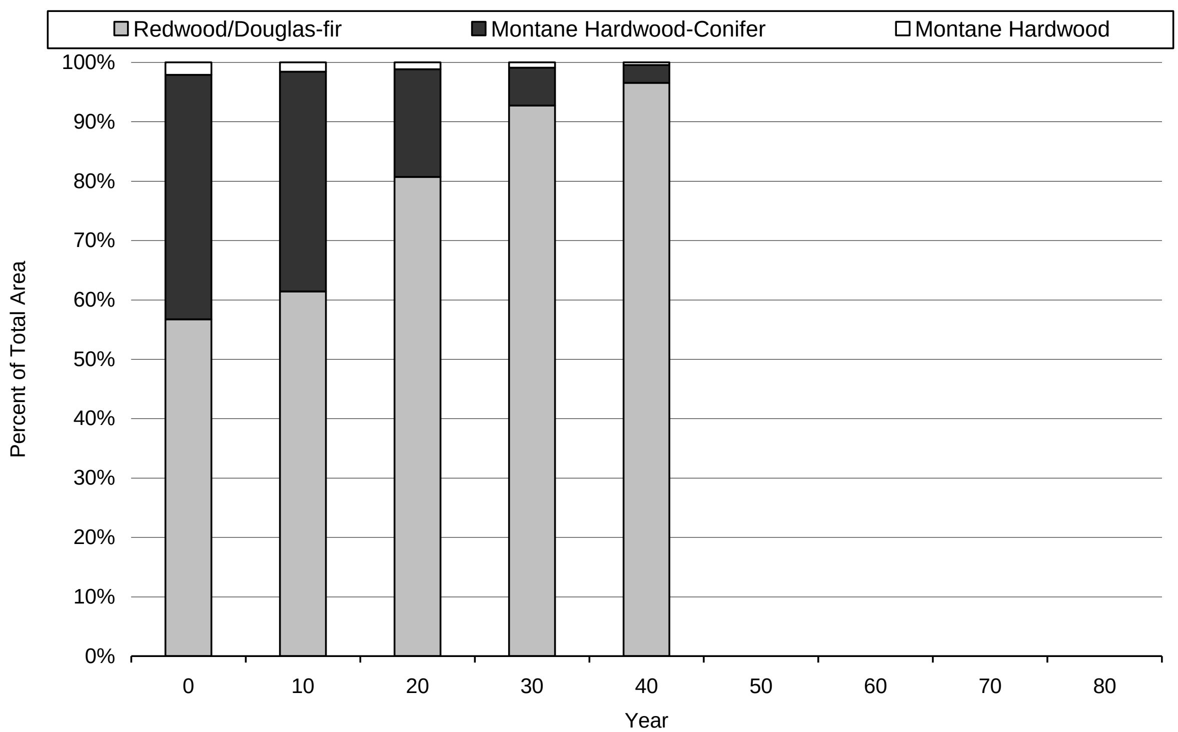


Figure 3.5-17. California Wildlife Habitat Relationships habitat type composition in the primary assessment area predicted under Alternative C.

Existing conditions, with a relatively higher percentage of both Montane Hardwood-Conifer and Montane Hardwood, are presumed to be a result of past forest management. MRC seeks to restore the balance of hardwoods and conifer to a state MRC considers more natural. Under Alternative C, MRC would retain a hardwood component in conifer-dominated stands and protect hardwood forest at locations where site conditions favor hardwoods as the natural, late-successional habitat type (MRC 2012).

Figure 3.5-18 displays modeling results for California Wildlife Habitat Relationships size classes in the primary assessment area under Alternative C. Under this alternative, it is predicted that the percentage of California Wildlife Habitat Relationships size classes 1 and 2 would decrease form approximately 8% to less than 1% by year 40. The percentage of class size 3 is predicted to initially increase from 20% to 30% and reach approximately 25% by year 40. The percentage of class size 4 is predicted to initially decrease from 70% at year 0 to 60% at year 10, reaching approximately 65% by year 40. The percentage of class size 5 is predicted to increase from less than 5% in year 0 to approximately 8% in year 40. Finally, the percentage of size class 6 is predicted to remain relatively low, at less than 1% from year 0 to year 40. Therefore, the predicted overall trend in California Wildlife Habitat Relationships size class under Alternative C is a substantial decrease in the percentage composition of younger, class 1 and 2 stands, a relatively stable representation of classes 3 and 4 stands, a substantial increase in class 5 stands, and a continual, low percentage composition of the larger and mixed-size tree stands (class 6). California Wildlife Habitat Relationships size classes and MRC structure classes in each inventory block under Alternative C are provided in Appendix O.

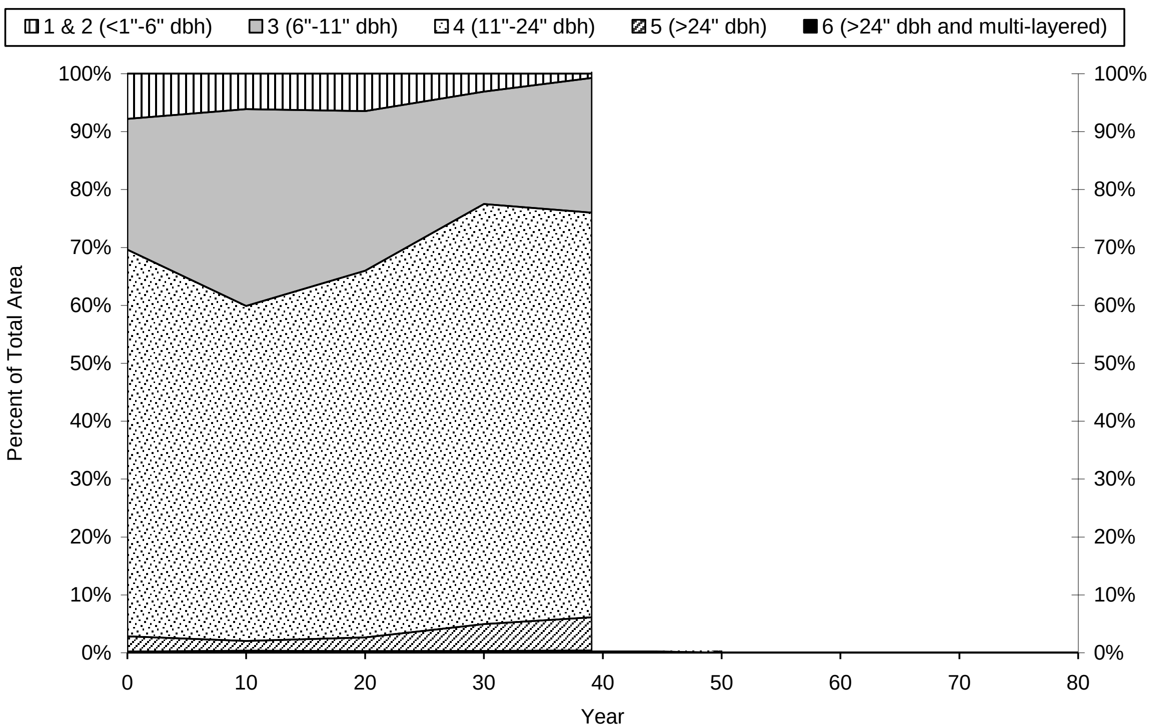


Figure 3.5-18. California Wildlife Habitat Relationships size class composition in the primary assessment area predicted under Alternative C.

As described in Section 3.5.2.2, existing conditions—with a relatively higher percentage composition of the younger size class stands (i.e., size classes 1 and 2)—are presumed to be an artificial state due to the past management practice of even-aged silviculture. MRC has a goal of restoring the forests to a more mixed-age condition, such that within a given stand the mean size class is more likely to be an intermediate size class (i.e., classes 4, 5). At the same time, the amount of the larger and mixed-size tree stands (class 6), would increase over time.

California Wildlife Habitat Relationships habitat types and size classes in the Riparian Buffer Zone

Figure 3.5-19 displays timber modeling results for dominant California Wildlife Habitat Relationships habitat type within the riparian buffer zone for the next 40 years under Alternative C. Under this alternative, it is expected that the amount of Montane Hardwood would decrease from approximately 1% to less than 1% by year 40. It is also predicted that the amount of Montane Hardwood-Conifer would initially increase slightly and then decrease from approximately 25% of the total area to approximately 2% of the total area by year 40. Finally, it is predicted that the forest-wide percentage of Redwood would increase from approximately 70% to approximately 98% by year 40. Therefore, the predicted overall trend in dominant California Wildlife Habitat Relationships type within the riparian buffer zone under Alternative C is a decrease in both Montane Hardwood and Montane Hardwood-Conifer and an increase in Redwood and Douglas-fir percentage composition. Acres of California Wildlife Habitat Relationships habitat types in each inventory block over time under Alternative C are provided in Appendix O.

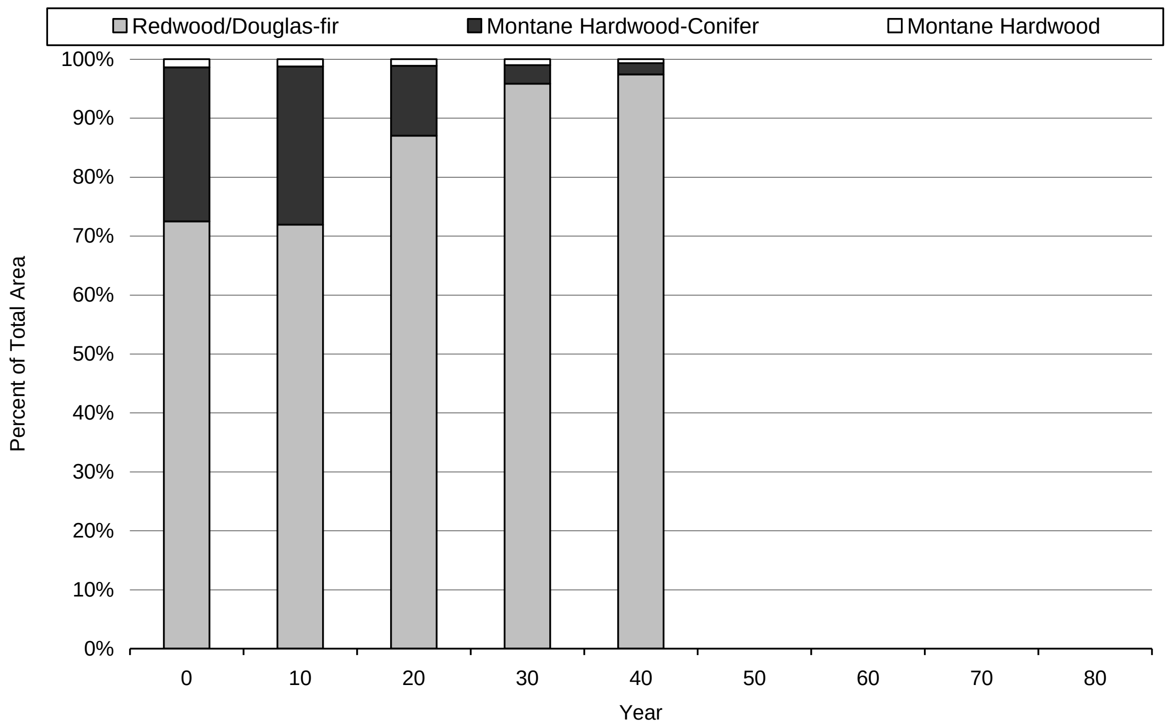


Figure 3.5-19. California Wildlife Habitat Relationships habitat type composition in riparian buffer zones predicted under Alternative C.

Existing conditions within the riparian buffer zone (which is primary dominated by upland, coniferous forest), with a higher percentage composition of Montane Hardwood-Conifer as compared with year 40 of the Proposed Action, are presumed to be a result of past forest management. Under Alternative C, MRC would seek to restore the balance of hardwoods and conifer to a state MRC considers more natural.

Figure 3.5-20 displays timber modeling results for California Wildlife Habitat Relationships size class within the riparian buffer zone for the next 80 years under Alternative C. Under this alterative, it is predicted that the small percentage of California Wildlife Habitat Relationships size classes 1 and 2 would decrease to less than 1% by year 20. The percentage of class size 3 is predicted to decrease from approximately 25% to approximately 1% by year 40. The percentage of class size 4 is predicted to remain relatively steady, decreasing from slightly above 70% at year 0 to slightly below 70% by year 40. The percentage of class size 5 is predicted to increase steadily from approximately 5% in year 0 to approximately 30% in year 40. Finally, the percentage of size class 6 is predicted to slightly increase from less than 1% to slightly more than 1% in year 40. Therefore, the predicted overall trend in California Wildlife Habitat Relationships size class under Alternative C is a decrease in the percentage composition of younger, class 1, 2, 3, and 4 stands, though sometimes only slightly, and substantial increase in class 5 stands and a slight increase in class 6 stands percentage composition. California Wildlife Habitat Relationships size classes and MRC's structure classes in each inventory block under Alternative C are provided in Appendix O.

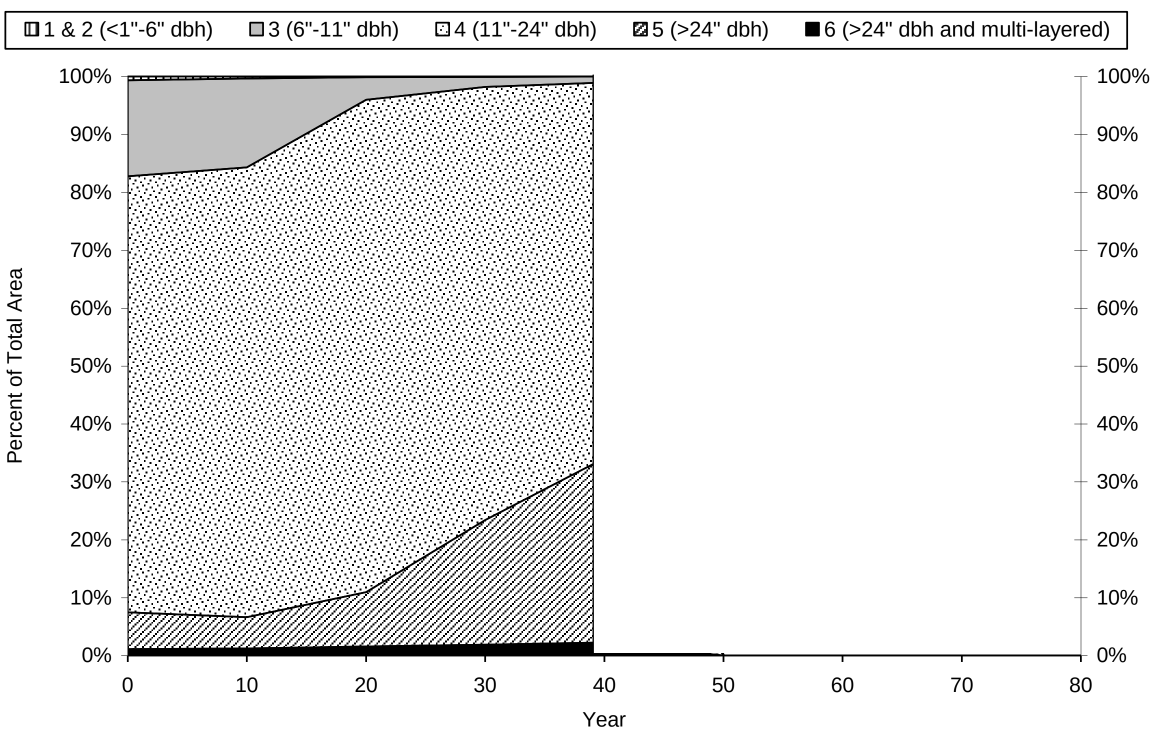


Figure 3.5-20. California Wildlife Habitat Relationships size class composition in riparian buffer zones predicted under Alternative C.

Similar to size class patterns in the primary assessment area, existing conditions within the riparian buffer zone, with a relatively higher percentage composition of the younger size class stands are presumed to be an effect of past management practice of even-aged silviculture. Under Alternative C, MRC would practice uneven-aged silviculture, with the goal of restoring a more mixed-age condition, such that within a given stand the mean size class is more likely to be size classes 4 and 5.

Effects on California Natural Diversity Database Special Community Types and Habitat Elements

Under Alternative C, guidelines for protection of California Natural Diversity Database Special Community Types and Habitat Elements would be defined by protection measures outlined in the HCP through year 40. Table 3.5-17 summarizes management strategies (per the HCP/NCCP) and potential effects on California Natural Diversity Database Special Community Types in the primary and secondary assessment areas under Alternative C. Table 3.5-18 summarizes management strategies (per the HCP/NCCP) and potential effects on Habitat Elements in the primary and secondary assessment areas under Alternative C.

Several California Natural Diversity Database Special Community Types occur in the secondary assessment area but not in the primary assessment area: Grand Fir Forest, Upland Douglas-fir Forest, Northern Coastal Bluff Scrub, Coastal and Valley Freshwater Marsh, Coastal Brackish Marsh, Coastal Terrace Prairie, Fen, and Sphagnum Bog. If, in the future, MRC acquires land in the secondary assessment area with one of these plant communities, MRC would not implement forest management activities on these community types; there would presumably be conservation measures in the HCP that would apply for wetlands (i.e., no construction, retain and protect non-commercial vegetation, protect soil to the maximum extent possible) and old-growth habitat (Section 3.6.2, Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation). Therefore, it is anticipated that there would be **no effects** on these communities. There would be protection measures under the HCP that apply to and would protect Northern Coastal Salt Marsh (i.e., wetland protection measures, which include buffers around wetland and special protections within those buffers; and Class I watercourse protection measures, which include buffers, restrict the amount and type of harvest, and specify the types of activities that can and cannot occur in the Aquatic Management Zones), and Mendocino Pygmy Cypress Forest (i.e., management is limited to existing infrastructure, a maximum of 5% of the total acreage can be impacted by new roads, and historical roads would be decommissioned and revegetated) in the primary assessment area. Therefore, it is anticipated that there would be **no effects** on these communities.

Under Alternative C, there are management strategies under Alternative C that would apply to and protect hardwoods (i.e., Class I: no harvest except for limited rehab; Class II: harvest only if stand is re-classified as Class 3 following on-the-ground assessment, retention of representative mid-successional hardwood stands, increased hardwood for northern spotted owls based on monitoring and adaptive management guidelines) and wetlands (i.e., maintenance of a 25-ft (8-m) buffer around wetlands that are < 50 ft^2 (4.6 m^2) in surface area, or 50-ft (15-m) buffer if > 50 ft^2 (4.6 m^2) in surface area, and, within the buffer, only partial harvest allowed, no sanitation or salvage, retention of downed large woody debris, and basal area retention of 50 ft^2 (4.6 m^2) or 50% of the pre-harvest basal area, whichever is greater) in the primary assessment area. Therefore, there would be **less than significant effects** on all California Natural Diversity Database Special Community Types and Habitat Elements under Alternative C. Potential effects on old-growth forest are discussed in Section 3.6.2 (Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation).

Table 3.5-17. Effects on California Natural Diversity Database Special Community Types within the assessment areas under Alternative C.

California Natural Diversity Database Special Community Types	Primary assessment area (ac)[a]	Secondary assessment area (ac)[a]	Management strategy	Potential effects
Grand Fir Forest	0	509	Not in the primary assessment area.	**Less than significant effects**.
Mendocino Pygmy Cypress Forest	135[b]	4,316	No harvest; management limited to existing infrastructure; a maximum of 5% of the total acreage can be impacted by new roads; and decommission and revegetate historical roads.	**Less than significant effects**.
Upland Douglas-Fir Forest	0	2,775	Not in the primary assessment area.	**Less than significant effects**.
Northern Coastal Bluff Scrub	0	4		
Coastal and Valley Freshwater Marsh	0	326		
Coastal Brackish Marsh	0	175		
Coastal Terrace Prairie	0	18		
Fen	0	Approximately 70[c]		
Northern Coastal Salt Marsh	77	1,268	No defined management strategy specific to Northern Coastal Salt Marsh; however there are protection measures for wetlands and Class I watercourses that would apply.	**Less than significant effects**.
Sphagnum Bog	0	Approximately 1,165[d]	Not in the primary assessment area.	**Less than significant effects**.

[a] Unless otherwise noted, source: CDFG 2009a.
[b] MRC's natural community data set, unpublished data.
[c] Source: California Natural Diversity Database (CDFG 2009a); the fen acreage is estimated based on a circle with 1/5-mi accuracy.
[d] Source: California Natural Diversity Database (CDFG 2009a); the bog acreage is estimated based on a circle with 1-mi accuracy.

Table 3.5-18. Effects on Habitat Elements within the assessment areas under Alternative C.

Habitat Elements	Primary assessment area (ac)	Secondary assessment area (ac)	Management strategy	Potential effects
Hardwoods	No estimate available	No estimate available	*Class I and II treatment*: Class I: no harvest; Class II: harvest only if stand is re-classified as Class 3 following on-the-ground assessment. *Hardwood retention rules apply to the following*: • all trees of the true oak and madrone species > 18 in diameter at breast height; • ≥ 15 ft^2 of hardwood trees > 6 in diameter at breast height, provided they made up at least that amount pre-harvest; • all hardwoods > 6 in diameter at breast height when < 15 ft^2 basal area of hardwoods per acre is present before harvest; • all hardwoods ≥ 24 in diameter at breast height if those ≥ 24 in comprise less than 20% of the hardwoods pre-harvest; • retention areas, and clusters of mast-producing hardwoods; and • potential increases in hardwood basal area for northern spotted owls based on monitoring and adaptive management guidelines.	**Less than significant effects**.
Old-growth Forest	Type I: 102[a] Type II: 520[a]	No estimate available	See Section 3.6 (Terrestrial Habitats and Wildlife Species of Concern).	
Wetlands	2,267[b]	14,733[b]	Maintain a 25-ft buffer around wetlands that are < 50 ft^2 in surface area, or 50-ft buffer if > 50 ft^2 in surface area. Within the buffer, only partial harvest allowed; no sanitation or salvage; retain downed large woody debris and basal area retention of 50 ft^2 or 50% of the pre-harvest basal area, whichever is greater.	**Less than significant effects**.

[a] MRC's natural community data set, unpublished data.
[b] Source: National Wetlands Inventory (USFWS 2011b) (Table 3.5-4).

Effects on plant species of concern

Forty-six of the 104 plant species of concern have the potential to occur in timber-related California Wildlife Habitat Relationships habitat types (i.e., 45 in at least one of the three California Wildlife Habitat Relationships timber habitat types and one in the Montane Riparian California Wildlife Habitat Relationships habitat type; Appendix N) and therefore have the most potential to be impacted. As with the Proposed Action, protections provided to each of these 46 species would be dependent on MRC's conservation and management measures under the HCP, the species' listing status, and the type of activity being conducted; therefore the analysis of potential effects on the species is broken down by these categories. Table 3.5-19 summarizes management strategies and potential effects on plant species of concern in California Wildlife Habitat Relationships timber-related habitat types under Alternative C. Additionally, potential effects on the 58 plant species of concern with the potential to occur in non-timber related California Wildlife Habitat Relationships habitat types are discussed below, where they may be impacted by non-PTHP activities.

While Alternative C is very similar to the Proposed Action for the first four decades, under Alternative C, only state-listed plant species of concern would be covered by an HCP. Therefore two of these species of concern with the potential to occur in timber-related California Wildlife Habitat Relationships habitat types would be covered by the HCP under Alternative C. As with the Proposed Action, protection for covered species would be provided through either the application of species-specific HCP conservation measures or programmatic measures particular to a management category. MRC would conduct a floristic survey for covered species at least twice during the term of HCP, the first survey being within a three-year window prior to any covered management activities (i.e., PTHP-related or non-PTHP related). Two covered plant species of concern potentially occur only in non-timber habitat types. MRC's floristic survey standards and protections for covered species would still apply. For those that inhabit covered communities, the HCP would define community-based measures that would assist in the protection of these species by the avoiding or minimizing the potential for loss of a population or part of a population, or degradation of its habitat. For those species that inhabit communities that are not covered, covered species would be protected under the developed survey protocol and mitigation measures. Given the protocols and protections provided to all covered plant species of concern and a monitoring/adaptive management framework to provide feedback to improve future management, the potential for loss of a population or part of a population, or habitat degradation, would be substantially avoided or minimized. As a result, for all covered management activities, there would be **less than significant effects** on all covered plant species of concern under Alternative C.

Impact 3.5-8: Effects on non-covered plant species of concern for all activities due to removal of a population or degradation of habitat. Forty-four of the species of concern with the potential to occur in timber-related California Wildlife Habitat Relationships habitat types would not be covered by the HCP under Alternative C but are either federally and/or state-listed or exclusively designated as a California Rare Plant Rank species. When conducting any covered management activities (i.e., PTHP-related or non-PTHP related), MRC would conduct a floristic survey for covered species at least twice during the term of HCP; however, this survey may or may not document the presence of non-covered species. The HCP/NCCP (2012) states the following:

> "An acceptable floristic survey may include a plant list containing some plants that are identified only to genus, if those plants are in genera or families that do not include <u>any covered rare plants</u>. The wildlife agencies will consider floristic surveys acceptable even

> if they do not include every non-covered species found in the survey area." (Emphasis added)

For PTHP-related management activities, if one of these 44 species is documented, CAL FIRE would consult with CDFG in a project-specific review to ensure that operations are conducted to meet the CEQA (14 CCR §15380[d]) and CFPR (14 CCR §919.4) standards, and therefore potential effects would be avoided or minimized. However, a non-covered plant species of concern may go undetected, resulting in the potential for loss of a population or part of a population, or degradation of habitat for a species.

When conducting activities other than those associated with a PTHP or maintenance of an existing road (activities for which CESA exempts take restrictions), measures to avoid impacts on non-covered but CESA-listed species would be developed with CDFG. For federally listed plant species, there is no prohibition of take on private lands when the action incidentally taking the plants is otherwise legal (including state laws). However, a non-covered plant species of concern may go undetected. Given the lack of survey and mitigation protocols for all non-covered species under Alternative C for all activities, loss of a population or part of a population, or degradation of habitat could occur. Therefore, under Alternative C, for both PTHP-related and non-PTHP activities, there would be **potentially significant effects** on all non-covered species of concern due to loss of a population or part of a population, or degradation of habitat.

With implementation of **Mitigation Measure 3.5-1** (Adopt the CDFG survey protocol and guidance for all covered activities, and for non-PTHP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all plant species of concern), there would be **less than significant effects** on all plant species of concern under Alternative C.

Table 3.5-19. Effects on plant species of concern in California Wildlife Habitat Relationships timber habitat types within the assessment areas under Alternative C.

Scientific name	Federal status	State status	California rare plant rank status[a]	Management strategy	Potential effects
Pleuropogon hooverianus	None	Threatened	1B.1	*All activities*: Covered; Management Strategy 1 assigned.	*All activities*: **Less than significant effects**.
Astragalus agnicidus	None	Endangered	1B.1	*All activities*: Covered; species-specific management strategy assigned.	*All activities*: **Less than significant effects**.
Arabis mcdonaldiana	Endangered	Endangered	1B.1	*All activities*: Not covered, may go undetected during surveys.	*All activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Eriogonum kelloggii	Candidate	Endangered	1B.2		
Calamagrostis foliosa	None	Rare	4.2		
Silene campanulata ssp. *campanulata*	None	Endangered	4.2		
Sedum laxum ssp. *eastwoodiae*	Candidate	None	1B.2	*All activities*: Not covered, may go undetected during surveys.	*All activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Arctostaphylos canescens ssp. *sonomensis*	None	None	1B.2	*All activities*: Not covered, may go undetected during surveys.	*All activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Arctostaphylos stanfordiana ssp. *raichei*	None	None	1B.1		
Kopsiopsis hookeri [*Boschniakia hookeri* in Hickman 1993]	None	None	2.3		

Scientific name	Federal status	State status	California rare plant rank status[a]	Management strategy	Potential effects
Calystegia purpurata ssp. *saxicola*	None	None	1B.2	*All activities*: Not covered, may go undetected during surveys.	*All activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Campanula californica	None	None	1B.2		
Cardamine pachystigma var. *dissectifolia*	None	None	3		
Carex lenticularis var. *limnophila*	None	None	2.2		
Carex californica	None	None	2.3		
Carex comosa	None	None	2.1		
Carex viridula var. *viridula*	None	None	2.3		
Coptis laciniata	None	None	2.2		
Didymodon norrisii	None	None	2.2		
Erigeron biolettii	None	None	3		
Erythronium revolutum	None	None	2.2		
Fissidens pauperculus	None	None	1B.2		
Gentiana setigera	None	None	1B.2		
Glyceria grandis	None	None	2.3		
Horkelia bolanderi	None	None	1B.2		
Horkelia tenuiloba	None	None	1B.2		
Lathyrus palustris	None	None	2.2		
Lilium maritimum	None	None	1B.1		
Lupinus sericatus	None	None	1B.2		
Lycopodium clavatum	None	None	4.1		
Montia howellii	None	None	2.2		
Microseris borealis	None	None	2.1		
Mitella caulescens	None	None	4.2		
Piperia candida	None	None	1B.2		
Monardella villosa ssp. *globosa*	None	None	1B.2		
Navarretia leucocephala ssp. *bakeri*	None	None	1B.1		
Oenothera wolfii	None	None	1B.1		
Packera bolanderi var. *bolanderi*	None	None	2.2		

Scientific name	Federal status	State status	California rare plant rank status[a]	Management strategy	Potential effects
Sanguisorba officinalis	None	None	2.2	*All activities*: Not covered, may go undetected during surveys.	*All activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species.
Sidalcea malachroides	None	None	4.2		
Sidalcea malviflora ssp. *purpurea*	None	None	1B.2		
Sidalcea malviflora ssp. *patula*	None	None	1B.2		
Thermopsis robusta	None	None	1B.2		
Trifolium buckwestiorum	None	None	1B.1		
Usnea longissima	None	None	None		
Viburnum ellipticum	None	None	2.3		

[a] Status codes:

California Rare Plant Rank
- 1A = plants presumed extinct in California
- 1B = plants rare, threatened, or endangered in California, and elsewhere
- 2 = plants rare, threatened, or endangered in California, but more common elsewhere
- 3 = plants about which we need more information, a review list
- 4 = plants of limited distribution, a watch list

California Rare Plant Threat Rank
- 0.1= Seriously threatened in California (high degree/immediacy of threat)
- 0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
- 0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

[b] For a description of the four management categories plus the species-specific management strategies for the species indicated above, see MRC 2012, Chapter 11.

3.5.2.7 Comparison of alternatives

Effects on California Natural Diversity Database Special Community Types and Habitat Elements

Table 3.5-20 summarizes potential effects on California Natural Diversity Database Special Community Types under the Proposed Action and each alternative. For all alternatives, there would be less than significant effects on California Natural Diversity Database Special Community Types located only in the secondary assessment area because if, in the future, MRC acquires land in the secondary assessment area with one of these plant communities, MRC would not implement forest management activities on these community types; there are conservation measures in the HCP/NCCP that apply for wetlands (i.e., no construction, retain and protect non-commercial vegetation, protect soil to the maximum extent possible) and old-growth habitat (Section 3.6.2, Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation). For Northern Coastal Salt Marsh located in the primary assessment area, there are protection measures for Class I watercourses and wetlands under each alternative that would apply. Therefore, all alternatives would have less than significant effects on this plant community. Additionally, under the Proposed Action, Alternative A, and Alternative C, there would be protection measures for Mendocino Pygmy Cypress Forest (i.e., management is limited to existing infrastructure, a maximum of 5% of the total acreage can be impacted by new roads, and historical roads would be decommissioned and revegetated); therefore there would be less than significant effects on this plant community under these alternatives. However, under the No Action alternative and under Alternative B, outside of the reserves, there is no management strategy defined under the CFPRs for Mendocino Pygmy Cypress Forest; therefore, there would be potentially significant effects on this plant community under these alternatives due to the removal of vegetation or the alteration of local habitat conditions.

Table 3.5-21 summarizes potential effects on Habitat Elements under the Proposed Action and each alternative. For wetlands located in the primary assessment area, there are management strategies (i.e., buffers around wetland and special protections within those buffers) under each alternative that would apply. Therefore, there would be less than significant effects on these plant communities for all alternatives. Similarly, there are measures for protection of hardwoods under all but Alternative B outside of the reserves, where CFPR measures apply but don’t protect hardwoods and in general promote their conversion. Therefore, under the No Action alternative, the Proposed Action, Alternative A, and Alternative C, there would be less than significant effects on hardwood communities. Under Alternative B, however, there would be potentially significant effects due to the removal of vegetation or the alteration of local habitat conditions. Potential effects on old-growth forest are discussed in Section 3.6.2 (Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation).

Table 3.5-20. Comparison of alternatives for California Natural Diversity Database Special Community Types.

<table>
<tr><th>California Natural Diversity Database Special Community Types</th><th>No Action</th><th>Proposed Action</th><th>Alternative A</th><th>Alternative B</th><th>Alternative C</th></tr>
<tr><td>Grand Fir Forest</td><td>No effect.</td><td>No effect.</td><td>No effect.</td><td>No effect.</td><td>No effect.</td></tr>
<tr><td>Mendocino Pygmy Cypress Forest</td><td>Potentially significant effects due to the removal of vegetation or the alteration of local habitat conditions.</td><td>Less than significant effects.</td><td>Less than significant effects.</td><td>Within the reserves: No effects. Outside of the reserves: Potentially significant effects due to the removal of vegetation or habitat degradation.</td><td>Less than significant effects.</td></tr>
<tr><td>Upland Douglas-Fir Forest</td><td rowspan="6">No effect.</td><td rowspan="6">No effect.</td><td rowspan="6">No effect.</td><td rowspan="6">No effect.</td><td rowspan="6">No effect.</td></tr>
<tr><td>Northern Coastal Bluff Scrub</td></tr>
<tr><td>Coastal and Valley Freshwater Marsh</td></tr>
<tr><td>Coastal Brackish Marsh</td></tr>
<tr><td>Coastal Terrace Prairie</td></tr>
<tr><td>Fen</td></tr>
<tr><td>Northern Coastal Salt Marsh</td><td>Less than significant effects.</td><td>Less than significant effects.</td><td>Less than significant effects.</td><td>Less than significant effects.</td><td>Less than significant effects.</td></tr>
<tr><td>Sphagnum Bog</td><td>No effect.</td><td>No effect.</td><td>No effect.</td><td>No effect.</td><td>No effect.</td></tr>
</table>

Table 3.5-21. Comparison of alternatives for Habitat Elements.

Habitat elements	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Hardwoods	**Less than significant effects**.	**Less than significant effects**.	**Less than significant effects**.	*Within the reserves*: **No effect**s. *Outside of the reserves*: **Potentially significant effects** due to the removal of vegetation or habitat degradation.	**Less than significant effects**.
Wetlands	**Less than significant effects**.	**Less than significant effects**.	**Less than significant effects**.	**Less than significant effects**.	**Less than significant effects**.

Effects on plant species of concern

Table 3.5-22 summarizes potential effects on the 46 plant species of concern with the potential to occur in California Wildlife Habitat Relationships timber habitat types under each alternative. For all alternatives, protections provided to each of these 46 species are dependent on MRC's conservation and management measures (under the HCP, NCCP, or both), the species' listing status, and the type of activity being conducted. There are potential effects under all alternatives. Under the No Action and Alternative B, outside of the reserves, there are potentially significant effects on all plant species of concern in California Wildlife Habitat Relationships timber-related habitat types, regardless of listing status (i.e., federally or state-listed versus California Rare Plant Rank) when non-THP activities (i.e., forest management activities not subject to the CFPRs) are conducted, given the lack of both survey protocols and/or mitigation measures. Under the Proposed Action, Alternative A, and Alterative C, there are potentially significant effects on all non-covered species of concern in California Wildlife Habitat Relationships timber-related habitat types (i.e., 25 for the Proposed Action and Alternative A, and 44 for Alternative C) regardless of management action given the lack of survey and mitigation protocols for non-covered species. Additionally, under the No Action and Alternative B, outside of the reserves there are potentially significant effects on all species of concern that potentially occur only in non-timber California Wildlife Habitat Relationships habitat types given the lack of both survey protocols and/or mitigation measures. Finally, under the Proposed Action, Alternative A, and Alterative C there are potentially significant effects on all species of concern that potentially occur only in non-timber California Wildlife Habitat Relationships habitat types given the lack of survey and mitigation protocols for non-covered species.

Effects of post-fire timber salvage under Alternative C would be the same as under the Proposed Action for the first 40 years, with measures that would provide additional protections for plant species of concern in burned areas and reduced potential for effects on plant species of concern compared with existing conditions and the No Action alternative.

Table 3.5-22. Comparison of alternatives for plant species of concern.

Scientific name	Federal status	State status	California rare plant rank status[a]	Covered for any Alternative?[b]	No Action	Proposed Action	Alternative A	Alternative B, *outside of the reserves.*	Alternative C
Arctostaphylos canescens ssp. *sonomensis*	None	None	1B.1	No	*THP-related activities*: **Less than significant effects**. *Non-THP activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of lack of survey and mitigation protocols.	*All activities:* **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of lack of survey protocols.	*All activities:* **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of survey and protocols.	*THP-related activities*: **Less than significant effects**. *Non-THP activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of survey and mitigation protocols.	*All activities:* **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of survey and protocols.
Arctostaphylos stanfordiana ssp. *raichei*	None	None	1B.2	No					
Calystegia purpurata ssp. *saxicola*	None	None	3	No					
Cardamine pachystigma var. *dissectifolia*	None	None	2.2	No					
Carex lenticularis var. *limnophila*	None	None	2.2	No					
Didymodon norrisii	None	None	1B.2	No					
Fissidens pauperculus	None	None	1B.2	No					
Gentiana setigera	None	None	2.3	No					
Glyceria grandis	None	None	1B.2	No					
Horkelia bolanderi	None	None	2.2	No					
Lathyrus palustris	None	None	1B.2	No					
Lupinus sericatus	None	None	2.1	No					
Microseris borealis	None	None	4.2	No					
Mitella caulescens	None	None	1B.2	No					
Monardella villosa ssp. *globosa*	None	None	2.2	No					
Montia howellii	None	None	1B.1	No					
Navarretia leucocephala ssp. *bakeri*	None	None	1B.1	No					
Oenothera wolfii	None	None	1B.2	No					
Sidalcea malviflora ssp. *purpurea*	None	None	1B.2	No					
Thermopsis robusta	None	None	2.3	No					

Scientific name	Federal status	State status	California rare plant rank status[a]	Covered for any Alternative?[b]	No Action	Proposed Action	Alternative A	Alternative B, *outside of the reserves.*	Alternative C
Kopsiopsis hookeri [*Boschniakia hookeri* in Hickman 1993]	None	None	2.3	Yes (P, A)	*THP-related activities*: **Less than significant effects**. *Non-THP activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey and mitigation protocols.	*All activities*: **Less than significant effects**.	*All activities*: **Less than significant effects**.	*THP-related activities*: **Less than significant effects**. *Non-THP activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey and mitigation protocols.	*All activities:* **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey protocols.
Campanula californica	None	None	2.1	Yes (P, A)					
Carex californica	None	None	2.3	Yes (P, A)					
Carex comosa	None	None	2.2	Yes (P, A)					
Carex viridula var. *viridula*	None	None	3	Yes (P, A)					
Coptis laciniata	None	None	2.2	Yes (P, A)					
Erigeron biolettii	None	None	1B.2	Yes (P, A)					
Erythronium revolutum	None	None	1B.1	Yes (P, A)					
Horkelia tenuiloba	None	None	4.1	Yes (P, A)					
Lilium maritimum	None	None	2.2	Yes (P, A)					
Lycopodium clavatum	None	None	1B.2	Yes (P, A)					
Packera bolanderi var. *bolanderi*	None	None	2.2	Yes (P, A)					
Piperia candida	None	None	4.2	Yes (P, A)					
Sanguisorba officinalis	None	None	1B.2	Yes (P, A)					
Sidalcea malachroides	None	None	1B.1	Yes (P, A)					
Sidalcea malviflora ssp. *patula*	None	None	None	Yes (P, A)					
Trifolium buckwestiorum	None	None	2.3	Yes (P, A)					
Usnea longissima	None	None	None	Yes (P, A)					
Viburnum ellipticum	None	None	2.3	Yes (P, A)					

<table>
<tr><th>Scientific name</th><th>Federal status</th><th>State status</th><th>California rare plant rank status[a]</th><th>Covered for any Alternative?[b]</th><th>No Action</th><th>Proposed Action</th><th>Alternative A</th><th>Alternative B, outside of the reserves.</th><th>Alternative C</th></tr>
<tr><td>Astragalus agnicidus</td><td>None</td><td>Endangered</td><td>1B.1</td><td>Yes (P, A, C)</td><td rowspan="2">THP-related activities: Less than significant effects.

Non-THP activities: Potentially significant effects due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey protocols.</td><td rowspan="2">All activities: Less than significant effects.</td><td rowspan="2">All activities: Less than significant effects.</td><td rowspan="2">THP-related activities: Less than significant effects.

Non-THP activities: Potentially significant effects due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey protocols.</td><td rowspan="2">All activities: Less than significant effects.</td></tr>
<tr><td>Pleuropogon hooverianus</td><td>None</td><td>Threatened</td><td>1B.1</td><td>Yes (P, A, C)</td></tr>
</table>

Scientific name	**Federal status**	**State status**	**California rare plant rank status**[a]	**Covered for any Alternative?**[b]	**No Action**	**Proposed Action**	**Alternative A**	**Alternative B, *outside of the reserves.***	**Alternative C**
Sedum laxum ssp. *eastwoodiae*	Candidate	None	1B.2	No	*THP-related activities*: **Less than significant effects**. *Non-THP activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey and mitigation protocols.	*All activities:* **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey protocols.	*All activities:* **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey protocols.	*THP-related activities*: **Less than significant effects**. *Non-THP activities*: **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey and mitigation protocols.	*All activities:* **Potentially significant effects** due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey protocols.

<table>
<tr><th>Scientific name</th><th>Federal status</th><th>State status</th><th>California rare plant rank status[a]</th><th>Covered for any Alternative?[b]</th><th>No Action</th><th>Proposed Action</th><th>Alternative A</th><th>Alternative B, outside of the reserves.</th><th>Alternative C</th></tr>
<tr><td>Arabis mcdonaldiana</td><td>Endangered</td><td>Endangered</td><td>1B.1</td><td>No</td><td rowspan="4">THP-related activities: Less than significant effects.

Non-THP activities: Potentially significant effects due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey protocols.</td><td rowspan="4">All activities: Potentially significant effects due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey protocols.</td><td rowspan="4">All activities: Potentially significant effects due to loss of a population or part of a population, or degradation of habitat for a species as a result of a lack of survey protocols.</td><td rowspan="4">THP-related activities: Less than significant effects.

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<tr><td>Calamagrostis foliosa</td><td>None</td><td>Rare</td><td>4.2</td><td>No</td></tr>
<tr><td>Eriogonum kelloggii</td><td>Candidate</td><td>Endangered</td><td>1B.2</td><td>No</td></tr>
<tr><td>Silene campanulata ssp. campanulata</td><td>None</td><td>Endangered</td><td>4.2</td><td>No</td></tr>
</table>

[a] Status codes:

California Rare Plant Rank
1A = plants presumed extinct in California
1B = plants rare, threatened, or endangered in California, and elsewhere
2 = plants rare, threatened, or endangered in California, but more common elsewhere
3 = plants about which we need more information, a review list
4 = plants of limited distribution, a watch list

California Rare Plant Threat Rank
0.1= Seriously threatened in California (high degree/immediacy of threat)
0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

[b] P = Proposed Action; A = Alternative A; C = Alternative C

3.5.3 PTEIR alternate standard analysis for the Proposed Action, Alternative A, and Alternative C

In its TMP (Appendix A) and HCP/NCCP, MRC has proposed alternate standards to the current (2012) CFPRs, which would be implemented and included in PTHPs prepared under the Proposed Action, Alternative A, or Alternative C. Alternate standards are not proposed for the No Action alternative because no TMP, HCP, or NCCP would be implemented. Likewise, alternate standards are not proposed for Alternative B because no TMP or NCCP would be implemented. The 2012 CFPRs (14 CCR §1092[b]) authorize CAL FIRE to accept alternate standards in a PTHP where it has been demonstrated in a PTEIR that the alternate standard provides resource protections that are equal to or better than the standard operational rule and its implementation would have a less than significant impact on the environment. Also, where future changes in the CFPRs occur, the current operational standards (2012 CFPRs) may be accepted by CAL FIRE as alternate standards where the PTEIR has similarly demonstrated a less than significant impact.

The proposed alternate standards were reviewed by the lead agencies to determine the resource area(s) to which they apply (see Attachment D to Appendix A). For each alternate standard that applies to Vegetation and Plant Species of Concern, the analysis in Sections 3.5.2.3, 3.5.2.4, and 3.5.2.6 and the cumulative effects analysis in Sections 4.5.2, 4.5.3, and 4.5.5 demonstrates that its implementation as part of the Proposed Action, Alternative A, or Alternative C would provide equal or better protection to Vegetation and Plant Species of Concern than the 2012 CFPR standard and its implementation would either (1) not result in adverse environmental impacts or (2) result in impacts that are below the level of significant effect on the environment. This analysis considered the effects of implementing the proposed alternate standards as part of a suite of management and conservation measures contained in the HCP, NCCP, and TMP.

The following are the CFPRs for which alternate standards (or current operational standards, which due to a rule change could become an alternate standard) have been proposed by MRC in its TMP (Appendix A) and/or its HCP/NCCP and are applicable to Vegetation and Plant Species of Concern:

913.1(a)(2)(E), 913.4(a), 913.6(b)(4), 913.6(e)(1), 914.2(d), 915.2(a), 915.3(b-c), 915.4, 916.3(d), 916.3(e), and 919.4.

The EIS/PTEIR analysis demonstrates that these alternate standards would provide equal or better protection to Vegetation and Plant Species of Concern than the 2012 CFPR standard. Implementation of these alternate standards, with implementation of associated mitigation measures for potentially significant impacts, would have a less than significant impact and would not contribute to cumulative effects on Vegetation and Plant Species of Concern, and may be proposed in PTHPs by MRC and approved by CAL FIRE (14 CCR §1092[c]).

A complete list of MRC's proposed alternate standards is included in the TMP (Appendix A) as Attachment D. Attachment D of the TMP also includes a reference to the location of each alternate standard in the TMP and/or HCP/NCCP, and the CFPR standard (rule) it would replace.

3.6 Terrestrial Habitat and Wildlife Species of Concern

This section describes the terrestrial habitat and associated wildlife within the assessment area, as well as the effects of implementation of the alternatives on wildlife species of concern. The terrestrial habitat and wildlife species of concern assessment area is broken down into the primary assessment area and the secondary assessment area, and occasionally organized by inventory block (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1).

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is of a similar forest type, geology, climate, and hydrology and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects in the secondary assessment area are therefore expected to be similar to those in the primary assessment area.

3.6.1 Affected environment/Environmental setting

Information on the terrestrial habitat and wildlife species in the assessment area was obtained from several sources representing the best and most recent data available. Information is largely derived from surveys conducted on MRC property by MRC and the previous landowner (Louisiana-Pacific Corporation), statewide databases, and scientific literature. Primary data sources include:

- MRC's HCP/NCCP (2012).
- California Wildlife Habitat Relationships System database (version 8.2) (CDFG and CIWTG 2008).
- CDFG's California Natural Diversity Database (CDFG 2009a).
- CDFG's Special Animals List, January 2011 (CDFG 2011a).
- USFWS's online services species list (data accessed on 27 August 2009) (http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SpAnimals.pdf).

The following sections summarize: (1) the existing terrestrial habitat conditions in the assessment area; and (2) the wildlife species of concern that occur or potentially occur in the assessment area.

3.6.1.1 Terrestrial habitat conditions

California Wildlife Habitat Relationships habitat types

The description of the terrestrial habitat types in the affected environment and effects analysis is presented using the California Wildlife Habitat Relationships system (Mayer and Laudenslayer 2005, CDFG and CIWTG 2008), as described above in Section 3.5.1 (Vegetation and Plant Species of Concern, Affected environment/Environmental Setting). The California Wildlife Habitat Relationships classification has been developed to support a wildlife habitat information system and predictive model of wildlife habitat distribution. Since many wildlife species respond strongly to structural aspects of vegetation, the California Wildlife Habitat Relationships classification is based on vegetation structure and canopy closure as well as dominant plant species. This model enables a coarse assessment of effects and comparisons among alternatives. A central assumption of the California Wildlife Habitat Relationships system is that a wildlife species' presence is largely dictated by these habitat attributes. Its use must include acknowledgement that even though it may be a useful tool, the assumptions of this model do not always hold true for individual species and sites (Section 3.6.2.1). The relationship of the California Wildlife Habitat Relationships habitat types to the MRC vegetation types is described in Appendix L. A description of each California Wildlife Habitat Relationships habitat type, including dominant plant species, vegetation structure, and canopy closure can be found in Section 3.5.1 (Vegetation and Plant Species of Concern, Affected environment/Environmental Setting).

The following are the California Wildlife Habitat Relationships habitat types found within the primary assessment area and examples of wildlife species typically associated with each.

Tree-dominated habitats

- ***Redwood and Douglas-fir*** forests provide habitat for many wildlife species, including several special-status species such as red-legged frog (*Rana aurora*/*Rana draytonii*), osprey (*Pandion haliaetus*), marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis*), ringtail (*Bassariscus astutus*), and Pacific fisher (*Martes pennanti pacifica*). Other amphibian and reptiles species associated with this habitat include the Pacific giant salamander (*Dicamptodon tenebrosus*), tailed frog (*Ascaphus truei*), and northwestern garter snake (*Thamnophis ordinoides*). Bird species that may utilize redwood and Douglas-fir habitats include Vaux's swift (*Chaetura vauxi*), olive-sided flycatcher (*Contopus cooperi*), brown creeper (*Certhia americana*), golden-crowned kinglet (*Regulus satrapa*), black-throated gray warbler (*Dendroica nigerscens*), hermit warbler (*Dendroica occidentalis*), MacGillivray's warbler (*Oporornis tolmiei*), western tanager (*Piranga ludoviciana*), and dark-eyed junco (*Junco hyemalias*). The dusky-footed woodrat (*Neotoma fuscipes*), an important mammalian prey species for northern spotted owl, may also be found in redwood and Douglas-fir habitats. The majority of the primary assessment area is redwood and Douglas-fir. For the purposes of modeling alternatives, the Douglas-fir California Wildlife Habitat Relationships habitat type is combined with the Redwood California Wildlife Habitat Relationships habitat type and referred to as the Redwood California Wildlife Habitat Relationships habitat type, since redwood stocking tends to exceed that of Douglas-fir in the majority of stands (refer to Section 3.5.1, Vegetation and Plant Species of Concern, Affected environment/Environmental Setting, for further detail).
- ***Closed-cone Pine-Cypress*** habitats provide feeding and cover habitat for a variety of game and non-game species, including squirrels (*Spermophilus* spp.) and band-tailed pigeons (*Columba fasciata*). Closed-cone pine-cypress areas are not considered important breeding habitat for many species, although red-tailed hawk (*Buteo jamaicensis*) and great horned owl (*Bubo virginianus*) are known to nest in closed-cone pine-cypress forests (Mayer and Laudenslayer 1988).
- ***Montane Hardwood-Conifer and Montane Hardwood*** forests provide habitat for a high diversity of amphibians, reptiles, birds, and mammals (Mayer and Laudenslayer 1988). Various amphibians and reptiles can be found on the forest floor, such as ensatina (*Ensatina eschscholtzi*), black salamander (*Aneides flavipunctatus flavipunctatus*), sagebrush lizard (*Sceloporus graciosus*), rubber boa (*Charina bottae*), and California kingsnake (*Lampropeltis getula*). Many amphibians rely on the moist detritus layer for cover. Of particular importance to wildlife, especially birds, are hardwood snags, cavities, and acorns. Bird species that depend on cavities for nesting include western screech owl (*Otis kennicotti*), northern flicker (*Colaptes auratus*), various woodpeckers, violet-green swallow (*Tachycienta thalassina*), and purple martin (*Progne subis*). California quail (*Callipepla californica*) often nests adjacent to down logs. Disseminators and/or consumers of acorns include band-tailed pigeon (*Patagioenas fasciata*), mountain quail (*Oreortyx pictus*), Steller's jay (*Cyanocitta stelleri*), and western scrub jay (*Aphelocoma californica*). The dusky-footed woodrat, a primary prey species of the northern spotted owl, occurs in these areas. Other mammals that may be found in montane hardwood and montane hardwood-conifer forests include those that feed on acorns, such as black bear (*Ursus americanus*),

mule deer (*Odocoileus hemionus*), and western gray squirrel (*Sciurus griseus*). Rare and sensitive mammal species that may rely on hardwoods as cover include the pallid bat (*Antrozous pallidus*) and western red bat (*Lasiurus blossevillii*).

- ***Coastal Oak Woodland and Blue Oak Woodland*** may have a highly variable overstory and understory and therefore provide suitable habitat for a variety of species. Oak woodland areas are important breeding areas for numerous bird species and an important acorn food source for California and mountain quail, the introduced wild turkey (*Meleagris gallopavo*), squirrels, and mule deer (Mayer and Laudenslayer 1988).
- ***Montane Riparian*** habitats are transitional areas between aquatic and upland zones. In coniferous forests, the diverse vegetation structure and composition of riparian zones provide a mosaic of habitats and edges in a small area, making them a source of habitat diversity (Thomas et al. 1979) that supports high wildlife species diversity. Riparian zones provide important resources to both obligate riparian species and upland wildlife species, such as the American dipper (*Cinclus mexicanus*), yellow warbler (*Dendroica petechia*), grey fox (*Urocyon cinereoargenteus*), Point Arena mountain beaver (*Aplodontia rufa nigra*), and California vole (*Microtus californicus*). The Montane Riparian California Wildlife Habitat Relationships habitat type is discussed in Section 3.5.1 (Vegetation and Plant Species of Concern, Affected environment/Environmental Setting), and a discussion of riparian and aquatic habitats is found in Section 3.4 (Aquatic and Riparian Habitats and Species of Concern).

Shrub-dominated habitats

- ***Mixed Chaparral*** meet the habitat needs of a wide variety of wildlife, providing critical summer foraging and fawning areas for mule deer, and a food source for brush rabbits (*Sylvilagus bachmani*) (twigs, evergreen leaves, and bark from chaparral) (Mayer and Laudenslayer 1988). Shrubs provide shade during hot weather and cover from predators. These habitats provide food sources for birds (seeds, fruits, and insects) as well as roosting, nesting, and/or singing sites for species such as the California quail, wrentit (*Chamaea fasciata*), California thrasher (*Toxostoma redivivum*), and spotted towhee (*Pipilo maculatus*). This habitat type is not covered under MRC's HCP/NCCP.

Herbaceous-dominated habitats

- ***Annual Grassland*** provides important foraging areas for raptors such as prairie falcon (*Falco mexicanus*) and American kestrel (*Falco sparverius*). Breeding wildlife typically associated with grassland and meadow areas include the common garter snake (*Thamnophis sirtalis*), western fence lizard (*Sceloporus occidentalis*), burrowing owl (*Athene cunicularia*), short-eared owl (*Asio flammeus*), and western meadowlark (*Sturnella neglecta*) (Verner and Boss 1980, Basey and Sinclear 1980; both as cited in Mayer and Laudenslayer 1988). This habitat type is not covered under MRC's HCP/NCCP.
- ***Fresh Emergent Wetland, Wet Meadow,* and *Lacustrine*** areas are freshwater habitats that can provide foraging and breeding habitat for a large variety of wildlife. Special-status wildlife species that may use fresh emergent wetland, wet meadow and/or lacustrine habitats for breeding, foraging, and/or cover include red-legged frog, Pacific pond turtle, bald eagle (*Haliaeetus leucocephalus*), and peregrine falcon (*Falco peregrinus anatum*). These areas provide limited habitat for small mammals, and larger mammals such as mule deer may feed on the forbs and palatable grasses. Red-wing blackbirds (*Agelaius phoeniceus*) may nest in the tall vegetation where there is adequate water to protect the nests from terrestrial predators. Examples of other wildlife species that use wet meadow and lacustrine habitats include rough-skinned newt (*Taricha granulosa*), garter snakes, great blue heron (*Ardea*

herodias), great egret (*Ardea alba*), ducks, swallows, and American beaver (*Castor canadensis*).

Succession and late-successional forests

Wildlife species have a unique set of habitat requirements based on their ecology and behavior, and each species is associated with one or more successional stages (often categorized as early-, mid-, and late-successional). Habitat generalists, whose populations are typically abundant, are able to use a range of successional stages, while habitat specialists have stricter habitat requirements and tend to be rarer. The relationship of successional stages to California Wildlife Habitat Relationships tree size classes and canopy closures can be found in a crosswalk table in Appendix L, Table L-5.

Late-successional forests are distinguished from earlier successional stages in several respects. In most cases, following stand-replacing disturbances, as trees grow through earlier successional stages they form a single crown canopy layer. They maintain this overall single canopy layer until competition, weather, insects, or disease cause mortality, resulting in gaps in the canopy. Over time, seedlings become established and grow in these gaps. This results in multiple canopy layers that include many large trees, some with broken tops and decaying wood, many large snags, and heavy accumulations of large logs on the forest floor. Stands may begin to exhibit signs of late succession as young as 40 years in some areas, but well over 100 years in others (Green 1985). Multi-storied stage, "true" old growth develops over the next 100 to 200 years, as the multiple canopies and abundant large snags become established, and large fallen trees become plentiful (USDA Forest Service and USDI BLM 1994).

These multi-canopied, structurally complex forests create important habitat for many plant and animal species. Species largely dependent on late-successional forests include marbled murrelets and northern goshawks, although the latter are uncommon in the redwood type. Tree-roosting bats, such as western red bat, may roost underneath the bark of large and old-growth trees. Large old-growth trees often have basal hollows used by Pacific fisher and maternity colonies of bats. Humboldt marten use mid- to late-successional conifer stands with complex physical structure near the ground (Buskirk and Powell 1994). The substantial reduction in this forest successional stage that has occurred throughout California and the Pacific Northwest is a concern due to its value as wildlife habitat, particularly for habitat specialists, coupled with the long time necessary for it to develop. Typically, forests managed for timber are harvested before late-successional stages develop.

Advanced-successional patch size and habitat connectivity

This EIS/PTEIR uses the term "advanced successional" in the context of the timber model and when analyzing the effects of the alternatives. This term generally refers to relatively older forest stands with larger trees and higher canopy closure than commonly grown under typical timber management schemes. Descriptions and analyses in this EIS/PTEIR correlate advanced-successional habitat with Calfornia Wildlife Habitat Relationships tree size class 5 (> 24 in [61 cm]) with dense canopy closure, tree size class 5 with moderate canopy closure and a dominant diameter of 32–40 in (81–102 cm), or tree size class 6 (defined as size class 5 over a distinct layer of size class 4 or 3 trees and a total tree canopy exceeding 60% closure)[34]. This term is not

[34] This EIS/PTEIR uses criteria for "advanced-successional" forest stands which are similar the CFPRs' characterization of "late successional" forest stands, which is "stands of dominant and predominant trees that meet the criteria of California Wildlife Habitat Relationships class 5M, 5D, or 6 with an open, moderate or dense canopy.

intended to necessarily equate to late-successional conditions, as there are likely fewer large trees and habitat elements (e.g., decadent trees, large snags, and heavy accumulations of large logs on the forest floor) than under more commonly accepted ecological definitions of late successional.

This EIS/PTEIR defines a "patch" of advanced-successional habitat as an aggregation of two or more advanced-successional stands that are adjacent to one another. It is important to consider scale when describing size and spatial distribution of advanced-successional patches. Section C(4)(f) of the Board of Forestry and Fire Protection's Technical Rule Addendum # 2 (CFPR 2012) states that "forests not previously harvested should be at least 80 ac (32 ha) in size to maintain the effects of edge." For this analysis, the agencies are using this value (80 ac [32 ha]) to represent a general minimum patch size of advanced-successional forest that minimizes the negative effects of edge.

Under existing conditions, there are an estimated 4,288 ac (1,735 ha) of advanced-successional habitat in the primary assessment area. Currently, most of the advanced-successional habitat in the primary assessment area consists of small (< 80 ac [32 ha]), highly fragmented patches. There are six patches of advanced-successional habitat in the primary assessment area that are greater than 80 ac (32 ha): two in the Albion, three in the Navarro West, and one in the South Coast inventory block (Table 3.6-1). The largest patch, located in the Albion inventory block, is 797 ac (323 ha) and is composed of both linear riparian and a few broader, upland stands. The remaining patches greater than 80 ac (32 ha) are between 86 and 211 ac (35 and 85 ha). Four patches greater than 80 ac (32 ha) are within 1 mi (1.6 km) of another patch, in the Albion and Navarro West inventory blocks (Figure 3.6-1). Movement and dispersal of wildlife is restricted to very few advanced-successional upland patches and riparian corridors in the Albion and Navarro West inventory blocks.

Table 3.6-1. Existing distribution of advanced-successional forest patches greater than or equal to 80 ac (32 ha) in the primary assessment area.

Inventory block	Patch size (ac)	Primarily composed of upland stands, riparian stands, or both?	Within 1 mi of another patch?
Albion	210	upland	yes
	797	both	yes
Navarro West	200	both	no
	86	riparian	yes
	86	riparian	yes
South Coast	116	upland	no

closure classification, often with multiple canopy layers, and are at least 20 acres in size. Functional characteristics of late succession forests under the CFPRs include large decadent trees, snags, and large down logs."

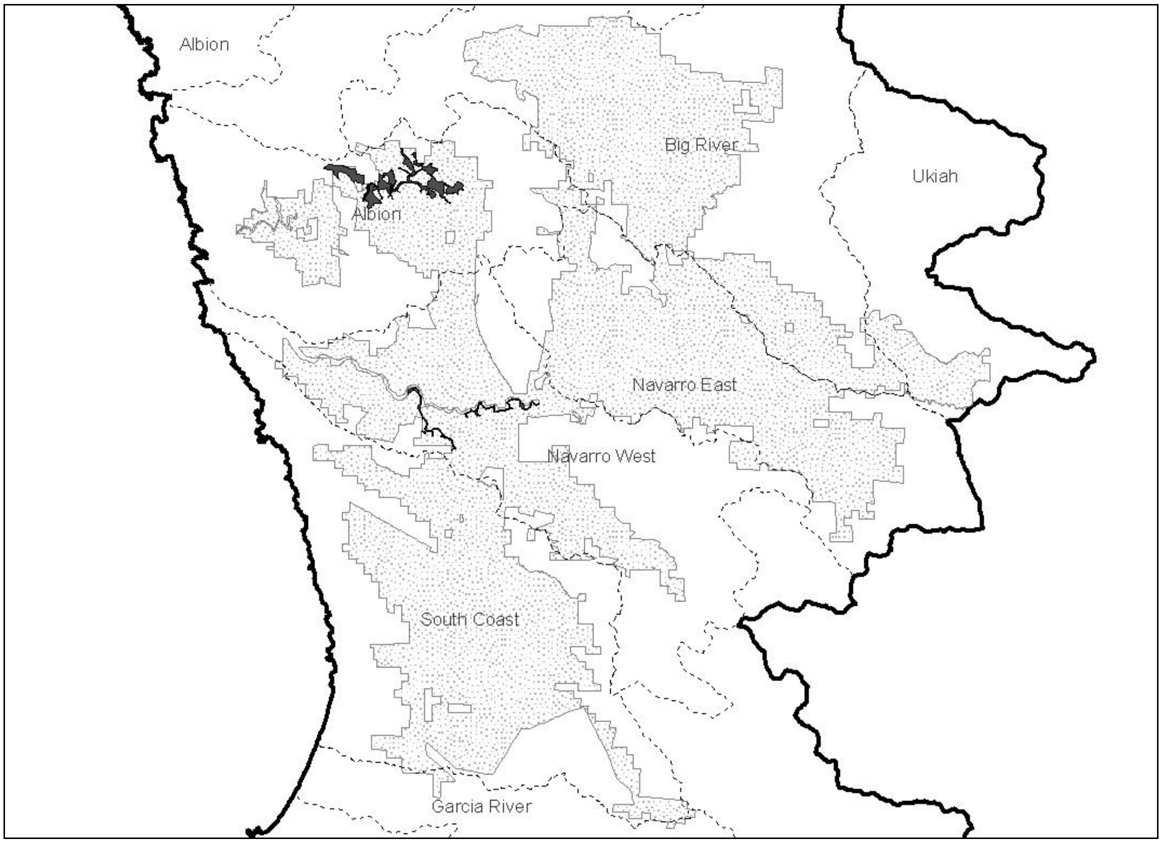


Figure 3.6-1. Existing distribution of advanced-successional forest patches greater than 80 ac (32 ha) and within 1 mi (1.6 km) of another patch in a subsection of the assessment area (advanced-successional patches are indicated in dark gray).

Important habitat and habitat elements

Although the California Wildlife Habitat Relationships system of classification encompasses several important attributes of wildlife habitat, it does not account well for some specific habitat elements that contribute to habitat quality for wildlife. Such elements include specific features benefitting wildlife (e.g., old-growth trees, snags, downed logs, or wildlife trees), vegetation components not reflected in the general cover type designation (e.g., a hardwood understory in a redwood cover type), or particular combinations of biotic and abiotic features that create a unique habitat condition (e.g., rocky outcrops). These important habitats and habitat elements are addressed below.

Old-growth trees and old-growth stands

Definitions of what constitutes "old-growth" trees and stands in coastal redwood and Douglas-fir forests vary. To define old-growth trees, some authors use tree diameter, while others use age (Green 1985). MRC's definition includes both defining an individual old-growth tree as being greater than 200[35] years old and:

[35] MRC uses an ecologically arbitrary age to help define old-growth trees. While not specifically focused on individual trees, the Forest Stewardship Council-United States generally describes "old growth" as "(1) the oldest seral stage in which a plant community is capable of existing on a site, given the frequency of natural disturbance events, or (2) a very old example of a stand dominated by long-lived early- or mid-seral species."

- greater than or equal to 48 in (122 cm) diameter at breast height for coastal redwood;
- greater than 36 in (91 cm) diameter at breast height for Douglas-fir;
- or, regardless of diameter at breast height, having old-growth characteristics specific to that species of tree;
- or, regardless of diameter at breast height or presence of old-growth characteristics, any tree that cannot be replaced in size or ecological function within 80–130 years (MRC 2012).

To define old-growth stands, MRC uses the Forest Stewardship Council-United States definition for Type I old-growth stands and a more conservative definition than Forest Stewardship Council-United States for Type II old-growth stands[36]. Type I is defined as "an un-harvested stand with at least 3 contiguous acres of old growth" (MRC 2012). Type II is defined as "a previously harvested stand of old growth on a minimum of 3 contiguous acres with an average of 6 old-growth trees per acre" (MRC 2012). MRC also has a third category, a "grouping of individual old-growth trees" defined as "a harvested old-growth patch less than 3 ac (1.2 ha) that is not a Type I or Type II old-growth stand" (MRC 2012).

While individual and groups of old-growth trees embedded in much younger forests are present, a very limited amount of old-growth forest occurs in the primary assessment area. Within the primary assessment area, there are an estimated 102 ac (41 ha) of Type I and 520 ac (210 ha) of Type II old growth in redwood and redwood/Douglas-fir forests, and an estimated 12,000 individual old-growth trees (Table 3.6-2, MRC 2012). Residual old-growth trees, occurring in small groups of less than six trees and not typical of the other trees in their stand, are scattered across the primary assessment area (MRC 2012). MRC tracks the size of Type I and Type II old-growth stands using aerial photos and on-site observation, and documents residual old-growth trees as they are encountered. MRC's HCP/NCCP discusses conservation measures for old-growth stands and individual old-growth trees.

[36] The Forest Stewardship Council-United States (2010) specifically defines old-growth stands as follows: Type I—three acres or more that have never been logged and that display old-growth characteristics; and Type II— 20 acres that have been logged, but which retain significant old-growth structure and functions.

Table 3.6-2. Type I and Type II old-growth forest in the primary assessment area inventory blocks.

Inventory block	Old growth (approximate gross[a] ac)		
	Type I	Type II	Total
Albion	–	7	7
Big River	72	241	312
Garcia River	–	12	12
Navarro East	–	–	–
Navarro West	–	26	26
Noyo	–	106	106
Rockport	–	–	–
South Coast	30	111	141
Ukiah	–	17	17
Total	**102**	**520**	**621**

[a] "Gross" acres includes roads.

Snags, logs, and wildlife trees

Snags are defined as standing dead trees. Logs (also known as downed logs, down wood, or downed woody debris) are defined as fallen dead trees. A wildlife tree is a standing tree (living or dead) that possesses unique characteristics providing valuable habitat for wildlife (e.g., cavities, basal hollows, granaries, decay, broken/forked tops, substantial decay, large spreading branches, etc.). Snags, logs, and wildlife trees provide denning, nesting, roosting, and foraging habitat for wildlife. Snags and logs are recognized as critical habitat elements for a wide array of forest-dwelling wildlife species, including salamanders, wood ducks, woodpeckers, swifts, swallows, Humboldt marten, fisher, and flying squirrels. Snags and decaying live trees can provide cavity nests, chimney roosts, platform nests, perches, food caches, foraging substrates, and nests or roosts beneath peeling bark. Similarly, logs can provide food and cover for a variety of species. The abundance and size distribution of snags and logs influence the presence and persistence of certain wildlife species. Snags are important in meeting the overall habitat needs of numerous wildlife species. Many special-status wildlife species occurring in the assessment area use snags or logs in fulfilling some life-stage requisite.

Target densities for snags in managed forests have been proposed by a number of authors using a number of methods. Zarnowitz and Manuwal (1985) recommended 3.6 snags per acre for cavity-nesting birds in western hemlock/Douglas-fir forests on the Olympic Peninsula of Washington. Mannan et al. (1980) recommended 4.3 snags per acre for breeding birds in Douglas-fir forests. Schrieber and DeCalesta (1992) recommended leaving 5.7 snags per acre for cavity-nesting birds in hemlock/cedar/Douglas-fir forests, and Hunter (1990) suggested 2 to 4 large snags per acre as an average target for an array of habitat conditions across North America. In the Sierra Nevada of California, Raphael and White (1984) found that the abundance of cavity-nesting birds increased with snag density to a maximum at 3 snags per acre. Based on a literature review, Richter (1993) recommended retaining 3 snags per acre following timber management activities in California to maintain wildlife habitat quality. While a commonly cited target for retaining logs for wildlife habitat is 2 large logs per acre (Thomas 1979, USDA Forest Service and USDI Bureau of Land Management 2001, Oregon Revised Statute 527.676 of the Oregon Forest Practices Act), more recent research has indicated guidelines based on many of the earlier assumptions yield substantially less dead wood—both snags and large down logs—than are needed to provide for fish and wildlife (Rose et al. 2001). It is difficult to apply target values across varying managed landscapes since they differ based on habitat type and structural conditions (Mellen-McLean et al. 2009).

MRC defines snags as dead standing trees ≥ 16 in (41 cm) diameter at breast height, and categorizes them as either “hard snags” or “soft snags.” A hard snag is “composed primarily of sound wood; its top is intact as well as some of its branches and most of its bark, although a redwood hard snag may actually lack considerable bark”; a soft snag is “composed of wood softened by weather, insects, and fungal rot; its top is typically missing, as well as its bark and branches” (MRC 2012). Since 2000, MRC tallies both types of snags within its inventory plots as part of the inventory process. MRC does not typically tally snags created through herbicide use; only those that have died by natural means. Though variation exists among inventory blocks, the existing density is estimated at less than 1 snag per acre for each inventory block (Table 3.6-3). The Cottaneva Creek watershed analysis unit had the highest estimated snag density (1.0 snags per acre) (Table 3.6-3). Overall in the primary assessment area, approximately two-thirds of the snags are conifer and the remaining one-third are hardwood (MRC 2012, Appendix O).

Table 3.6-3. Estimated density of snags in the primary assessment area watershed analysis units as of 2010.

Watershed analysis unit	Snag density (snags per acre)
Albion	0.4
Alder Creek/Schooner	0.3
Big River	0.3
Cottaneva Creek	1.0
Elk Creek	0.2
Garcia River	0.5
Greenwood Creek	0.3
Hollow Tree Creek	0.4
Navarro River	0.4
Noyo	0.3
Rockport Coastal	0.2
Upper Russian River	0.6

MRC also inventories logs as part of its routine inventory procedure. Within fixed-area plots (0.10 ac), logs are counted if they are ≥ 16 in (41 cm) average diameter and ≥ 6 ft (2 m) long. Logs are classified as redwood, other conifer, or hardwood. Based on MRC forest inventory data from 2004, the primary assessment area an average density of 7.5 logs per acre (Table 3.6-4). The Greenwood Creek Watershed Assesment Unit has the highest estimated density of downed wood at 9.3 logs per acre.

Table 3.6-4. Estimated density of logs in the primary assessment area watershed analysis units.

Watershed analysis unit [a]	Log density (logs per acre)			
	Redwood	Other conifer	Hardwood	Total
Albion River	5.0	1.7	0.3	7.1
Alder Creek	5.7	1.0	0.3	7.1
Big River	6.3	0.7	0.3	7.3
Cottaneva Creek	7.0	0.9	0.6	8.5

Watershed analysis unit [a]	Log density (logs per acre)			
	Redwood	Other conifer	Hardwood	Total
Elk Creek	7.0	0.9	0.6	8.5
Garcia River	5.8	1.9	0.8	8.0
Greenwood Creek	7.8	1.0	0.6	9.3
Hollow Tree Creek	6.7	0.6	0.4	7.7
Navarro River	7.5	1.0	0.5	9.0
Noyo River	4.8	0.4	0.2	5.4
Rockport Coastal	4.8	0.7	0.4	5.9
Upper Russian River	0.5	6.3	2.1	6.4
Total	**5.7**	**1.4**	**0.6**	**7.5**

[a] MRC collected log density data by watershed analysis unit (MRC 2012). Appendix F, Figures F-1 and F-2 allow for a visual comparison of watershed analysis units with inventory blocks.

Hardwoods stands and hardwoods within conifer stands

Hardwood stands and hardwood inclusions in predominantly coniferous stands provide important reproductive, cover, and foraging habitat for a variety of wildlife species (see Section 3.5.1 [Vegetation and Plant Species of Concern, Affected environment/Environmental Setting] for a description of hardwood stands and hardwoods within conifer stands, and Section 3.6.1.1 above for a discussion of wildlife-habitat relationships for Montane Hardwood-Conifer and Montane Hardwood). Although few species are entirely dependent on mixed coniferous forests (CDFG and CIWTG 2008), the presence of a hardwood component in conifer-dominated forests is particularly important for wildlife as it provides habitat diversity, food, and cover. While California Wildlife Habitat Relationships habitat types are named based on the dominant vegetation, they also include other sub-dominant vegetation including hardwoods. For example, the redwood-dominated California Wildlife Habitat Relationships habitat type includes a hardwood component.

Rocky outcrops

Rocky outcrops are sections of bedrock protruding from the soil. This EIS/PTEIR uses MRC's definition for rocky outcrops, delineated as any area (1) consisting entirely of rock that is at least 1 ac (0.4 ha) in size and not created by human activity or currently in use as a rock pit, or (2) as near-vertical rock faces 50 ft (15 m) or more in height and 100 ft (30 m) or more in length (MRC 2012). Throughout the primary assessment area, rocky outcrops occur as exposed and isolated areas of solid and partially decomposed rock in forested and non-forested vegetation and land cover types. These areas, which include rocky ridges, cliffs, and talus slopes, may have some sparse vegetation but are typically devoid of large trees due to dry, exposed, and rocky soils that are characteristic of this habitat element.

Although rocky outcrops represent only a small fraction of the landscape, their unique qualities provide nesting, roosting, and denning habitat for a variety of wildlife. Lizards and snakes commonly use rocky outcrops for cover, foraging, and thermoregulation. Bat species, including pallid bat and Townsend's western big-eared bat (*Corynorhinus townsendii*) often utilize rocky outcrops and cliffs for roosting. Cliffs and steep rocky outcrops are especially important as nesting sites for birds such as the American peregrine falcon, golden eagle (*Aquilo chrysaetos*), and cliff swallow (*Hirundo pyrrhonota*). Approximately 63 ac (20 ha) of rocky outcrop occur in the primary assessment area, predominantly in the Ukiah inventory block and in the coastal portion of the Rockport inventory block.

3.6.1.2 Terrestrial wildlife species of concern

For the purposes of this EIS/PTEIR, wildlife species of concern include species that are:

- Covered under the HCP/NCCP (MRC 2012);
- Listed as endangered or threatened under the federal ESA;
- Listed as endangered or threatened under the California ESA;
- Designated as a Species of Special Concern by CDFG (Williams 1986, Jennings and Hayes 1994, Bolster 1998, Shuford and Gardali 2008);
- Designated as Fully Protected by the California Fish and Game Code (Sections 3511, 4700, 5050, and 5515); and/or
- Considered 'sensitive species' by the California Board of Forestry under the CFPRs (14 CCR §895.1).

A variety of sources were searched to generate a list of terrestrial wildlife species with the potential to occur in the assessment area. Primary data sources include:

- California Natural Diversity Database (CDFG 2009a).
- California Wildlife Habitat Relationships (CDFG and CIWTG 2008).
- CDFG's Special Animals List, January 2011 (CDFG 2011a).
- Special-status species lists generated by USFWS (2009a).
- Surveys conducted by MRC in the primary assessment area.

The process used to search databases for information on wildlife species of concern, including the list of United States Geological Survey quadrangles that were included in the search area and the initial species' scoping list, is described in Appendix J.

Thirty-eight terrestrial wildlife species of concern[37] (terrestrial invertebrates, birds, and mammals) were identified from database queries and literature searches as having potential to occur in the assessment area (Appendices B and J). Five of these species were eliminated from further consideration, since the assessment area was outside of the species' range or no suitable habitat was present. Thirty-three terrestrial wildlife species of concern occur, or have the potential to occur, within the primary and/or secondary assessment areas. Distribution (including documented occurrences in or near the assessment area), legal status, life history, habitat associations, and potential threats are described in detail in Appendix B and summarized in the table in Appendix J.

Of the 33 identified terrestrial wildlife species of concern, the following three would be covered by a USFWS incidental take permit and CDFG take permit under the Proposed Action (which includes the HCP/NCCP):

- Marbled murrelet (*Brachyamphus marmoratus*)
- Northern spotted owl (*Strix occidentalis caurina*)

[37] Amphibians and reptiles, regarded as aquatic and riparian animal species of concern for the purpose of this EIS/PTEIR, are discussed separately in Section 3.4, Aquatic and Riparian Resources.

- Point Arena mountain beaver (*Aplodontia rufa nigra*)

Seventeen terrestrial wildlife species of concern that would not be covered under the HCP/NCCP have high or moderate potential to occur within at least one natural community type that is associated with forest management (timber harvest in addition to other forest management activities and components such as roads, skid trails, landings, etc.) in the primary assessment area, and are not covered under the HCP/NCCP. These species were also considered in evaluation of the alternatives:

- great blue heron (rookery) (*Ardea herodias*)
- great egret (rookery) (*Ardea alba*)
- osprey (*Pandion haliaetus*)
- white-tailed kite (*Elanus leucurus*)
- golden eagle (*Aquila chrysaetos*)
- bald eagle (*Haliaeetus leucocephalus*)
- northern goshawk (*Accipter gentilis*)
- American peregrine falcon (*Falco peregrinus anatum*)
- Vaux's swift (*Chaetura vauxi*)
- olive-sided flycatcher (*Contopus cooperi*)
- purple martin (*Progne subis*)
- pallid bat (*Antrozous pallidus*)
- Townsend’s western big-eared bat (*Corynorhinus townsendii*)
- California ringtail (*Bassariscus astutus raptor*)
- Humboldt marten (*Martes americana humboldtensis*)
- Pacific fisher (*Martes pennanti [pacifica]*) West Coast Distinct Population Segment
- Sonoma (=California red) tree vole (*Arborimus pomo [= longicaudus]*)

The remaining 13 terrestrial wildlife species of concern were identified as having either: (1) low potential to occur in the natural communities of the primary assessment area; (2) low or moderate potential to occur in natural communities that are only in the secondary assessment area (e.g., coastal terrace prairie, open grasslands); or (3) low or moderate potential to occur in natural communities of the primary assessment area that are minimally associated with forest management (timber harvest in addition to other forest management activities and components such as roads, landings, etc.) and very small in area (e.g., wet meadows, deciduous riparian areas). These species were not considered in the analysis of effects, but are described in Appendix B and summarized in a table in Appendix J.

- Behren’s silverspot butterfly (*Speyeria zerene behrensii*)
- lotis blue butterfly (*Lycaeides argyrognomon lotis*)
- northern harrier (*Circus cyaneus*)
- western snowy plover (*Charadrius alexandrinus nivosus*)
- long-eared owl (*Asio otus*)
- willow flycatcher (*Empidonax traillii*)
- yellow warbler (*Dendroica petechia*)
- yellow-breasted chat (*Icteria virens*)

- grasshopper sparrow (*Ammodramus savannarum*)
- Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*)
- tricolored blackbird (*Agelaius tricolor*)
- western red bat (*Lasiurus blossevillii*)
- American badger (*Taxidea taxus*)

If any of these species is included in a PTHP, potential effects would be analyzed and mitigation measures, if necessary, would be developed in consultation with the reviewing agencies. If CAL FIRE, in consultation with CDFG, determines that implementation of the PTHP could result in a potentially significant effect on a Species of Special Concern that was not adequately addressed in the EIS/PTEIR, and determines that there are feasible measures that would avoid or minimize the potentially significant impact, MRC would incorporate them into the PTHP to ensure that the impact is avoided or reduced to a less than significant level. See Appendix A (MRC's TMP) for additional detail on this process.

Below are brief summaries of the habitat associations, occurrence, and distribution of the three terrestrial wildlife species of concern that are covered under the proposed incidental take authorizations.

Marbled murrelet

Status and Distribution

Marbled murrelet is federally threatened, state-listed as endangered, and considered a sensitive species by the California Board of Forestry and Fire Protection. Marbled murrelet occurs along the Pacific Coast. The Alder Creek basin within the South Coast inventory block is the only portion of the primary assessment area with known marbled murrelet occupation, with three known occupied sites (MRC 2012). There was confirmed evidence of nesting marbled murrelets in this area; eggshell fragments were identified under an old-growth Douglas-fir near Alder Creek in 1993 (MRC 2012). There have been confirmed and possible radar detections of marbled murrelets in Navarro River, Greenwood Creek, Big River, and Albion River basins (which are encompassed by Albion, Navarro West, and South Coast inventory blocks), though follow-up surveys conducted by MRC in some of those areas have not resulted in any ground detections (MRC 2012). In the secondary assessment area, murrelets have been identified on Hawthorne Timberlands, Russian Gulch State Park, Admiral Standley State Recreation Area, Angelo Preserve, the Gualala River, and 1 km (0.6 mi) east of the town of Mendocino (MRC 2012).

Habitat

Marbled murrelets forage in coastal marine waters and nest inland. In California, nesting occurs in advanced-successional stands of conifers, typically within 10 km (6.5 mi) of the coast (Miller et al. 1995), while the farthest inland distance recorded in California was 29 km (18 mi) from the ocean (USFWS 1997). Nesting habitat is characterized by large trees, multiple canopy layers, and moderate to high canopy closure. Of particular importance are nesting platforms, typically branches with a diameter greater than 10 cm (4 in). Marbled murrelets nest in mossy depressions on limbs at heights of a minimum of 30 m (100 ft) (USFWS 1997) that are concealed by high overhead and horizontal canopy cover, and where the trunk can also contribute to nest concealment (Hamer and Nelson 1995).

Critical habitat

USFWS has not designated any part of the primary assessment area as critical habitat for the marbled murrelet. USFWS has designated areas within the secondary assessment area—including adjacent to the primary assessment area—as critical habitat. These areas include Jackson

Demonstration State Forest, Hendy Woods State Park, Montgomery Woods State Reserve, Mailliard State Reserve, and Bureau of Land Management lands east and north of Rockport inventory block. Critical habitat has been designated in zones where relatively large populations nest, as well as in areas of current low use.

Threats including predation by corvids

Threats to marbled murrelets include loss and fragmentation of nesting habitat due to timber harvesting, oil spills, gill netting, fluctuations in food supply due to El Niño, changes in sediment delivery to streams due to timber harvest practices, windthrow, natural fires, and additional human disturbances (Marshall 1988, Miller et al. 1995).

Corvid predation of marbled murrelet eggs and juveniles may be a contributing factor to lower nest success. This predatory behavior has been documented on two occasions: in the Santa Cruz Mountains (Singer et al. 1991) and Humboldt County, California (Hebert and Golightly 2007). It is also hypothesized that marbled murrelets may select the location of their nest based on a strategy to minimize predation risk. A study in the Oregon Coast Range identified an increase in murrelet predation near clearcuts, which may have been the result of increased berry-producing plants and consequently an increase in corvids (Ripple et al. 2003). This study also documented that nest sites were located in areas with low proportions of early successional stands, which may be associated with more cover for murrelets to avoid corvids. Corvids are well-adapted to the presence of humans, as an increase in corvid abundance has been associated with an increase in human land uses.

Recovery objectives

The following are the verbatim recovery objectives from the *Marbled Murrelet Recovery Plan* (USFWS 1997):

- *To stabilize and then increase population size, changing the current downward trend to an upward (improving) trend throughout the listed range,*
- *to provide conditions in the future that allow for a reasonable likelihood of continued existence of viable populations, and*
- *to gather the necessary information to develop specific delisting criteria.*

Northern spotted owl

Status and Distribution

Northern spotted owl is federally listed as threatened and considered a sensitive species by the California Board of Forestry and Fire Protection. Northern spotted owls breed from southwestern British Columbia along the coast to Marin County, California. They are considered an uncommon resident species in northwestern California (Harris 1993). MRC conducts yearly surveys for northern spotted owl, and initiated a yearly banding program in 2003. Northern spotted owls are found throughout the primary and secondary assessment areas. Between 1988 and 2007, MRC identified approximately 220 individual territories on or adjacent to MRC property. As of 2007, 214 northern spotted owl territories were determined to be active within the assessment area, 167 of which were either in the primary assessment area or within a 1,000-ft (305-m) buffer of the primary assessment area (MRC 2012).

Habitat

In California, northern spotted owls are typically associated with complex stands dominated by conifers, with hardwood understories (Pious 1994). Roosting sites are characterized by dense canopy cover dominated by large-diameter trees, multiple canopy layers, and north-facing slopes (Barrows 1981, Gutièrrez et al. 1995). Nests tend to be found in tree or snag cavities, on platforms (abandoned raptor or raven nests, squirrel nests, mistletoe brooms, or debris accumulations), or on broken-top snags. In coastal Mendocino County, the majority of nests occurred in coastal redwood trees (Pious 1995).

Primary prey items for northern spotted owls are mammals (Forsman et al. 1984), but birds and insects are also taken. The diet of northern spotted owls in coastal Mendocino County (and the redwood region in general) primarily consists of dusky-footed woodrats (*Neotoma fuscipes*) (Pious and Ambrose 1994). The relatively high northern spotted owl density in this region is likely associated with the presence and abundance of dusky-footed woodrats. Dusky-footed woodrats occur in a variety of habitats, including both older, structurally complex forests and earlier successional stages (Williams et al. 1992, Sakai and Noon 1993).

Critical habitat

USFWS has not designated any part of the primary assessment area as critical habitat for northern spotted owl; critical habitat does exist within the secondary assessment area, east of the Rockport and Navarro East inventory blocks. In 1992, USFWS designated 0.57 million ha (1.4 million ac) of critical habitat essential to the conservation of the northern spotted owl in 61 units in California, primarily occurring on U.S. Forest Service lands (USFWS 1992). A revision of northern spotted owl critical habitat was proposed 8 March 2012 (USFWS 2012) which includes proposed critical habitat in both the primary and secondary assessment areas.

Threats including predation by barred owl

Extensive loss and degradation of habitat, primarily due to clearcutting and even-aged tree management, has been commonly regarded as the principal threat to northern spotted owls (Gutièrrez et al. 1995). Recently, the barred owl (*Strix varia*) has been recognized as another significant threat as a result of competition with, displacement of, hybridization with, and possible direct mortality of northern spotted owls (USFWS 2008, Courtney et al. 2004). Prior to the mid-1900s, the historical range of the barred owl was confined to eastern North America. For at least the past 50 years, the barred owl has been expanding its range into southwestern Canada, the northern Rockies, and Pacific states where it has invaded the range of the northern spotted owl. It is unknown if this range expansion was natural or facilitated by anthropogenic habitat change (Gutierrez et al. 2004).

California's first confirmed barred owl detection was in Trinity County in 1981 (Hunter et al. 2005). Since that time the barred owl's range expansion southward through California has been rapid and widespread and now completely overlaps the range of the northern spotted owl (Dark et al. 1998, USFWS 2008). Where monitored, the impact of barred owl on northern spotted owl in California appears to be profound. For example, at Redwood National Park in 1995, of 39 sites surveyed, 28 were occupied by northern spotted owls while 11 were occupied by barred owls. Of the 20 sites surveyed on the Park in 2008, only 3 were occupied by northern spotted owls while 17 were occupied by barred owls (K. Schmidt, Redwood National Park, pers. comm. with J. Hunter, USFWS, 1 May 2009). Similarly, at Hoopa Indian Reservation, northern spotted owl numbers have declined by approximately 33% since the early 1990s while the proportion of historical northern spotted owl territories with barred owl detections has climbed to approximately 44% during 2008 and 2009 (M. Higley, Hoopa Tribal Forestry, pers. comm. with J. Hunter, USFWS, 16 December 2009).

The first report of a barred owl in Mendocino County occurred in 1978, but a barred owl was not confirmed to be present at that location until 1989 (Dark et al. 1998). By 2005 there was a single detection of a barred owl at or associated with a northern spotted owl territory on MRC lands in Mendocino County. Since then, the number of barred owl territories detected within 0.6 mi (1 km) of northern spotted owl territories has generally increased in the primary assessment area (5 in 2006, 6 in 2007, 11 in 2008, 4 in 2009). (Note that northern spotted owl survey effort was reduced in 2009 due to financial constraints.) By the end of the 2010 breeding season, MRC biologists had detected barred owls within 0.6 mi (1 km) of 22 individual northern spotted owl territories. Some northern spotted owl territories had barred owl detections in some years and not in others. There are likely more undocumented occurrences of barred owls in the primary assessment area and in Mendocino County. There are no documented declines in northern spotted owl density or reproductive success associated with the increase in barred owls.

While there are numerous barred owls in Mendocino County, at this writing they have not yet reached the densities seen farther north. As a result, the future impact of barred owl on northern spotted owl in the assessment area remains uncertain, although existing information suggests that the invasion would likely have detrimental effects on northern spotted owl populations. If the barred owl invasion continues unabated, it is possible that northern spotted owl could be completely extirpated from the assessment area. In fact, the abundance of barred owls continues to increase throughout Mendocino County and California, with reports of reduced northern spotted owl site occupancy, reproduction, and survival (USFWS 2008). Gutierrez et al. (2004) noted "Hence we believe that the barred owl invasion has probably not reached its peak over most of the northern spotted owl's range, and that there are no grounds for optimistic views suggesting that barred owl effects on northern spotted owl have been already fully realized."

The invasive barred owl has been identified as a potential negative impact on a variety of wildlife species other than northern spotted owl. For instance, Elliott (2006) attributed a regional disappearance of western screech owls in British Columbia to the coincident invasion of barred owls. While barred owl and northern spotted owl diets overlap by 76% (Hamer et al. 2001), barred owl diets are more diverse than northern spotted owl diets and include more species associated with riparian and other wetland habitats and more terrestrial and diurnal species (Hamer et al. 2001). Barred owls are known to eat a wide variety of prey species not consumed by northern spotted owl, including earthworms, slugs, crayfish (*Cambarus* spp.), and fish (Livezey et al 2008).

In addition to greater diet breadth, other factors suggests that replacing the existing northern spotted owl population with a barred owl population would have unforeseen effects on prey species. For example, barred owls are larger than northern spotted owls and presumably require a higher caloric intake. Also, barred owl territories are smaller than northern spotted owl territories, and where they are relatively well-established, they occur in much higher densities than do northern spotted owls.

Consideration of whether or not the barred owl is "native" or "non-native" to California is largely a semantic or philosophical discussion and has little bearing on the legal or biological basis of decisions related to their management. One could consider the barred owl as non-native to California since it did not occur here historically, and only began to occur here after more than a century of extensive human-induced habitat alteration across North America. On the other hand, one could consider the barred owl as native since this species had historically occurred in other parts of North America, and spread to California under its own power of locomotion. The ESA makes no distinction relative to threats to listed species in terms of "native" or "non-native." The barred owl is, however, widely considered to be an invasive species in California since it is not indigenous (i.e., it did not originate in California), has a propensity to greatly expand its distribution through high reproduction or adaptability to new environments (or both), and has adverse effects on indigenous species that have historically occurred within areas colonized. Wherever it occurs, the barred owl is considered a migratory bird and afforded relevant protections under the Migratory Bird Treaty Act and California Fish and Game Code (§3503.5 and §3513).

Recovery objectives

The following are the verbatim recovery objectives from the *Northern Spotted Owl Recovery Plan* (USFWS 2008):

- *Spotted owl populations are sufficiently large and distributed such that the species no longer requires listing under the ESA.*
- *Adequate habitat is available for spotted owls and will continue to exist to allow the species to persist without the protection of the ESA.*
- *The effects of threats have been reduced or eliminated such that spotted owl populations are stable or increasing and spotted owls are unlikely to become threatened again in the foreseeable future.*

Point Arena mountain beaver

Status and Distribution

Point Arena mountain beaver is federally listed as endangered and a California Species of Special Concern. Of the seven subspecies of mountain beaver, Point Arena mountain beaver has the most limited range, known only to occur in western Mendocino County, California (USFWS 1991, 1998). Point Arena mountain beavers are known to occur as far north as Bridgeport Landing down to just south of Point Arena (MRC 2012). To date, there are 262 known Point Arena mountain beaver sites (J. Hunter, USFWS, pers. comm., e-mail correspondence with C. Hansen, ICF Jones and Stokes, 8 January 2009, as cited in MRC 2012).

In the combined primary and secondary assessment areas, Point Arena mountain beavers have been documented in the Mills Creek, Mallo Pass Creek, Irish Creek, Alder Creek, Brush Creek, and Garcia River basins (within the Garcia River and South Coast inventory blocks) (CDFG 2009a). In the primary assessment area, there are currently 13 known Point Arena mountain beaver burrow systems, all in the South Coast inventory block. Ten of those burrow systems have been mapped, and range in size from 0.06 to 0.57 ac (0.02 ha to 0.23 ha) (MRC 2012). These mapped burrow systems add up to a total of 1.87 ac (0.76 ha) (MRC 2012).

Habitat

Point Arena mountain beavers have been found in a variety of habitat types including coastal scrub, coastal strand, conifer forest, and riparian plant communities (Steele 1986, as cited in USFWS 1998). This species is known to occur within narrow and irregularly shaped coastal valleys on north-facing slopes and protected gulches (USFWS 1991). Burrows and dens are most commonly located under dense patches of perennial vegetation in friable, well-drained soils (Steele 1986).

Critical habitat

Critical habitat has not been designated for the Point Arena mountain beaver.

Threats

The primary threats to Point Arena mountain beaver include habitat loss and fragmentation and urbanization in western Mendocino County. Other significant threats include livestock grazing, rodent control, and domestic and feral cats and dogs (Steele 1986, 1989). Timber harvest operations could result in disturbance or mortality of mountain beavers, but over time the removal of overstory trees is thought to increase and enhance the herbaceous and brushy habitats that they favor (USFWS 1998). Subspecies farther north are often considered pests as they colonize and impact young conifer plantations.

Recovery objectives

The following are the verbatim recovery objectives from the *Point Arena Mountain Beaver Recovery Plan* (USFWS 1998):

- *Protect existing mountain beaver populations.*
- *Survey to locate new populations.*
- *Establish corridors between populations where feasible.*
- *Conduct research on Point Arena mountain beavers.*
- *Restore the Point Arena mountain beaver to suitable habitat.*
- *Conduct outreach.*

3.6.1.3 Wildlife communities

According to a list generated from the California Wildlife Habitat Relationships database (CDFG and CIWTG 2008), the forested areas in the assessment area provide suitable habitat for 256 vertebrate wildlife species: 19 species of amphibians, 19 species of reptiles, 144 species of birds, and 74 species of mammals. The species that potentially occur in the assessment area are listed in Appendix P; this list represents the maximum number of species that could occur in the area if other aspects of their habitat requirements (e.g., minimum habitat patch size, adjacent habitats, structural elements) are met. Of these, game species that may have suitable habitat in the assessment area include sooty grouse, wild turkey, California quail, mountain quail, band-tailed pigeon, mourning dove, American crow, Virginia opossum, brush rabbit, black-tailed jackrabbit, western gray squirrel, Douglas's squirrel, American beaver, gray fox, black bear, raccoon, ermine, long-tailed weasel, American badger, western spotted skunk, striped skunk, bobcat, wild pig, elk, and mule deer.

3.6.2 Environmental effects and mitigation

Effects on terrestrial habitat and wildlife species of concern are considered significant if the Proposed Action or alternatives would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any terrestrial wildlife species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFG or USFWS.
- Interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Potential to substantially reduce the habitat of a wildlife species; cause a wildlife population to drop below self-sustaining levels; threaten to eliminate an animal community; substantially reduce the number or restrict the range of an endangered, rare, or threatened species.
- Conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.

There are two other small HCPs in the secondary assessment area. As discussed in Section 3.4.2 (Aquatic and Riparian Habitats and Species of Concern, Environmental effects and mitigation), there is no known conflict between the provisions of these two HCPs and any of the EIS/PTEIR alternatives, since the area covered by these HCPs is not directly adjacent to the primary assessment area and does not include forest habitats that would be subject to future acquisition by MRC and addition to the HCP/NCCP plan area.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.6.2.7.

3.6.2.1 Analysis approach and impact mechanisms

The analysis of the effects of the alternatives on terrestrial habitat and wildlife species of concern addresses the primary and secondary assessment areas. The primary assessment area was treated in more detail than the secondary assessment area, primarily due to the greater potential for effects and the availability of data upon which to base the analysis.

Analysis of climate change and cumulative effects are discussed separately under Section 3.8 (Climate and Climate Change) and Section 4 (Cumulative Effects), respectively.

Terrestrial habitat types and successional stage trends

Analysis approach

A full description of the analysis of change in habitat types under each alternative using the California Wildlife Habitat Relationships system can be found in Section 3.5.2 (Vegetation and Plant Species of Concern, Environmental effects and mitigation). Analysis of terrestrial habitat and successional stage trends included an assessment of change in acreage of the following three California Wildlife Habitat Relationships habitat types: Montane Hardwood, Montane Conifer-Hardwood, and Redwood, and the six California Wildlife Habitat Relationships size classes over time under each alternative. Additional analyses in this section include change in acreage of early-, mid-, and advanced-successional stages over time under each alternative.

Impact mechanisms: changes in forest structure, composition, and complexity

Historical timber management has considerably altered the landscape and reduced the amount of suitable habitat used by a number of wildlife species in northwestern California. Clearcutting without sparing select patches of core “tall trees” creates a landscape of even-aged stands with reduced structural complexity. In addition, removal of trees triggers new successional conditions that did not exist prior to the harvest. While this may benefit certain species, new successional conditions may not be suitable for other species that previously inhabited the area. For example, without regenerating, a forest may shift composition from conifer-dominant to hardwood-dominant, which then potentially affects wildlife species that depend on conifer-dominated habitats. Conversely, in some areas, replanting following timber harvest emphasizes conifer re-growth, which can truncate the initial grass/forb and shrub stages of succession and lead to loss of important native hardwoods (e.g., tanoaks, live oaks, and madrone) and indigenous understory plant communities that other wildlife species depend on.

Advanced-successional patch size and habitat connectivity

Analysis approach

Habitat fragmentation in terms of patch size of advanced-successional habitat was analyzed over time for the primary assessment area. Habitat connectivity in terms of inter-connectedness of advanced-successional habitat, especially through protection of wildlife corridors (including riparian corridors), was also assessed.

Per the 2012 CFPRs (Technical Rule Addendum # 2, Section C(4)(g)), advanced-successional patch size and habitat connectivity was evaluated by estimating the amount of the primary assessment area occupied by advanced-successional stands greater than 80 ac (32 ha) in size and less than 1 mi (1.6 km) apart, or connected by a corridor of similar habitat. For this analysis, “advanced-successional” habitat corresponds to:

- California Wildlife Habitat Relationships class 5 (dominated by large trees > 24 in [61 cm] diameter at breast height) and with dense (60–100%) canopy closure,
- California Wildlife Habitat Relationships class 5 with moderate (40–59%) canopy closure and a dominant diameter of 32–40 in (81–102 cm), or
- California Wildlife Habitat Relationships class 6 (defined as size class 5 trees over a distinct layer of size class 4 or 3 trees and a total tree canopy exceeding 60% closure) (Appendix L).

Impact mechanisms: fragmentation of forest habitat

In general, timber harvest activities may result in a fragmented landscape with little or no connectivity between patches of habitat. Habitat connectivity, especially connectivity of late-successional habitat and riparian corridors, plays an important role in the distribution and dispersal of species and is essential to maintaining gene pools of low-mobility species that are unable or unlikely to traverse unsuitable habitat between suitable forest habitat patches. Especially in a managed landscape, connectivity is essential for colonization of new patches of habitat. Activities that isolate and fragment important habitats may affect associated species.

Fragmented forests composed of many small stands have a high ratio of forest edge to interior forest. A number of forest structural and environmental changes occur at the edges of stands that may reduce habitat value for some wildlife species. At forest edges, wind disturbance increases, temperature and humidity are more variable, and canopy cover and vegetation type can be substantially different from that of the interior forest (Chen et al. 1992, Chen et al. 1995). Although primarily documented as more of an issue in eastern forests, predation and brood-parasitism on forest-nesting birds in western forests can also be greater along a forest edge relative to interior forest areas, due to predators’ and brood-parasites’ association with open habitats (Paton 1994). These effects can render portions of late-successional forest stands unsuitable for some species.

Important habitat and habitat elements

Analysis approach

The management and level of protection of old-growth forest and trees were evaluated qualitatively and described under each alternative. As an indicator for recruitment of snags, logs, and wildlife trees, the number of large trees per acre forest-wide and in riparian buffer zones was assessed for each alternative, with the assumption that large trees were an appropriate indicator for recruitment of snags, logs, and wildlife trees. Two size classes were evaluated: 24–32 in (61–81 cm), and > 32 in (81 cm) diameter at breast height. The level of protection of rocky outcrops and cliffs under each alternative was assessed, as well as hardwood stands and hardwoods within conifer stands.

Impact mechanism: loss of habitat elements

One of the most important effects of timber harvest on wildlife to consider is a decrease in habitat elements that are not easily replaced because they require a long period of time to regenerate, or cannot be replaced at all under the harvest regime. These elements include old-growth trees, snags, and logs (downed wood) across a range of decay classes, and large residual trees with elements such as cavities, basal hollows, deeply furrowed bark, and upturned root wads. Practices such as salvage logging reduce the recruitment of large snags and large downed logs, key habitat elements for several wildlife species whose life history requirements may need these specific elements that are independent of the dominant vegetation. The absence of a particular key element can eliminate the species from otherwise suitable habitat.

Wildlife species of concern

The effects of the alternatives on wildlife species of concern were evaluated based on predicted changes in the quality and quantity of terrestrial wildlife habitats in the assessment area, in the context of the habitat-specific effects analyses described above, as well as MRC's species-specific and habitat-specific HCP/NCCP conservation measures. For federally listed species with recovery plans, the effects analysis considered recovery objectives. Detailed analysis could be performed with data from the primary assessment area only; however, the agencies assume that forest stands in the secondary assessment with the potential to be acquired by MRC have similar characteristics to those in the primary assessment area. Assessment of effects on wildlife species of concern uses wildlife-habitat relationships information derived from a broader understanding of life history requirements across each species' range. Comparison among alternatives was made in consideration of the full distribution of each species.

Under each of the alternatives, MRC's response to wildfire would follow its current (2011) Fire Suppression Plan or future updates to this plan (Section 3.10, Hazards and Hazardous Substances). Because the potential effects of wildfire on terrestrial habitat and wildlife species of concern are varied and unpredictable due to the stochastic nature of wildfires, an analysis of the effects would be speculative in nature. Accordingly, effects of wildfire on terrestrial habitat and wildlife species of concern are not analyzed in this EIS/PTEIR. However, post-fire timber salvage may occur in burned areas to salvage trees that are likely to die or that are not viable for timber production. The effects of post-fire timber salvage on terrestrial habitat and wildlife species of concern may differ by alternative based on the conservation and management measures that would be implemented under each alternative. The EIS/PTEIR therefore includes a qualitative analysis of the effects of post-fire timber salvage.

The use of herbicides is not an activity covered by the USFWS, NMFS, or CDFG under the proposed HCP/NCCP or any of the alternatives analyzed in this EIS/PTEIR. However, herbicide use is a reasonably foreseeable forest management activity that may take place in association with MRC's future timber operations under each of the alternatives. The potential effects of herbicides on terrestrial species of concern are analyzed in Section 3.10.2 (Hazards and Hazardous Substances, Environmental effects and mitigation). MRC does not use insecticides, fungicides, rodenticides, or fertilizers during forest management activities.

Marbled murrelet

Trends in suitable habitat for marbled murrelet were analyzed using the habitat suitability criteria for nesting habitat. These criteria were cross-walked to MRC's structure class system and to corresponding California Wildlife Habitat Relationships habitat types (Table 3.6-5). In order to model the differences among the alternatives with respect to marbled murrelet, "Possible Murrelet Habitat" was defined as those stands meeting the following diameter and canopy criteria: all stands > 40 in (102 cm) diameter at breast height, stands 32–40 in (81–102 cm) diameter at breast height that have > 40% canopy closure, and stands 24–32 in (61–81 cm) diameter at breast height that have > 60% canopy closure. Since the distance from marine environments and topographic position also greatly influence marbled murrelet habitat suitability, the three murrelet zones defined in the HCP/NCCP were also considered. These three zones are defined based on the relative likelihood that murrelets would use or occupy these areas. Zone 1 is any location in the primary assessment area within 5 mi (8 km) of the coast, any area within the Lower Alder Creek Management Area that is within 5–10 mi (8–16 km) of the coast, or in a defined area of the Rockport inventory block; Zone 2 is any location in the primary assessment area (excluding Zone 1) that is 5–10 mi (8–16 km) from the coast and at the bottom 1/3 of a hillslope; and Zone 3 is any location that is > 10 mi (16 km) from the coast or any area that is 5–10 mi (8–16 km) from the coast and at the upper 2/3 of a hillslope. For the alternatives analysis, the following combinations are considered "Potentially Suitable Murrelet Habitat": within Zone 1, all stands labeled Possible Murrelet Habitat; within Zone 2, only those Possible Murrelet Habitat stands that are > 32 in (81 cm) diameter at breast height; and within Zone 3 only those Possible Murrelet Habitat stands > 40 in (102 cm) diameter at breast height. Geographic distribution of existing Potentially Suitable Marbled Murrelet Habitat upon which the alternatives were compared is shown in Appendix F, Figure F-14 (corresponding acreages are shown in Appendix Q [Marbled Murrelet Habitat Plan Area]). All other stands were considered "Likely Unsuitable Murrelet Habitat" and are not discussed further.

Table 3.6-5. MRC forest structure class relationship to marbled murrelet habitat and California Wildlife Habitat Relationships habitat types.

MRC structure class	Marbled murrelet habitat?	Successional stage	Corresponding California Wildlife Habitat Relationships type	Corresponding California Wildlife Habitat Relationships size class (diameter at breast height)	Corresponding California Wildlife Habitat Relationships closure class
20	Yes (Zones 1, 2)	Advanced-successional	Redwood and Douglas-fir	5 (> 24 in)	Moderate Cover
23	Yes (Zones 1)	Advanced-successional	Redwood and Douglas-fir	5 (> 24 in)	Dense Cover
24	Yes (Zones 1, 2)	Advanced-successional	Redwood and Douglas-fir	6 (> 24 in, multi-layered)[a]	NA
25[b]	Yes (Zones 1, 2, 3)	Advanced-successional	Redwood and Douglas-fir	5 (> 24 in)	Open Cover
26[b]	Yes (Zones 1, 2, 3)	Advanced-successional	Redwood and Douglas-fir	5 (> 24 in)	Moderate Cover
27[b]	Yes (Zones 1, 2, 3)	Advanced-successional	Redwood and Douglas-fir	6 (> 24 in, multi-layered)[a]	NA

NA = not applicable.

[a] California Wildlife Habitat Relationships size class 6 is defined as "Size class 5 over a distinct layer of size class 4 or 3 trees, total tree canopy exceeds 60% closure" (Mayer and Laudenslayer 1988).

[b] MRC structure classes 25–27 were created specifically for the marbled murrelet habitat modeling analysis and are therefore not included in other tables showing MRC structure classes.

The results of the marbled murrelet modeling effort need to be interpreted carefully. Modeling outputs (in units of acres) should not be interpreted as estimates of the actual amount of suitable marbled murrelet nesting habitat in the primary assessment area at any particular point in time. Rather, the numbers pertaining to "Potentially Suitable Murrelet Habitat" should be considered an index of potential suitability that was produced to allow comparisons among the alternatives. The actual suitability of habitat for marbled murrelet nesting can only be estimated by careful, on-site evaluation of specific conditions such as the presence of suitable nest platforms and protective cover. The scale of on-site evaluations is the individual tree or group of trees, and can not be reliably accomplished using aerial photographs or habitat maps. Those stands determined to be "Potentially Suitable Murrelet Habitat" in this alternatives analysis would only be actually suitable for marbled murrelet nesting if the specific habitat components (such as large limbs with adequate cover; see Section 3.6.1.2 for a description of specific habitat elements) are present within them. In many, if not most, cases those stands deemed "Potentially Suitable Murrelet Habitat" do not have those components. However, since the same modeling rules were applied to all alternatives, the resulting numbers allow meaningful relative comparisons to be made.

Northern spotted owl

Trends in suitable habitat for northern spotted owls were analyzed using suitability criteria developed by the agencies for nesting/roosting and foraging habitat. These criteria were cross-walked to MRC's structure class system and to corresponding California Wildlife Habitat Relationships habitat categories (Table 3.6-6). The existing geographic distribution of northern spotted owl habitat, which was used as a baseline to compare alternatives, is shown in Appendix F, Figure F-15 (corresponding acreages are shown in Appendix Q [Northern Spotted Owl Habitat (forest-wide) Plan Area]).

The results of the northern spotted owl modeling effort need to be interpreted carefully. Modeling outputs (in units of acres) should not be interpreted as estimates of the actual amount of suitable northern spotted owl habitat in the primary assessment area at any particular point in time. Rather, the numbers pertaining to foraging or nesting/roosting habitat should be considered an index of potential suitability that was produced to allow comparisons among the alternatives. The actual suitability of habitat for northern spotted owls can only be estimated by careful, on-site evaluation of specific conditions (e.g., presence of cavities, platforms, or broken-top snags for nesting habitat) or presence surveys for individuals/territories. However, since the same modeling rules were applied to all alternatives, the resulting numbers allow meaningful relative comparisons to be made.

Table 3.6-6. MRC forest structure class relationship to northern spotted owl habitat and California Wildlife Habitat Relationships habitat types.

<table>
<tr><th>MRC structure class</th><th>Northern spotted owl habitat?</th><th>Successional stage</th><th>Corresponding California Wildlife Habitat Relationships type</th><th>Corresponding California Wildlife Habitat Relationships size class (diameter at breast height)</th><th>Corresponding California Wildlife Habitat Relationships closure class</th></tr>
<tr><td>1</td><td>Unsuitable</td><td>Early Successional</td><td rowspan="6">Montane Hardwood</td><td>2 (1–6 in)</td><td>Open Cover</td></tr>
<tr><td>2</td><td>Unsuitable</td><td>Mid-Successional</td><td>4 (11–24 in)</td><td>Open Cover</td></tr>
<tr><td>3</td><td>Unsuitable</td><td>Mid-Successional</td><td>3 (6–11 in)</td><td>Moderate Cover</td></tr>
<tr><td>4</td><td>Foraging</td><td>Mid-Successional</td><td>4 (11–24 in)</td><td>Moderate Cover</td></tr>
<tr><td>5</td><td>Unsuitable</td><td>Mid-Successional</td><td>3 (6–11 in)</td><td>Dense Cover</td></tr>
<tr><td>6</td><td>Foraging</td><td>Mid-Successional</td><td>4 (11–24 in)</td><td>Dense Cover</td></tr>
</table>

MRC structure class	Northern spotted owl habitat?	Successional stage	Corresponding California Wildlife Habitat Relationships type	Corresponding California Wildlife Habitat Relationships size class (diameter at breast height)	Corresponding California Wildlife Habitat Relationships closure class
7	Unsuitable	Early Successional		2 (1–6 in)	Open Cover
8	Unsuitable	Mid-Successional		4 (11–24 in)	Open Cover
9	Unsuitable	Mid-Successional		3 (6–11 in)	Moderate Cover
10	Foraging	Mid-Successional	Montane Hardwood-Conifer	4 (11–24 in)	Moderate Cover
11	Unsuitable	Early Successional		2 (1–6 in)	Dense Cover
12	Foraging	Mid-Successional		4 (11–24 in)	Dense Cover
13	Unsuitable	Early Successional		2 (1–6 in)	Open Cover
14	Unsuitable	Mid-Successional		4 (11–24 in)	Sparse Cover
15	Unsuitable	Mid-Successional		5 (> 24 in)	Open Cover
16	Unsuitable	Mid-Successional		5 (> 24 in)	Open Cover
17	Foraging	Mid-Successional		3 (6–11 in)	Moderate Cover
18	Foraging	Mid-Successional	Redwood and Douglas-fir	4 (11–24 in)	Moderate Cover
19	Foraging	Mid-Successional		5 (> 24 in)	Moderate Cover
20[a]	Foraging	Advanced-successional		5 (> 24 in)	Moderate Cover
21	Foraging	Mid-Successional		3 (6–11 in)	Dense Cover
22	Nesting/Roosting	Mid-Successional		4 (11–24 in)	Dense Cover
23	Nesting/Roosting	Advanced-successional		5 (> 24 in)	Dense Cover
24	Nesting/Roosting	Advanced-successional		6 (> 24 in, multi-layered)[b]	NA

NA = not applicable

[a] Structure class 20 was modeled as northern spotted owl foraging habitat, though habitat my vary between Foraging and Nesting/Roosting habitat within such stands. This assignment was made to avoid overestimating Nesting/Roosting habitat.

[b] California Wildlife Habitat Relationships size class 6 is defined as "Size class 5 over a distinct layer of size class 4 or 3 trees, total tree canopy exceeds 60% closure" (Mayer and Laudenslayer 1988).

Point Arena mountain beaver

A qualitative assessment of potential effects on Point Arena mountain beaver habitat was made based on the habitat suitability relationships reported in the scientific literature and level of protection provided by management strategies under each alternative.

Other species of concern

Species-specific qualitative assessments of effects were made based on predicted changes in the quality of terrestrial habitats in the assessment area, habitat-suitability relationships reported in the scientific literature, and any measures taken under each alternative to conserve habitat and avoid or minimize impacts. For other species of concern, site-specific effects would be assessed and appropriate mitigation measures developed through the completion of individual THPs or PTHPs (depending on alternative), subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with the CFPRs and other applicable mitigation requirements.

Wildlife communities

Changes in habitat value for all wildlife species with potential to occur in the primary assessment area, including common and/or unlisted species, were assessed for each alternative. California Wildlife Habitat Relationships habitat associations were used to model changes in amount of suitable habitat for each species over the 80-year analysis period, and 40-year analysis period for Alternative C. For species of concern that were predicted to decline, the significance of such declines is assessed in the environmental effects analysis that follows this section.

Information from the California Wildlife Habitat Relationships program database (CDFG and CIWTG 2008) was used to run a specialized query for this analysis—instead of the standard queries built into the California Wildlife Habitat Relationships software program—in order to identify general trends involving 256 species and 60 combinations of habitat type, size class, and canopy closure designations across eight decades for five alternatives. This specialized query was designed to account for the existing and relative projected change in area of each combination of habitat type, size class, and canopy closure through time in the primary assessment area. The standard queries built into the California Wildlife Habitat Relationships software program do not allow for handling this many species, habitat types, time steps, and alternative management scenarios simultaneously, nor do they allow for incorporating information on changes in the predicted areal extent of each of the many habitat type combinations.

First, the California Wildlife Habitat Relationships program was queried to obtain a list of all terrestrial wildlife species predicted to occur within Mendocino County and associated with California Wildlife Habitat Relationships habitat types used in the timber model (Redwood, Montane Hardwood-Conifer, and Montane Hardwood, with associated size classes [2–6] and cover codes [sparse, open, moderate, and dense] [see Appendix L]). Habitat-specific suitabilities from the California Wildlife Habitat Relationships program were assigned levels (High [H], Medium [M], Low [L]) and corresponding index values (H=1.00, M=0.66, L=0.33, or Blank=0.00) for three life requisites: reproduction, cover, and feeding. These habitat-specific suitability levels were assigned for each combination of habitat type, size class, and canopy closure associated with each species.

Habitat suitability levels are defined as follows (CDFG and CIWTG 2008):

- *High:* Habitat is optimal for species occurrence; can support relatively high population densities at high frequencies.

- *Medium:* Habitat is suitable for species occurrence; can support relatively moderate population densities at moderate frequencies.
- *Low:* Habitat is marginal for species occurrence; can support relatively low population densities at low frequencies.
- *Blank:* Habitat is unsuitable for species occurrence; species is not expected to occur in the habitat.

For each species, the arithmetic average of these ratings among the three life requisites was used to represent the overall suitability value for each associated combination of California Wildlife Habitat Relationships habitat type, size class, and canopy closure. This overall suitability value was multiplied by the acreage of each associated combined California Wildlife Habitat Relationships habitat type, size class, and canopy closure. For each species, these products were then summed across all California Wildlife Habitat Relationships habitat combinations to represent a total "habitat index value." This value was calculated for every 20 years under each alternative. The habitat index values were then evaluated to predict long-term habitat trends for each species under each alternative—a 66% change (increase or decrease) from comparisons with year 0 was considered substantial, and a 33% change in habitat value was also identified (Appendix P). Habitat index values are not to be interpreted as absolute values; instead, these values are used for the purposes of comparison between alternatives and to demonstrate predicted relative trends over time.

The results of queries of the California Wildlife Habitat Relationships database need to be interpreted by trained, knowledgeable users, in order to assess the biological significance of changes in predicted habitat values (Garrison 1994). Important assumptions built into the California Wildlife Habitat Relationships database that should be considered, which are probably met to different degrees among the species, include:

- Wildlife species occurrence and abundance are strongly influenced by habitat conditions.
- Wildlife habitat can be described by a set of environmental characteristics.
- Relative values of habitats and the relative importance of special habitat elements may be determined for each species.
- Habitat value is uniform for a species throughout its range in California.

Important specific model assumptions which may or may not always be met include:

- Habitat ratings reflect values only for that species.
- Habitats for species that require juxtaposition of two or more habitats are available in the proper mix.
- Because data are not available to account for the availability of different habitat elements, either currently or for future projections, the query assumes that all special habitat elements are present in adequate amounts if they are typical components of the habitat.
- Habitat amounts or patch sizes required by a species are available in the proper amounts.

While these assumptions undoubtedly do not always hold, they are equally applied to all alternatives and time periods, and thus allow for comparison between alternatives and to demonstrate predicted relative trends over time. Because the scale of analysis in the California Wildlife Habitat Relationships system is coarse, the California Wildlife Habitat Relationships analysis alone is inappropriate for detailed impact analysis and its findings need to be reinforced with other information.

3.6.2.2 No Action alternative

Analysis of trends in terrestrial habitat types and successional stage

As described in Section 3.5.2 (Vegetation and Plant Species of Concern, Environmental effects and mitigation), the predicted overall trend in the dominant California Wildlife Habitat Relationships habitat type under the No Action alternative is a decrease in both Montane Hardwood and Montane Hardwood-Conifer and an increase in relative proportion of Redwood in most conifer stands. The predicted overall trend in California Wildlife Habitat Relationships size class under the No Action alternative is a substantial decrease in the percentage composition of younger, class 1 and 2 trees, a relatively stable representation of classes 3 and 4 trees, and a substantial increase in the older trees, classes 5 and 6, with the highest increase in the class 5 percentage composition.

After peaking at about 15% during year 20, there is a predicted forest-wide decrease in early successional forest to a trace by year 80 under the No Action alternative. Over the 80-year analysis period, there is an increase in advanced-successional forest from approximately 2% to 13% (Figure 3.6-2, Appendix Q [Successional Stage (forest-wide) by Inventory Type]). The acreage of mid-successional forest would remain relatively stable.

Successional stage composition in riparian buffer zones is predicted to change noticeably over 80 years, with advanced-successional habitat increasing from approximately 7% to 77% over the 80-year analysis period (Figure 3.6-3, Appendix Q [Successional Stage (riparian) by Inventory Type]). Coincidentally, early-successional conditions in riparian buffer zones are predicted to be non-existent after the year 30, and mid-successional conditions are predicted to decline to about 25% in riparian buffer zones by year 80.

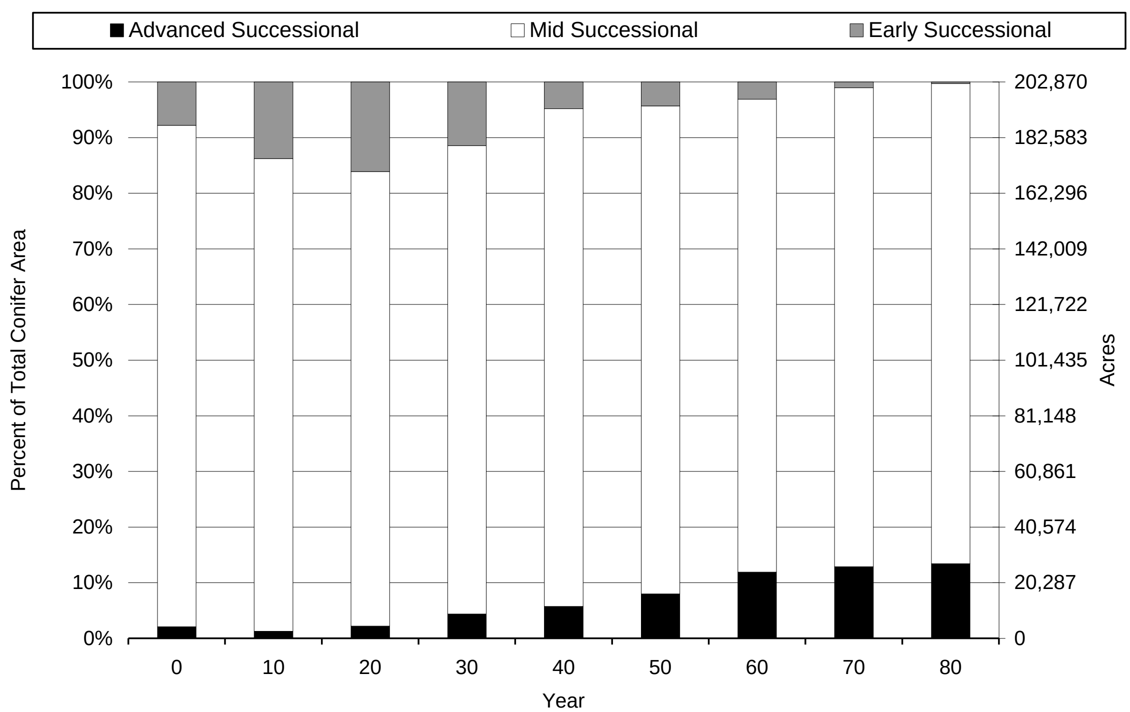


Figure 3.6-2. Successional stage composition predicted forest-wide by decade under the No Action alternative.

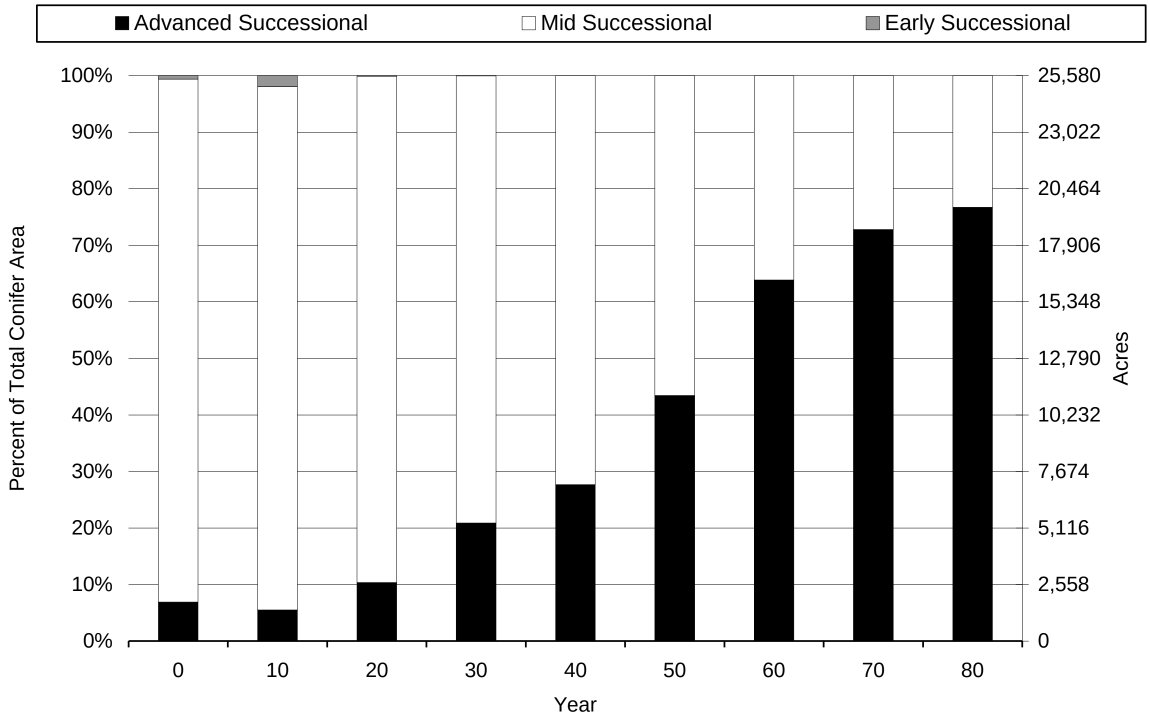


Figure 3.6-3. Successional stage composition predicted in riparian buffer zones by decade under the No Action alternative.

Effects on advanced-successional patch size and habitat connectivity

Under the No Action alternative, the number and total area of advanced-successional patches greater than or equal to 80 ac (32 ha) is predicted to increase over 80 years, although with a decrease in the number of such patches during the last 20 years (Table 3.6-7). The number and total area of such patches within 1 mi (1.6 km) of another large patch is also predicted to increase over 80 years, with a decrease in number during the last 20 years (Table 3.6-7, Figure 3.6-4). The predicted decrease in number of patches greater than or equal to 80 ac (32 ha) during the last 20 years is due to stands without harvesting constraints (e.g., stands selected as Class I and Large Class II watercourse buffers, northern spotted owl buffers, marbled murrelet buffers, etc.) meeting harvest triggers. In years 20 and 80, increase in patch size and connectivity is primarily predicted in the Albion and Navarro West inventory blocks. By year 80, increase in patch size and connectivity is evident throughout the primary assessment area. The majority of patches are aggregations of linear, riparian stands (Figure 3.6-4). Between years 40 and 60, there is a steep rise in the total area of patches greater than or equal to 80 ac (32 ha) and within 1 mi (1.6 km) of another patch, presumably because of protections for stream buffers under the 2000 Management Plan and CFPRs (14 CCR §916.9). Compared with existing conditions, the No Action alternative would improve advanced-successional patch conditions, with increases in patch size and habitat connectivity of predominantly riparian stands.

Table 3.6-7. Number and total area (ac) of advanced-successional patches greater than or equal to 80 ac (32 ha), and within 1 mi (1.6 km) of another patch under the No Action alternative.

Parameters	Year				
	0	20	40	60	80
Number of patches greater than or equal to 80 ac	6	8	24	71	54
Total area of patches greater than or equal to 80 ac	1,497	2,321	5,163	16,294	21,997
Number of patches greater than or equal to 80 ac AND within 1 mi of another patch	4	7	22	67	52
Total area of patches greater than or equal to 80 ac AND within 1 mi of another patch	1,181	2,196	4,948	15,701	21,696

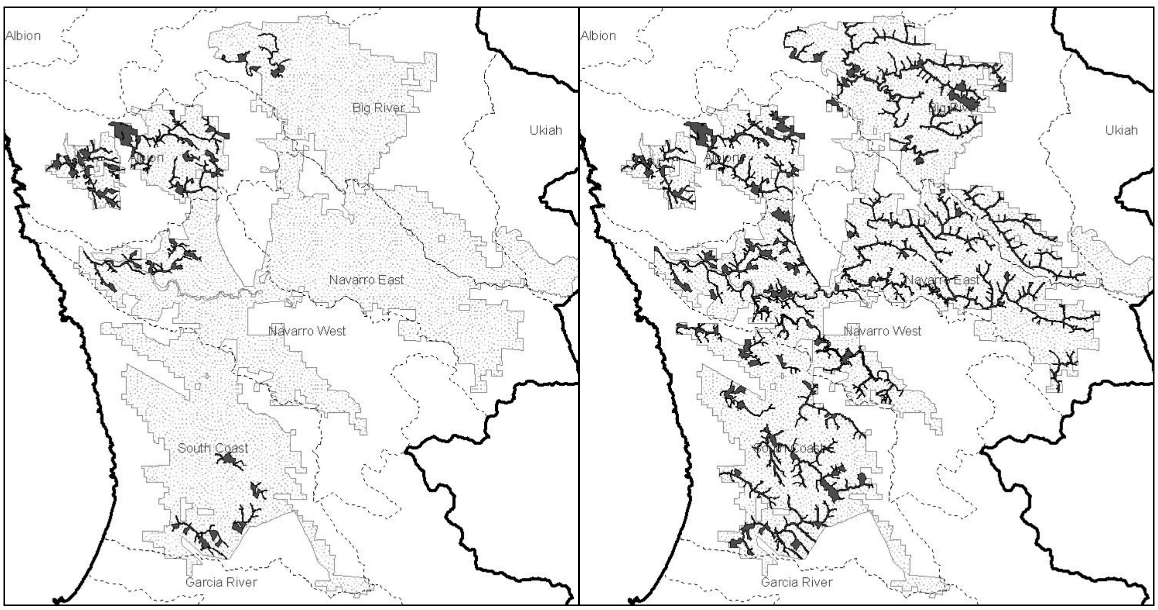


Figure 3.6-4. Distribution of advanced-successional patches greater than 80 ac (32 ha) and within 1 mi (1.6 km) of another patch in a subsection of the primary assessment area modeled for year 40 (left) and year 80 (right) under the No Action alternative (advanced-successional patches are indicated in dark gray) (existing conditions are shown in Figure 3.6-1).

Under all of the alternatives, MRC forestlands would be used for timber production as opposed to alternate land uses, helping to minimize fragmentation of lands and provide value for terrestrial resources.

Effects on important habitat and habitat elements

The following section analyzes effects on important habitat and habitat elements under the No Action alternative. Effects determinations are not provided for habitat elements, with the exception of old-growth trees and stands since they are a unique community with intrinsic biological and social value in addition to providing habitat value for wildlife. For analyses of individual species of concern associated with the following habitat elements, see the analysis in the subsection below titled “Effects on wildlife species of concern.”

Old-growth trees and stands

MRC’s 2000 Management Plan outlines policies regarding old-growth trees and stands, which include: (1) preserving all Type I old-growth stands and protecting them with a conservation easement, (2) protecting all Type II old-growth stands and allowing selective silviculture only to thin stands in a way that would enhance them, and (3) preserving individual old-growth trees—conifers and hardwoods—that have significant habitat values or provide unique biological function within the forest. Because Type I and Type II old-growth stands would be protected, there would be **no effects** on old-growth trees anticipated under the No Action alternative.

Snags, logs, and wildlife trees

Figure 3.4-2 (in Section 3.4 [Aquatic and Riparian Habitats and Species of Concern]), Figure 3.6-5, and Appendix Q (Large Tree Density [forest-wide] by Inventory Block and Large Tree Density [riparian] by Inventory Block) show timber modeling results for large tree density for the next 80 years under the No Action alternative, forest-wide and in riparian buffer zones. Forest-wide, trees with a diameter at breast height of > 32 in (81 cm) are predicted to increase from an estimated 1 tree per acre to approximately 3 trees per acre between years 0 and 80; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 5 trees per acre to approximately 8 trees per acre, with the exception of a slight temporary decrease (approximately 1 tree per acre) between years 0 and 10. In riparian buffer zones, trees with a diameter at breast height of > 32 in (81 cm) are predicted to increase from an estimated 2 trees per acre to approximately 12 trees per acre between years 0 and 80; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 8 trees per acre to approximately 23 trees per acre (Section 3.4 [Aquatic and Riparian Habitats and Species of Concern], Figure 3.4-2). The predicted overall trend for large trees under the No Action alternative is an increase in trees per acre over 80 years, both forest-wide and in riparian buffer zones. An increase in large trees over time may enhance snag, log, and wildlife tree recruitment.

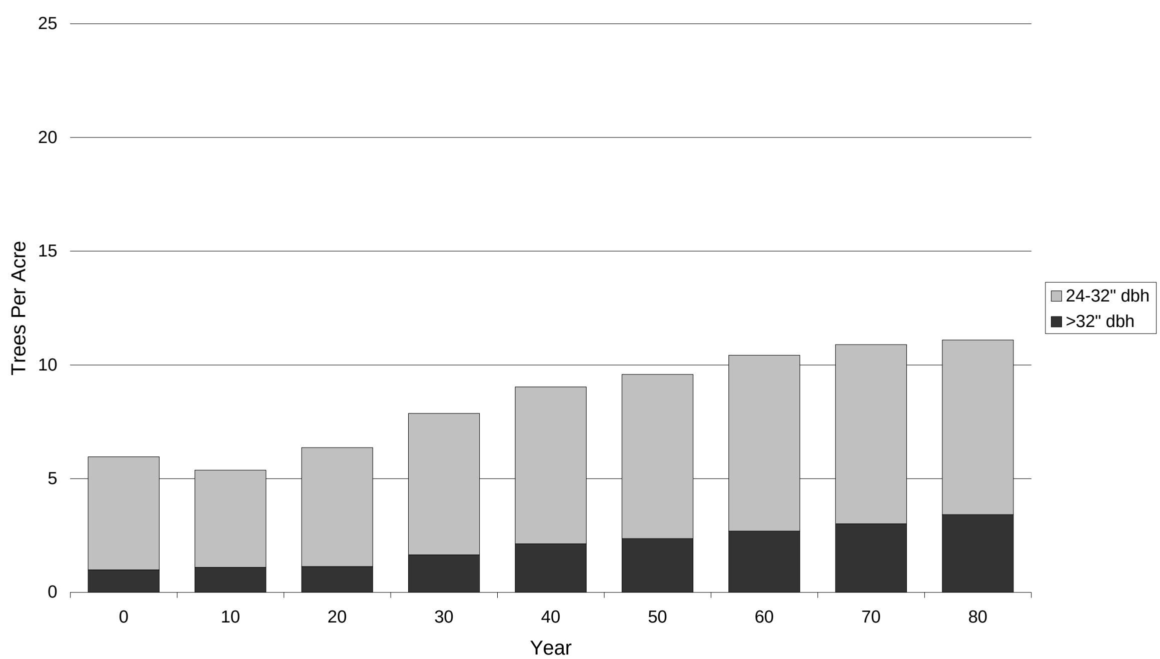


Figure 3.6-5. Large tree density (trees per acre) predicted forest-wide by decade under the No Action alternative.

Under the No Action alternative, MRC's policies (as outlined in its 2000 Management Plan and described in Section 2, Alternatives) would incorporate strategies aimed at retaining and recruiting a specific quantity and distribution of snags, logs, and wildlife trees across the forest in both riparian and upslope areas as follows: retain all snags and specific nest trees (i.e., used by a listed/sensitive bird species) in every THP, unless a snag or tree poses a safety or excessive fuel loading hazard; recruit an average of 2–3 snags per acre in Watercourse and Lake Protection Zones and other "wildlife emphasis areas"; recruit at least 1–2 snags per acre in general forested areas; recruit a minimum average of 7 downed logs per acre averaged over 40 ac (16 ha) in Watercourse and Lake Protection Zones ; and recruit and retain a minimum average of 5 downed logs per acre averaged over 40 ac (16 ha) in general forested areas. Incorporation of strategies to retain and recruit snags, logs, and wildlife trees, in combination with the increase in availability of large trees over time, would enhance conditions for native wildlife species by improving the abundance and distribution of these habitat elements.

Hardwoods stands and hardwoods within conifer stands

Under the No Action alternative, there would be retention of all true oaks greater than 18 in (46 cm) diameter at breast eight and an average targeted hardwood basal area retention level of 15% of the conifer basal area across the property (site-specific retention levels would depend on site-specific attributes and agency review of each THP) under MRC's 2000 Management Plan. There would also be review of all THPs to identify and retain hardwood trees that enhance wildlife habitat. While there would be a trend towards more redwood-dominated habitat and less hardwood-dominated habitat and associated wildlife species, hardwood retention and protection would continue to provide some level of wildlife value under the No Action alternative.

Rocky outcrops

The 2012 CFPRs (14 CCR §919.3) specify timber management restrictions developed to protect sensitive species that may use rocky outcrops, such as limited operating periods during the peregrine falcon nesting season. However, there is no strategy specified under the CFPRs that preserve and maintain the existing 63 ac (25 ha) of rocky outcrops in the primary assessment area. Since there is no strategy included under the No Action alternative to preserve and maintain the existing rocky outcrops in the primary assessment area, there are potential effects on species that use rocky outcrops in the event that rocky outcrops are converted to quarries. These effects are described below under the subsection "Effects on wildlife species of concern."

Effects on wildlife species of concern

For the No Action alternative, in addition to the following analyses for wildlife species of concern, site-specific effects would be assessed through the completion of individual THPs, subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with the CFPRs and other applicable mitigation requirements.

Under the No Action alternative, post-fire timber salvage would be conducted in accordance with the CFPRs and the measures included in MRC's 2000 Management Plan (MRC 2000a). Per the 2000 Management Plan, all residual old-growth trees would be retained and there would be no harvest in Type I (unharvested) old-growth stands. Single-tree selection would be allowed in Type II (previously harvested) old-growth stands, but the character and functionality of the stand would be preserved. Because management measures for post-fire timber salvage would not differ substantially from current practices, there would be no effect on terrestrial habitats and wildlife species of concern compared with existing conditions.

Marbled murrelet

MRC would continue to conduct certain research and monitoring activities on its forestlands under the No Action alternative, which may include surveys for marbled murrelet. The No Action alternative does not include any authorization for incidental take of any listed species. While no take is anticipated during such surveys, a separate consultation under Section 10(a)(1)(A) of the federal ESA would be required to authorize any take, if warranted.

Under the No Action alternative, the predicted overall trend for potentially suitable marbled murrelet habitat from year 0 to year 80 is an increase by approximately 9,500 ac (3,845 ha) for Zone 1 and an increase by approximately 790 ac (320 ha) for Zone 2 (Figure 3.6-6, Appendix Q [Marbled Murrelet Habitat Plan Area]). In Zone 3, there is a small decrease (approximately 40 ac) in potentially suitable marbled murrelet habitat from year 0 during years 30–70, though there is an increase in potentially suitable marbled murrelet habitat by approximately 10 ac (4 ha) when comparing year 80 with year 0. Appendix F, Figures F-16 and F-17 show projected distribution of marbled murrelet habitat for years 40 and 80 under the No Action alternative.

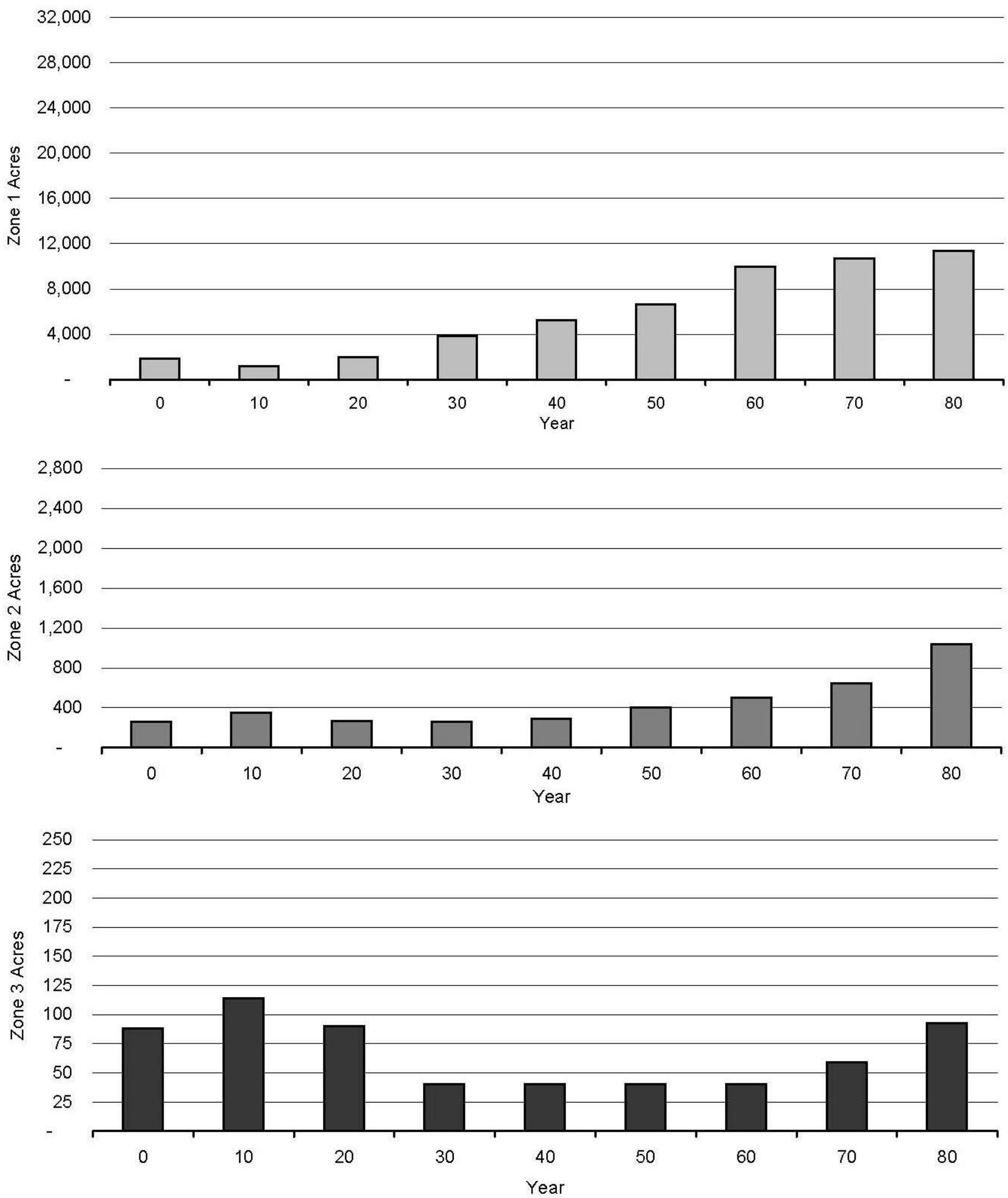


Figure 3.6-6. Potentially suitable marbled murrelet habitat predicted by decade under the No Action alternative.

In the terrestrial habitat analysis presented above for the No Action alternative, there would be an increase in advanced-successional habitat and connectivity, predominantly in riparian stands. Old-growth stands would be protected through measures outlined in MRC's 2000 Management Plan, which also includes strategies to retain and protect wildlife trees. MRC's 2000 Management Plan also designates 1,400 ac (566 ha) as a marbled murrelet management area, incorporating high retention selection harvest. Under the No Action alternative, MRC would be required to comply with no-take standards, with technical assistance from CDFG and USFWS. No-take standards include no-harvest buffers and breeding season disturbance buffers for occupied or potential habitat with unconfirmed occupancy status. As specified in the 2012 CFPRs, (14 CCR §919.11) a THP would not be approved if CDFG determines jeopardy or a take would occur as a result of operations proposed in the THP.

Timber management activities (e.g., harvest, hauling, and road maintenance) could potentially cause direct disturbance of marbled murrelet nests from noise, vibration, and human activity resulting in nest failure or abandonment, and/or indirect disturbance resulting from removal or degradation of habitat. However, since: (1) there would be measures in place under the No Action alternative to protect marbled murrelet individuals, nest sites, and habitat; and (2) there are predicted trends showing an increase in the index for potentially suitable marbled murrelet habitat compared with existing conditions, there would be **no effects** on marbled murrelet under the No Action alternative.

Northern spotted owl

MRC would continue to conduct certain research and monitoring activities on its forestlands under the No Action alternative, which may include surveys for—and the capture and handling of—northern spotted owl. The No Action alternative does not include any authorization for incidental take of any listed species; a separate recovery permit issued under Section 10(a)(1)(A) of the federal ESA would be issued to MRC to authorize any take associated with such surveys.

Under the No Action alternative, forest-wide Nesting/Roosting habitat for northern spotted owl is predicted to decrease slightly by year 10, to increase in years 20–30, and then decrease again in years 40–80, returning to smaller but similar acreages as compared with year 0 (Figure 3.6-7, Appendix Q [Northern Spotted Owl Habitat (forest-wide) Plan Area]). The trend for foraging habitat is to decrease slightly during years 10–40 and then increase through year 80. Non-suitable habitat is predicted to decrease over 80 years as compared with year 0. Nesting/Roosting habitat is expected to comprise 20–33% of total acres across the primary assessment area over years 10–80, while foraging habitat is expected to comprise 48–78% of the area of the primary assessment area over the same time period. In most decades under the No Action alternative, there would be more Nesting/Roosting habitat compared with year 0, though in years 60 to 80, there would be less, with 3,200 fewer acres than year 0 by year 80. Appendix F, Figures F-18 and F-19 show projected distribution of northern spotted owl habitat for years 40 and 80 under the No Action alternative.

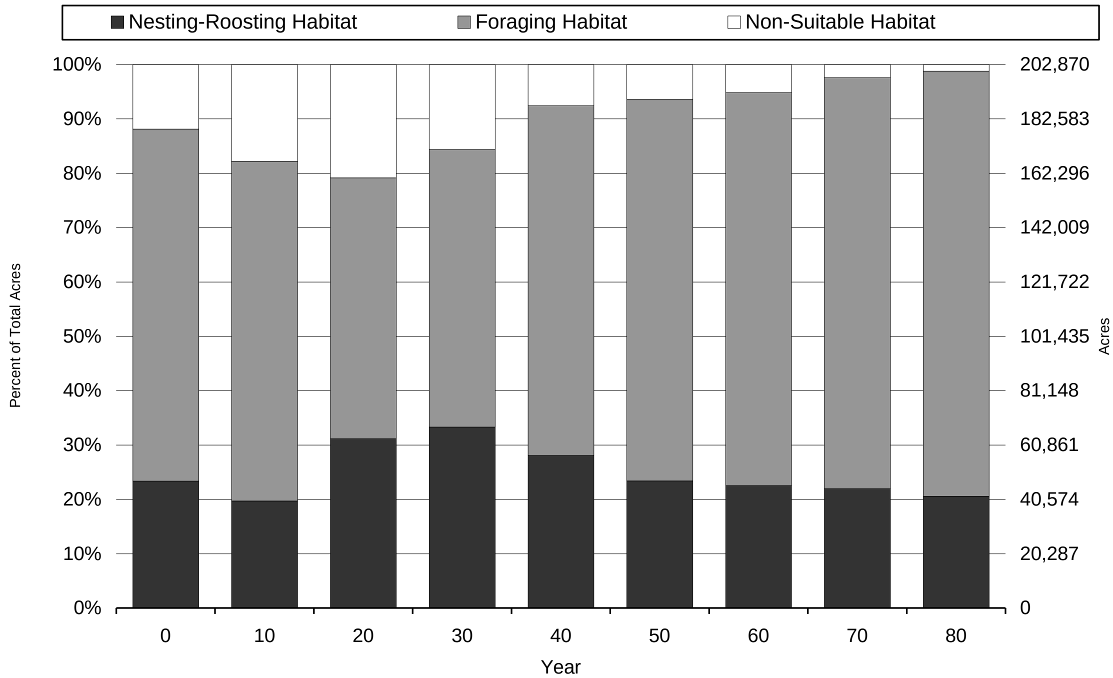


Figure 3.6-7. Northern spotted owl habitat predicted by decade under the No Action alternative.

In the terrestrial habitat analysis presented above for the No Action alternative, there would be several predicted trends and protections that would support northern spotted owls. There would be an increase in advanced-successional habitat and connectivity, predominantly in riparian stands. Old-growth stands would be protected through measures outlined in MRC's 2000 Management Plan, which also includes strategies to retain and protect wildlife trees. Management strategies under MRC's 2000 Management Plan would also include some hardwood protections that would preserve some northern spotted owl foraging habitat, including an average targeted hardwood basal area retention level of 15% of the conifer basal area across the property (site-specific retention levels would depend on site-specific attributes and agency review of each THP).

Under the No Action alternative, MRC would operate under its Northern Spotted Owl Resource Plan, which includes identifying northern spotted owl territories and activity centers, and applying appropriate harvest restrictions and buffers. In addition, 2012 CFPR measures (14 CCR §919.9) would apply to protect northern spotted owl nest sites and habitat. Under the No Action alternative, MRC would be required to comply with no-take standards; CDFG and USFWS technical assistance may be required for approval of THPs.

Under the No Action alternative, MRC would not be obligated to participate in barred owl management. It is difficult to predict the eventual result of no barred owl management on northern spotted owl populations in the primary assessment area. The barred owl invasion would be expected to increase until the number of barred owls is greater than the present number of spotted owls. Based on current trends of barred owl population growth and corresponding decreasing occupancy of northern spotted owls both on MRC lands and elsewhere, the numbers of northern spotted owls would certainly decrease over time. The entire northern spotted owl population could possibly be extirpated from the primary assessment area. There would also likely be an adverse effect on northern spotted owl prey species as well as a wide variety of non-nothern spotted owl prey species due to the barred owl population increase.

There is a small decrease in projected nesting/roosting habitat during years 60 to 80 under the No Action alternative. In addition, timber management activities (e.g., harvest, hauling, road maintenance, and helicopter yarding) could potentially cause direct disturbance of northern spotted owl nests from noise, vibration, and human activity resulting in nest failure or abandonment, and/or indirect disturbance resulting from removal or degradation of habitat. However, since: (1) there would be measures in place under the No Action alternative to protect specified levels of northern spotted owl nesting, roosting, and foraging habitat where spotted owls occur; and (2) there are predicted trends showing a reduction in non-suitable habitat compared with existing conditions, there would be **less than significant effects** on northern spotted owl under the No Action alternative.

Point Arena mountain beaver

The No Action alternative includes no-take standards for Point Arena mountain beaver, including a minimum of 100-ft (30-m) no-harvest buffer zones around burrows, and up to 400-ft (122-m) no-cut buffer zones around burrows, if contiguous habitat extends that far from a burrow (Section 2, Alternatives). Such standards would protect identified burrows, but do not account for unsurveyed areas with potentially suitable habitat. There is potential for direct disturbance of Point Arena mountain beaver from destruction of burrows, or indirect disturbance due to habitat modifications or vibration of heavy equipment resulting from timber harvest activities. However, since USFWS technical assistance would provide additional measures to survey and protect unidentified burrows, effects are expected to be **less than significant**.

Other species of concern

For the No Action alternative, in addition to the following analyses for other species of concern, site-specific effects on other species of concern would be assessed through the completion of individual THPs, subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with the CFPRs and other applicable mitigation requirements.

Based on the specialized wildlife communities query using information from the California Wildlife Habitat Relationships database for the No Action alternative (described above in Section 3.6.2.1), habitat values are expected to substantially decrease (greater than -66%) for white-tailed kite, golden eagle, northern goshawk and Humboldt marten. However, specific nest protection measures and considerations such as changes in advanced-successional patch size and connectivity, and availability of critical habitat elements such as snags and downed logs (described below) for several of these species would offset some of the predicted effects related strictly to changes in overall forest structure. Habitat values are expected to remain similar (less than +/- 66%) for great blue heron (rookery). great egret (rookery), osprey, bald eagle, American peregrine falcon, olive-sided flycatcher, pallid bat, Townsend's big-eared bat, California ringtail, Pacific fisher, and Sonoma tree vole. Habitat values are expected to substantially increase (greater than +66%) for Vaux's swift and purple martin.

Forest management activities (e.g., harvest, hauling, road maintenance, and helicopter yarding) could potentially cause indirect disturbance due to structural changes in habitat and changes in tree species composition, and/or direct disturbance of nests from noise, vibration, and human activity. Such disturbance could result in nest failure or abandonment or disruption of breeding/denning for the following species of concern. The descriptions below include strategies and/or habitat analyses under the No Action alternative that may counteract potential negative effects.

- **Great blue heron (rookery) and great egret (rookery).** Under the No Action alternative, 2012 CFPRs (14 CCR §919.3) apply, which include a consultation with CDFG, a 300-ft (91-m) buffer zone around active nests and a critical period where operations near active nests are restricted. MRC's management strategy includes measures described in its 2000 Management Plan to actively recruit snags and wildlife trees, which provide important habitat elements for nesting great blue herons and great egrets.
- **Osprey and bald eagle.** Under the No Action alternative, 2012 CFPRs (14 CCR §919.3) apply, which include consultation with CDFG, 5- to 18-ac (2- to 7-ha) buffer zones for osprey nest trees and 10- to 40-ac (4- to 16-ha) buffer zones for bald eagle nest trees; preservation of nest, perch, screening, and replacement trees for both species; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. MRC's management strategy includes measures described in its 2000 Management Plan to actively recruit snags and wildlife trees, which provide important habitat elements for nesting osprey and bald eagles. A predicted increase in conifer-dominated and advanced-successional habitats over time also provides an increase in available nesting and winter communal roosting habitat for these species.
- **White-tailed kite.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for white-tailed kite to decline by 100% from year 0 to year 80 under the No Action alternative. However, the California Wildlife Habitat Relationships database only associates white-tailed kite with the following available habitat combination: Redwood habitat type with size class 2 and cover code "open." This specific habitat combination is predicted to decrease by year 80 because of the increase in mid- and advanced-successional conditions, and explains the decrease in habitat value for white-tailed kite. White-tailed kite breeds in lowland grasslands, oak woodlands or savannah, and wetlands with open areas. There are only a few acres of grassland in the primary assessment area and the grasslands are not affected by timber management activities. Since white-tailed kite is not associated with habitat conditions that are present in managed portions of the primary assessment area, there are no anticipated effects on this species.
- **Golden eagle.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for golden eagle to decline by 97% from year 0 to year 80 under the No Action alternative. This can be attributed to the association of golden eagle with only Montane Hardwood and Montane Hardwood Conifer habitat types in the California Wildlife Habitat Relationships database query, and the projected decline in those habitat types through year 80 under the No Action alternative. However, under the No Action alternative, 2012 CFPRs (14 CCR §919.3) apply, which include consultation with CDFG, a minimum 8-ac (3-ha) buffer zone for nest trees; preservation of nest, perch, screening, and replacement trees; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. MRC's management strategy includes measures described in its 2000 Management Plan to actively recruit snags and wildlife trees, which provide important habitat elements for nesting golden eagles. Under its 2000 Management Plan, MRC would retain all true oaks greater than 18 in (46 cm) diameter at breast height, and agencies would review all THPs to identify and retain hardwood trees that enhance wildlife habitat; these measures would also protect habitat for golden eagles.
- **Northern goshawk.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for northern goshawk to decline by 75% from year 0 to year 80 under the No Action alternative. This can

be attributed to the strong association of northern goshawk with Montane Hardwood and Montane Hardwood Conifer habitat types in the California Wildlife Habitat Relationships database query, and the projected decline in those habitat types through year 80 under the No Action alternative (the California Wildlife Habitat Relationships database shows a weak association of northern goshawk feeding habitat with Redwood habitat types). However, 2012 CFPRs (14 CCR §919.3) apply under the No Action alternative, which include consultation with CDFG, a 5- to 20-ac (2- to 8-ha) buffer zone for nest trees; preservation of nest, perch, screening, and replacement trees; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. In addition, there is a projected increase in conifer-dominated and advance-successional habitats over time, suggesting an increase in available habitat for this species.

- **Humboldt marten.** Humboldt marten has not been documented in the primary assessment area, but the primary assessment area is within the historical range of the species. The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for marten to decline by 99% from year 0 to year 80 under the No Action alternative. This can be attributed to the association of marten with only Montane Hardwood Conifer habitat type in the California Wildlife Habitat Relationships database query, and the projected decline in that habitat type through year 80 under the No Action alternative. However, there would be **beneficial effects** on Humboldt marten habitat because of the predicted increase in advanced-successional conifer habitats, a predicted improvement in habitat patch size and connectivity, and management strategies to increase the number of snags and wildlife trees over the 80-year analysis period. The importance of a dense and extensive shrubby understory is not captured in the California Wildlife Habitat Relationships modeling.

Under the No Action alternative, effects on other species of concern from disturbance during forest management activities are minimized by protections provided by the 2012 CFPRs (14 CCR §919.3) including consultation with CDFG; increases in advanced-successional conifer habitats; increases in habitat elements such as snags and wildlife trees; and predicted improvements in habitat patch size and connectivity. Therefore, these effects are considered **less than significant**.

Impact 3.6-1: Effects on golden eagle, American peregrine falcon, pallid bat, and/or Townsend's western big-eared bat from potential habitat modifications. Under the No Action alternative, there is no specific strategy to maintain and preserve rocky outcrops. If MRC opts to convert rocky outcrops (e.g., to a quarry) under the No Action alternative, it could remove valuable nesting habitat for golden eagle or American peregrine falcon, and roosting habitat for pallid bat or Townsend's western big-eared bat. Because removal of rocky outcrop habitat would adversely affect golden eagle, American peregrine falcon, pallid bat and/or Townsend's western big-eared bat through nesting or roosting habitat modifications or removal of nesting or roosting habitat, this effect is considered **potentially significant**.

Under the No Action alternative, there are predicted **beneficial effects** on Vaux's swift, olive-sided flycatcher, purple martin, Pacific fisher, and Sonoma red tree vole because of a predicted increase in advanced-successional conifer habitats, a predicted improvement in habitat patch size and connectivity, and management strategies to increase the number of snags and wildlife trees over the 80-year analysis period (which would also benefit Townsend's western big-eared bat). A shift in tree species compostion away from Douglas-fir could be detrimental to the tree vole, as could the invasion of the barred owl. Under the No Action alternative, there are anticipated beneficial effects on California ringtail since conservation strategies are included to increase the number of snags and wildlife trees (mid-successional habitats are predicted to remain stable).

Effects on wildlife communities

Based on the specialized query using information from the California Wildlife Habitat Relationships database for the No Action alternative, the primary assessment area would continue to provide habitat for species that currently have associated high or moderate habitat values under existing conditions. By year 80, it is estimated that the No Action alternative would result in an overall decrease of 66% or more of the habitat index value for 1 species of amphibian, 5 species of reptiles, 54 species of birds, and 19 species of mammals; and an overall increase in the habitat index value for 2 species of amphibians, 0 species of reptiles, 8 species of birds, and 5 species of mammals[38] (Table 3.6-8, Appendix P). The habitat index value for the remaining number of species would not change substantially. Appendix P lists each species, its starting habitat index value at year 0, and projected change in habitat index value (increase or decrease by 33%–66% or more) for every 20 years under each alternative.

Table 3.6-8. Number of wildlife species for which habitat value (quantity x quality) substantially increases or decreases (> 66% change) or remains similar relative to existing conditions under the No Action alternative, based on California Wildlife Habitat Relationships modeling.

Taxonomic group	Year			
	20	40	60	80
Amphibians				
Increase in habitat value	1	1	2	2
Minimal change in habitat value	18	17	16	16
Decrease in habitat value	0	1	1	1
Reptiles				
Increase in habitat index value	1	1	0	0
Minimal change in habitat value	18	14	15	14
Decrease in habitat index value	0	4	4	5
Birds				
Increase in habitat index value	14	11	6	8
Minimal change in habitat value	126	97	96	82
Decrease in habitat index value	4	36	42	54
Mammals				
Increase in habitat index value	6	5	5	5
Minimal change in habitat value	65	57	57	50
Decrease in habitat index value	3	12	12	19

The California Wildlife Habitat Relationships modeling results above do not account for the change in availability of different habitat elements based on unique management scenarios under future projections. Rather, the specialized query developed for this analysis simply assumes that all special habitat elements are present in adequate amounts if they are typical components of the habitat. Species such as woodpeckers, fishers, and others associated with snags and downed logs may be more likely to be affected by management of these habitat elements rather than dominant tree type, though these habitat elements tend to be found in advanced-successional rather than earlier-successional forest. Likewise, species associated with aquatic habitats (such as amphibians

[38] These tallies include the species of concern discussed under "Other species of concern" above, as well as species not currently considered as species of concern.

and turtles)—while included in this modeling analysis—are much more likely to be affected by management practices influencing instream habitat than by the dominant habitat type. Interpretation of modeling results must consider that factors other than dominant tree type, average tree diameter, and average canopy closure (the variables that can be modeled) have a considerable influence over habitat suitability for wildlife.

Many of the species with predicted decreases in habitat value are weakly associated with existing habitat conditions in the primary assessment area. This means that these species are associated with habitat conditions that are not present in the primary assessment area, and that the primary assessment area can only support relatively low population densities of these species. Most other species showing a decrease in habitat value are those largely associated with Montane Hardwood and Montane Hardwood-Conifer California Wildlife Habitat Relationships habitat types, often in combination with smaller size classes and open-canopied forests. As with every alternative, there is a trend under the No Action alternative towards more advanced-successional forest habitat and less early- and/or mid-successional habitat, and a trend toward more redwood-dominated habitat and less hardwood-dominated habitat. These trends would affect wildlife communities in the following ways:

- While wildlife diversity is dependent on many environmental factors, more wildlife (vertebrate) diversity may generally be associated with early- and late-successional conditions than mid-successional conditions (e.g., Olsen et al. 2001). Early- and mid-successional forests with plenty of edge habitat may tend to provide higher habitat value to wildlife species that are generalists, while species using advanced-successional forest types tend to be more specialized in their habitat requirements. Past forest management in the region has converted advanced-successional forest to early- and mid-successional forest with more edge habitat. The wildlife species associated with advanced-successional forest tend to be rarer and in decline, whereas wildlife species associated with early-successional, mid-successional, and edge habitats generally have more habitat available to them. The trend under all of the alternatives towards more advanced-successional forest habitat and less early- and/or mid-successional habitat (i.e., towards a more pre-European forest condition) could reduce overall (cumulative) habitat value for wildlife. However, it is expected to benefit the species of most conservation concern.
- Much of the hardwood-dominated California Wildlife Habitat Relationships forest types (Montane Hardwood and Montane Hardwood-Conifer) in the primary assessment area are the result of past management practices that have tended to favor hardwood-dominated early- and mid-successional forest. While a trend under all of the alternatives towards more redwood-dominated habitat and less hardwood-dominated habitat is expected to reduce overall forest diversity and thus overall (cumulative) habitat value for wildlife, an increase in conifer-dominated California Wildlife Habitat Relationships forest types moves forest conditions towards a more natural state for the region; albeit the agencies do not know what that range of values includes.

Of the game communities that occur within Mendocino County and have suitable habitat in the primary assessment area, species with predicted large decreases (greater than 66% at year 80) in habitat value under the No Action alternative that occur within harvestable vegetation types found in the primary assessment area include sooty grouse (associated with mixed conifer and Douglas-fir forests), wild turkey (a non-native introduced species primarily associated with conifer-oak woodlands), American beaver, and ermine (associated with mixed conifers). Other game species with large predicted declines in habitat value (brush rabbit, black-tailed jackrabbit, and American badger) are largely associated with early-successional, shrub, grassland, and/or chaparral habitats, which comprise very little of the primary assessment area.

While certain non-special-status wildlife communities may experience reductions in habitat value (Table 3.6-8), management towards more advanced-successional and conifer habitats under the No Action alternative is expected to: (1) benefit the species of most conservation concern; and (2) not substantially reduce the overall habitat of any wildlife species in a way that would cause a wildlife population or community to drop below self-sustaining levels in California. Therefore, effects on wildlife communities under the No Action alternative are considered **less than significant**.

3.6.2.3 Proposed Action

Analysis of trends in terrestrial habitat types and successional stage

As described in Section 3.5.2 (Vegetation and Plant Species of Concern, Environmental effects and mitigation), the predicted overall trend in the dominant California Wildlife Habitat Relationships habitat type under the Proposed Action is a decrease in both Montane Hardwood and Montane Hardwood-Conifer and an increase in relative proportion of Redwood in most conifer stands. The predicted overall trend in California Wildlife Habitat Relationships size class under the Proposed Action is a substantial decrease in the percentage composition of grass, forbs, brush, and younger trees (i.e., classes 1, 2 and 3), a substantial increase in the percentage composition of class 4 and 5 trees, and an increase in the percentage composition of class 6 (larger and mixed-size trees).

Over 80 years, there is a predicted forest-wide decrease in early-successional forest from about 8% to none under the Proposed Action. Correspondingly, there is an increase in advanced-successional forest from approximately 2% to 14% (Figure 3.6-8, Appendix Q [Successional Stage (forest-wide) by Inventory Type]). Despite a small decrease, the acreage of mid-successional forest would remain relatively stable.

Successional stage composition in riparian buffer zones is predicted to change noticeably over 80 years, with advanced-successional habitat increasing from approximately 7% to 80% over the 80-year analysis period (Figure 3.6-9, Appendix Q [Successional Stage (riparian) by Inventory Type]). Early successional conditions, a trace of the landscape during the first 20 years , is predicted to be nearly eliminated by year 30.

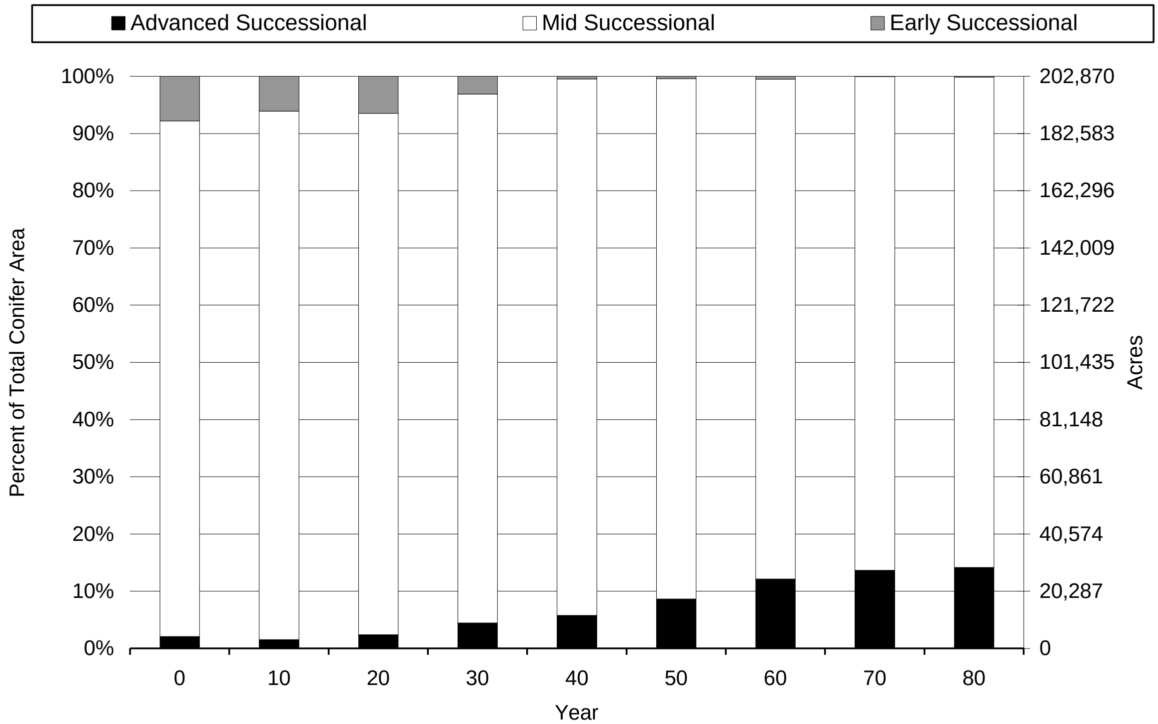


Figure 3.6-8. Successional stage composition predicted forest-wide by decade under the Proposed Action.

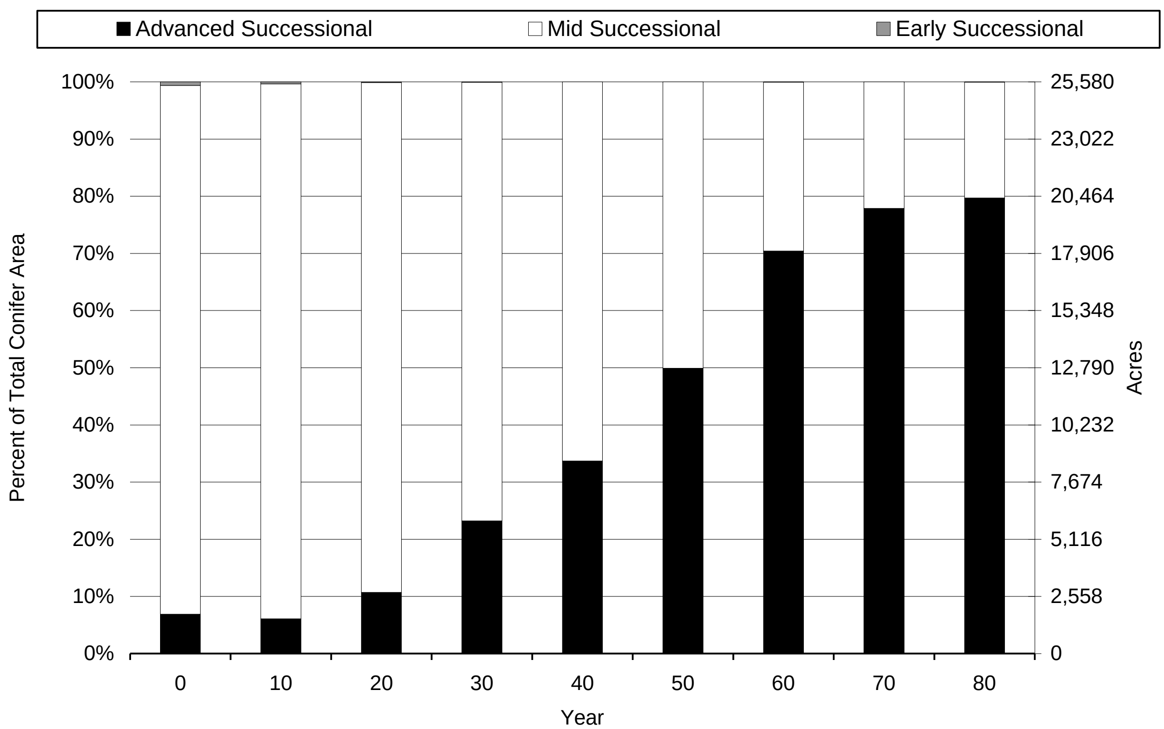


Figure 3.6-9. Successional stage composition predicted in riparian buffer zones by decade under the Proposed Action.

Effects on advanced-successional patch size and habitat connectivity

Under the Proposed Action, the number and total area of advanced-successional patches greater than or equal to 80 ac (32 ha) are predicted to increase over 80 years, although with a decrease in the number of such patches during the last 20 years (Table 3.6-9). The number and total area of such patches within 1 mi (1.6 km) of another large patch is also predicted to increase over 80 years, with a decrease in number during the last 20 years (Table 3.6-9, Figure 3.6-10). In years 20 and 80, increase in patch size and connectivity is primarily observed in the Albion and Navarro West inventory blocks, and the southern third of the South Coast inventory block. By year 80, increase in patch size and connectivity is evident throughout the entire primary assessment area. The majority of patches are aggregations of linear, riparian stands (Figure 3.6-10). The predicted decrease in number of patches greater than or equal to 80 ac (32 ha) during the last 20 years is due to stands without harvesting constraints (e.g., stands selected as Class I and Large Class II watercourse buffers, northern spotted owl buffers, marbled murrelet buffers, etc.) meeting harvest triggers. Compared with existing conditions, the Proposed Action would improve advanced-successional patch size conditions, with increases in patch size and habitat connectivity of predominantly riparian stands.

Table 3.6-9. Number and total area (ac) of advanced-successional patches greater than or equal to 80 ac (32 ha), and within 1 mi (1.6 km) of another patch under the Proposed Action.

Parameters	Year				
	0	20	40	60	80
Number of patches greater than or equal to 80 ac	6	8	24	47	38
Total area of patches greater than or equal to 80 ac	1,497	2,659	6,498	20,909	25,932
Number of patches greater than or equal to 80 ac AND within 1 mi of another patch	4	7	21	44	37
Total area of patches greater than or equal to 80 ac AND within 1 mi of another patch	1,181	2,546	6,047	20,532	25,777

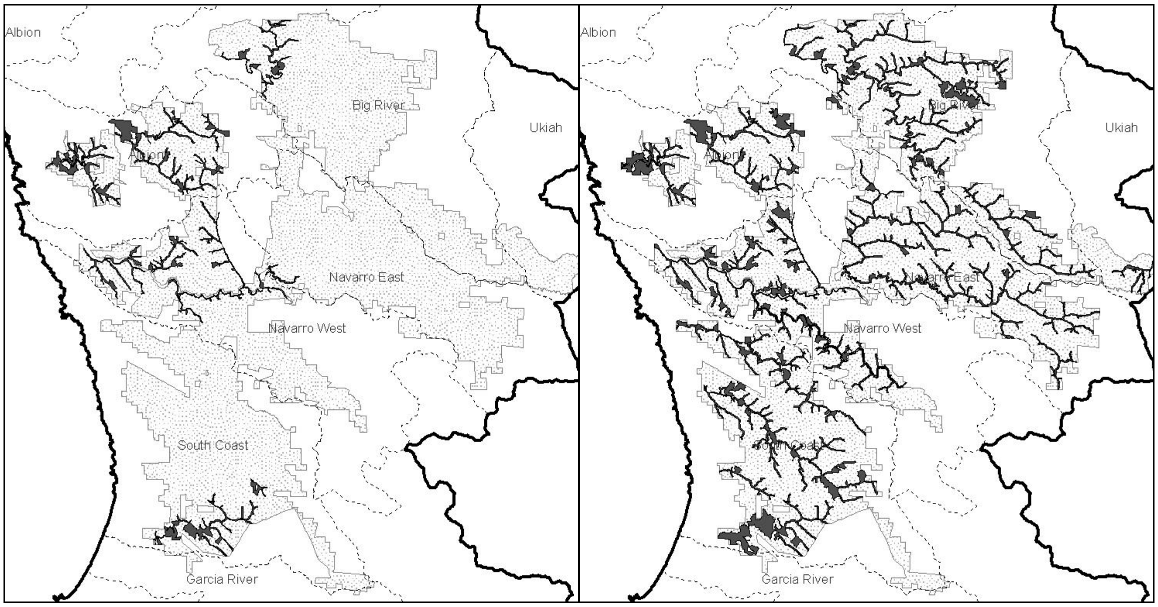


Figure 3.6-10. Distribution of advanced-successional patches greater than 80 ac (32 ha) and within 1 mi (1.6 km) of another patch in a subsection of the primary assessment area modeled for year 40 (left) and year 80 (right) under the Proposed Action (advanced-successional patches are indicated in dark gray) (existing conditions are shown in Figure 3.6-1).

Under all of the alternatives, MRC forestlands would be used for timber production as opposed to alternate land uses, helping to minimize fragmentation of lands and provide value for terrestrial resources.

Effects on important habitat and habitat elements

The following section analyses effects on important habitat and habitat elements Effects determinations are not provided for habitat elements, with the exception of old-growth trees and stands since they are a unique community with intrinsic biological and social value in addition to providing habitat value for wildlife. For analyses of individual species of concern associated with the following habitat elements, see the subsection below titled "Effects on wildlife species of concern."

Old-growth trees and stands

Under the Proposed Action, all 101 ac (40 ha) of Type I old growth in the primary assessment area would be retained. There would be no harvest in Type I old growth, and a 150-ft (46-m) buffer would be protected that retains at least 75% of the basal area of conifers in the Type I old-growth stand (e.g., a Type I stand with a basal area of 200 ft^2 [19 m^2] would have a 150-ft [46-m] wide buffer with basal area of 150 ft^2 [14 m^2]). If any additional Type I old growth is identified, it would managed the same.

All 520 ac (210 ha) of Type II old growth in the primary assessment area would be retained. There would be harvest of non-old-growth trees within Type II old growth using single-tree selection to maintain and increase mean stand diameter. Screen trees for old growth in Type II stands would be retained or recruited, if necessary. If any additional Type II old growth is identified, it would be managed the same.

Residual old-growth trees would be protected, and screen trees retained. If a residual old-growth tree needs to be felled for safety reasons, the agencies would be notified.

Because all Type I and Type II old-growth stands and residual old-growth trees would be retained and stand function potentially enhanced, **beneficial effects** on old-growth trees are anticipated under the Proposed Action compared with existing conditions.

Snags, logs, and wildlife trees

Figure 3.4-4 (in Section 3.4 [Aquatic and Riparian Habitats and Species of Concern]), Figure 3.6-11, and Appendix Q (Large Tree Density [forest-wide] by Inventory Block and Large Tree Density [riparian] by Inventory Block) show timber modeling results for large tree density for the next 80 years under the Proposed Action, forest-wide and in riparian buffer zones. Forest-wide, trees with a diameter at breast height of > 32 in (81 cm) are predicted to increase from an estimated 1 tree per acre to approximately 5 trees per acre between years 0 and 80; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 5 trees per acre to approximately 11 trees per acre, with the exception of a slight temporary decrease (approximately 1 tree per acre) between years 0 and 10. The slight temporary decrease between years 0 and 10 is due to stands without harvesting constraints meeting harvest triggers.

In riparian buffer zones, trees with a diameter at breast height of > 32 in (81 cm) are predicted to increase from an estimated 2 trees per acre to approximately 20 trees per acre between years 0 and 80; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 8 trees per acre to approximately 30 trees per acre (Section 3.4 [Aquatic and Riparian Habitats and Species of Concern], Figure 3.4-4). The predicted overall trend for large trees under the Proposed Action is an increase in trees per acre over the proposed 80-year term of the HCP/NCCP, both forest-wide and in riparian buffer zones. An increase in large tree density in the primary assessment area may enhance snag, log, and wildlife tree recruitment.

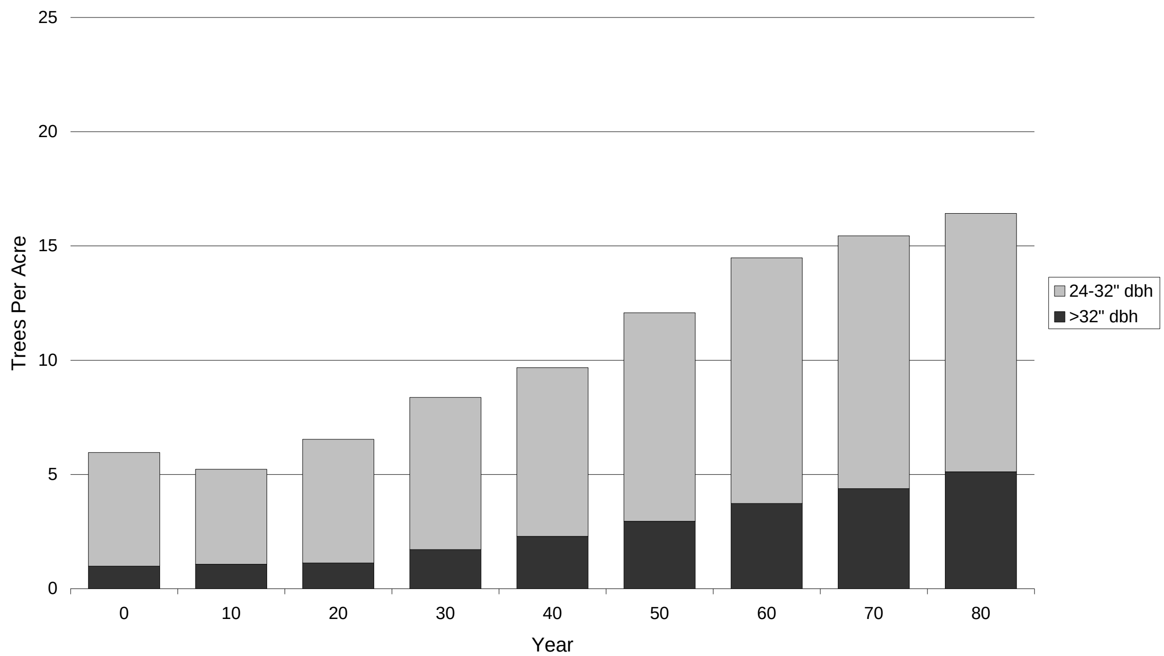


Figure 3.6-11. Large tree density (trees per acre) predicted forest-wide by decade under the Proposed Action.

The Proposed Action also incorporates explicit conservation measures aimed at retaining and recruiting a specific quantity and distribution of snags, logs, and wildlife trees across the forest in both riparian and upslope areas. Conservation objectives for snags, logs, and wildlife trees include: retaining at least an average of 3 hard snags per acre in Class I and Large Class II Aquatic Management Zones and 2 hard snags per acre in other forested areas; 6 hard logs per acre in Class I and Large Class II Aquatic Management Zones and 5 hard logs per acre in other forested areas; and one wildlife tree per acre in riparian and other forested areas. Incorporation of such measures, as well as screen trees for old-growth trees, in combination with the assumed increase in availability of large trees over time that may serve to recruit new snags, logs, and wildlife trees, would enhance conditions for native wildlife species by improving the abundance and distribution of these habitat elements.

Hardwoods stands and hardwoods within conifer stands

Under the Proposed Action, MRC's habitat conservation measures include protection of hardwood forest at locations where site conditions favor hardwoods as the natural, advanced-successional habitat type. Stands dominated by native hardwoods (e.g., tanoak, madrone, and true oaks) that have never been managed for conifer timber production would not be harvested. Stands that are dominated by native hardwoods only because of past management would be harvested to allow restoration to conifer dominance; except for representative mid-successional hardwood stands, which would be retained across the primary assessement area. The last strategy would assure representations of early- to mid-successional hardwood stands. While there would be a trend towards more redwood-dominated habitat and less hardwood-dominated habitat and associated wildlife species, hardwood retention and protection would continue to provide wildlife value under the Proposed Action. In addition, higher hardwood basal area standards would be applied under certain triggers under the northern spotted owl strategy. Due to retention of representative mid-successional hardwood areas and the northern spotted owl adaptive management-triggered strategies to increase hardwood basal area, the Proposed Action results in improved conditions for hardwoods as compared with the No Action alternative.

Rocky outcrops

MRC's HCP/NCCP incorporates conservation measures to preserve and maintain the known 63 ac (25 ha) of rocky outcrops in the primary assessment area. Newly discovered rocky outcrops would be surveyed for sensitive species if there are plans to convert them to quarries; if sensitive species are not present, MRC may convert the site (e.g., to a quarry); if sensitive species are present, MRC would consult with and obtain approval of the wildlife agencies prior to converting the site. Other conservation measures for rocky outcrops specific to peregrine falcon are discussed below under the subsection "Effects on wildlife species of concern."

Since the Proposed Action incorporates measures to preserve and maintain the currently known rocky outcrops and avoid and/or minimize effects on special concern species if newly discovered rocky outcrops are considered for conversion to a quarry, species that use rocky outcrops would be better protected than under the No Action alternative (see the subsection "Effects on wildlife species of concern" below for effects determinations).

Effects on wildlife species of concern

In addition to the following analyses for wildlife species of concern, site-specific effects would be assessed and appropriate mitigation measures developed under the Proposed Action through completion of individual PTHPs, subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with applicable mitigation requirements.

Under the Proposed Action, post-fire timber salvage would follow the prescriptions in MRC's proposed HCP/NCCP, which include site-specific measures to retain old-growth trees, retain additional snags, and protect wildlife trees (including potential nest trees for northern spotted owl, potential nest trees for marbled murrelet, and trees with known raptor nests). MRC would need to consult with the wildlife agencies before taking actions in the Lower Alder Creek Management Area (the proposed marbled murrelet protection area), and would not conduct salvage operations within 100 ft (30 m) of known Point Arena mountain beaver burrow systems. These HCP/NCCP measures would provide additional terrestrial habitat protections in burned areas and would reduce the potential for effects on wildlife species of concern compared with existing conditions and the No Action alternative.

Marbled murrelet

Under the Proposed Action, the HCP/NCCP proposes the use of radar and ground-based surveys to monitor marbled murrelet populations. The agencies find risk of harm, harassment, or mortality due to radar surveys to be so remote as to result in an estimate of zero marbled murrelets adversely affected over the 80-year term of the HCP/NCCP. Likewise, survey and monitoring efforts for other species do not alter marbled murrelet habitat and should not alter marbled murrelet behavior; the risk that they would lead to impacts is limited to attracting predators to occupied habitat. The agencies believe this source of incidental harm or harassment also approaches zero over the term of the plan.

Under the Proposed Action, the predicted overall trend for potentially suitable marbled murrelet habitat from year 0 to year 80 is an increase by approximately 9,300 ac (3,764 ha) for Zone 1 and an increase by approximately 1,780 ac (720 ha) for Zone 2 (Figure 3.6-12, Appendix Q [Marbled Murrelet Habitat Plan Area]). In Zone 3, there is a decrease in potentially suitable marbled murrelet habitat from year 0 during years 10–70, and a return to the approximate acreage of year

0 by year 80. Appendix F, Figures F-20 and F-21 show projected distribution of marbled murrelet habitat for years 40 and 80 under the Proposed Action.

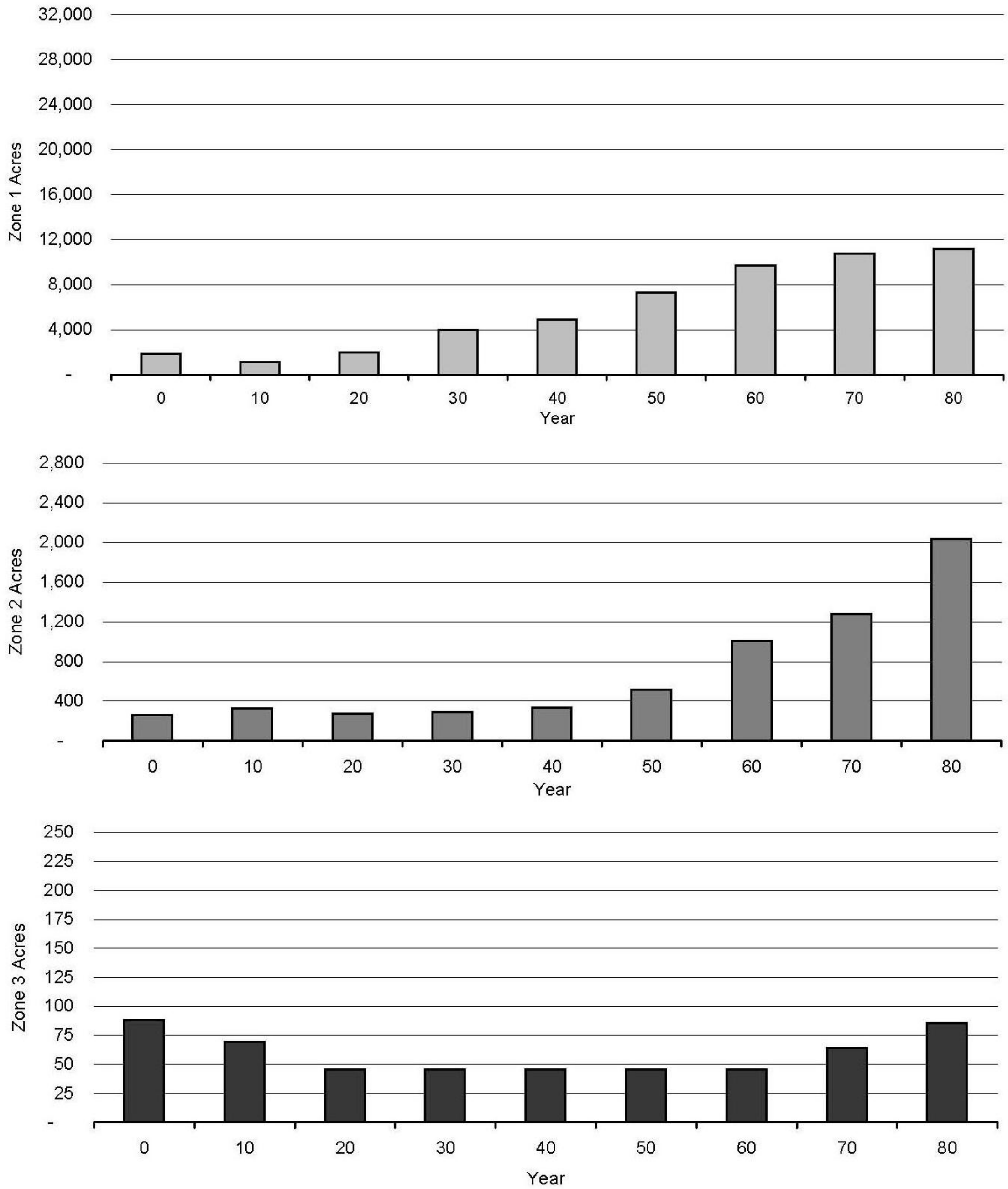


Figure 3.6-12. Potentially suitable marbled murrelet habitat predicted by decade under the Proposed Action.

In the terrestrial habitat analysis presented above for the Proposed Action, there would be an increase in advanced-successional habitat and connectivity, predominantly in riparian stands. Old-growth stands would be protected through conservation measures outlined in the HCP/NCCP. Outside of old-growth stands, individual old-growth trees would be protected by screen trees. Plan-wide, strategies to retain and recruit wildlife trees may allow recruitment of trees meeting old-growth characteristics over time.

The HCP/NCCP outlines conservation measures intended to minimize and mitigate the effects of incidental take of marbled murrelets. Specific conservation measures aimed at protecting marbled murrelets and habitat would promote the development of mature and advanced-successional forest in 1,237 ac (500 ha) designated as the Lower Alder Creek Management Area, and in Aquatic Management Zones. In the Lower Alder Creek Management Area, no forest management operations would be allowed in core marbled murrelet areas, and timber management in other areas would be only be allowed (with agency technical assistance) to enhance marbled murrelet habitat. Surveys for murrelets and potential habitat would be conducted within and outside the Lower Alder Creek Management Area. If marbled murrelet populations are observed to decline, management of corvids in the Lower Alder Creek Management Area would possibly be implemented as part of an extensive monitoring and adaptive management program. MRC would also cooperate with the agencies in setting aside mature stands outside of Lower Alder Creek Management Area to be managed to promote murrelet habitat.

Timber management activities (e.g., harvest, hauling, and road maintenance) could potentially cause direct disturbance of marbled murrelet nests from noise, vibration, and human activity resulting in nest failure or abandonment, and/or indirect disturbance resulting from removal or degradation of habitat. However, since: (1) there would be conservation measures in place under the Proposed Action to protect marbled murrelet individuals, nest sites, and habitat; (2) there are predicted trends showing an increase in the index for potentially suitable marbled murrelet habitat compared with existing conditions; (3) recruitment stands outside of the Lower Alder Creek Management Area would be identified for acquisition by the agencies and managed for murrelets; and (4) there would be an extensive monitoring and adaptive management program that would monitor presence of the species, its habitat, and the effectiveness of management strategies, there would be **beneficial effects** on marbled murrelet under the Proposed Action.

Northern spotted owl

Under the Proposed Action, MRC proposes to band northern spotted owls for purposes of long-term monitoring and adaptive management to better understand the demographic patterns of owl populations and the success of reproduction and survival of owls protected by different management strategies. Banding under the HCP/NCCP permit would replace a typical federal ESA Section 10(a)(1)(A) recovery permit. There would be several restrictions placed on the northern spotted owl banding program as stated in the HCP/NCCP:

- In every calendar year MRC must either band or re-sight (identify the bands from previous years' banding) a total of at least 60 northern spotted owls.
- If MRC does not succeed in banding or re-sighting the required number of spotted owls, MRC would meet with the wildlife agencies to determine if the banding program can be continued.
- MRC would include in an annual report: (a) re-sightings of spotted owls dispersing from other timberlands or other territories on covered lands; (b) calculations to determine demographic parameters of owl populations (such as survival); and (c) lists of all bands placed on spotted owls.
- MRC would report any injury or mortality to the wildlife agencies.
- MRC would only use individuals approved by the wildlife agencies to capture and band spotted owls.

Spotted owl monitoring includes both surveys and banding. Monitoring is essential to evaluate the effectiveness of MRC's terrestrial conservation measures and assess whether the biological goals and objectives of the HCP/NCCP are being met for this species. Survey efforts, including hooting and mousing as specified in the USFWS-endorsed survey guidelines (USFWS 2011c), can affect owl behavior. However, to date the USFWS has not found that these surveys significantly impair essential behavioral patterns, including breeding, feeding or sheltering. Therefore, the USFWS does not currently require permits to conduct surveys pursuant to the guidelines.

Estimates of the maximum number of northern spotted owls that would be captured per decade, shown in Table 3.6-10, are derived from recent efforts and adjusted for possible population increases. Spotted owl banding for the HCP/NCCP requires capture and processing of owls, an activity that can lead to injury or occasional direct mortality, as well as increased stress and reduced nesting success (i.e., harassment). Mortality of individual owls as a result of banding is expected to be minimal because of the restrictions placed on the banding program, and population-level effects are not expected. These estimates do not include incidental harm, harassment, or mortality that may occur through modification of habitat during forest management activities.

Table 3.6-10. Estimated maximum number of northern spotted owls captured and handled per decade during monitoring activities over the 80-year Proposed HCP/NCCP permit term.

Life stage	Estimated number captured/handled per decade
Hatch-year	105
After hatch-year	195

During monitoring activities between 1990 and 2011, MRC annually captured and handled between 0 and 51 hatch-year (average of 12 per year) and 1 and 89 after hatch-year (average of 25.5 per year) northern spotted owls (MRC unpublished data). Effects on northern spotted owls due to monitoring activities are expected to be minimal, as such efforts would not substantially reduce numbers, cause populations to drop below self-sustaining levels, or restrict the range of the species.

Under the Proposed Action, forest-wide nesting/roosting habitat for northern spotted owl is predicted to decrease slightly by year 10; this can be explained by some conifer stands being harvested for the first time (having met harvest triggers) by year 10, and because variable retention and rehabilitation are increasing in the first ten years. In years 20–80, nesting/roosting habitat is predicted to increase and fluctuate between an additional 9,800 and 29,900 ac (3,966 and 12,100 ha) as compared with year 0 (28–38% of the total acreage in the primary assessment area) (Figure 3.6-13, Appendix Q [Northern Spotted Owl Habitat (forest-wide) Plan Area]). The trend for foraging habitat is to remain relatively stable (between 51 to 61% of total area) through year 80. Non-suitable habitat is predicted to slightly decrease over 80 years as compared with year 0. Overall, there would be more nesting/roosting habitat over 80 years as compared with year 0 under the Proposed Action, with 15,500 ac (6,273 ha) more than year 0 by year 80. Appendix F, Figures F-22 and F-23 show projected distribution of northern spotted owl habitat for years 40 and 80 under the Proposed Action.

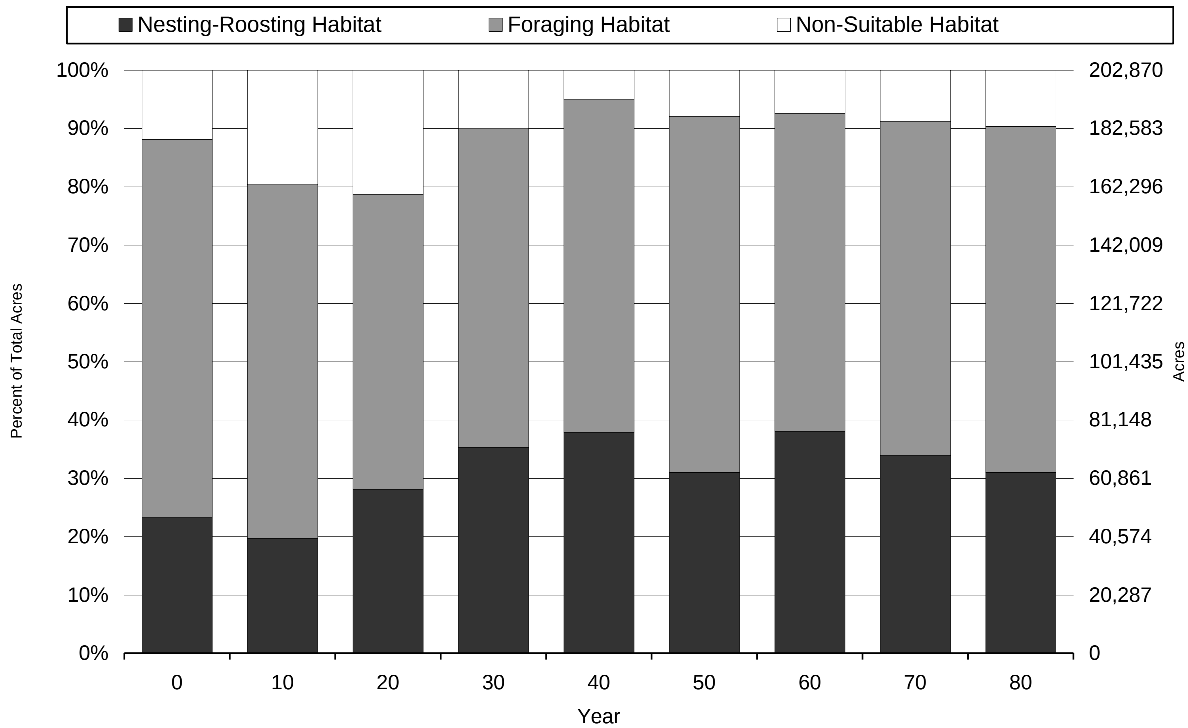


Figure 3.6-13. Northern spotted owl habitat predicted by decade under the Proposed Action.

In the terrestrial habitat analysis presented above for the Proposed Action, there would be several predicted trends and protections that would support northern spotted owls. There would be an increase in advanced-successional habitat and connectivity, predominantly in riparian stands. Old-growth stands and individual old-growth trees would be protected through conservation measures outlined in MRC's HCP/NCCP, which also includes strategies to retain and recruit wildlife trees. Management strategies under the HCP/NCCP would also include hardwood retention and protection that would preserve northern spotted owl foraging habitat.

The HCP/NCCP outlines conservation measures intended to minimize and mitigate the effects of incidental take of northern spotted owls. Specific conservation measures aimed at protecting northern spotted owls and habitat would maintain and increase productive owl territories and increase the area of nesting/roosting habitat. In addition, the Proposed Action provides for minimization of disturbance of nesting spotted owls, management of invasive barred owls, intensive long-term monitoring/surveying of the northern spotted owl population, and adaptive management-triggered strategies to increase hardwood basal area for northern spotted owls.

It is difficult to predict the result of barred owl management on northern spotted owl populations in the primary assessment area. With effective barred owl management, there is a reasonable likelihood that a viable northern spotted owl population could be maintained over time in the primary assessment area, although there is a possibility that barred owl control efforts would eventually fail. If barred owl management failed, there is a possibility that spotted owl populations would be extirpated from the primary assessment area.

It is difficult to estimate the number of barred owls that would be captured, relocated, sterilized, and/or removed using lethal means over the 80-year permit term. After initial implementation of barred owl management, the number of barred owls requiring capture and/or removal would possibly decrease within the primary assessment area and vicinity, but in the absence of a larger, range-wide management program, the numbers would likely rebound. For the purposes of this assessment, we assume approximately 30 barred owls would require capture and/or removal in the primary assessment area each year to meet the goals and objectives of the spotted owl management plan under the Proposed Action. During the 80-year term of the incidental take authorizations, this estimate would equate to the capture and/or removal of a total of approximately 2,400 barred owls. Under a completely successful barred owl management program, barred owl would be nearly or completely extirpated from the primary assessment area. Given the extent of the barred owl invasion and the relatively small area of the primary assessment area relative to the remainder of California, there would likely be no substantial effect on the viability of the barred owl population in California. There would certainly be no substantial effect on the status of barred owl populations throughout the remainder of North America.

Timber management activities (e.g., harvest, hauling, road maintenance, and helicopter yarding) could potentially cause direct disturbance of northern spotted owl nests from noise, vibration, and human activity resulting in nest failure or abandonment, and/or indirect disturbance resulting from removal or degradation of habitat. However, since: (1) there would be thorough measures in place under the Proposed Action to protect specific amounts of northern spotted owl nesting, roosting, and foraging habitat; (2) the HCP/NCCP provides for minimization of disturbance of nesting spotted owls; (3) there are predicted trends showing an overall increase in nesting/roosting habitat compared with existing conditions; and (4) there would be an extensive monitoring and adaptive management program that would monitor presence of the species, its habitat, and the effectiveness of management strategies (and trigger improvements in specific management actions based on monitoring results), there would be **beneficial effects** on northern spotted owl under the Proposed Action.

Point Arena mountain beaver

Under the Proposed Action, MRC proposes to monitor for Point Arena mountan beaver. Chapter 13 of the HCP/NCCP (*Monitoring and Adaptive Management*) (MRC 2012) indicates there are 14 known Point Arena mountain beaver burrow systems in the primary assessment area. The HCP/NCCP identifies two types of effectiveness monitoring efforts, the intent of which is to assess whether the plan is achieving its objectives:

1. Spatial Extent of Known Burrow Systems of Point Arena Mountain Beaver: once every 5 years, MRC will locate the edges and map each burrow system relative to a fixed, permanent reference point.
2. Creating Habitat within Dispersal Distance of Existing Point Arena Mountain Beaver Burrow Systems: MRC will create at least one site of potential habitat within dispersal distance of each active burrow system when timber harvest is adjacent to the burrow system. MRC will complete survey visits two years following harvest. When burrows are discovered, MRC will document spatial extent as described in #1.

The HCP/NCCP identifies two types of validation monitoring efforts, the intent of which is to evaluate the understanding upon which the plan's conservation measures are based or provide feedback to the conservation measures.

3. Defining Habitat for Point Arena Mountain Beavers: MRC will quantify the vegetation and abiotic conditions within each active burrow system and a nearby, randomly selected site during the spatial extent analyses described under #1. The HCP/NCCP proposes this

monitoring program as being optional, but a report prepared every five years is coincident with the Spatial Extent monitoring program.

4. Creating Potential Habitat in or adjacent to Existing Point Arena Mountain Beaver Burrow Systems: MRC will assign burrow systems to “control” and “treatment” based on similarity and proximity. At burrow systems assigned as treatment, both the area within the burrow system and its buffer will be managed for habitat as defined in the HCP/NCCP, as modified by the results of the “defining habitat” (#3) validation monitoring program, and/or coarse woody debris enhancements. Response of mountain beavers will be evaluated as presence and spatial extent in created habitat. This monitoring program is also optional, with no timeline assigned by the HCP/NCCP.

Direct mortality or injury of Point Arena mountain beavers is unlikely during any of the monitoring programs. Any effects due to the habitat improvement efforts themselves are addressed below. For each monitoring effort, some disturbance of mountain beavers (due to surveyors presence and activity), and minor habitat modification or damage (e.g., trampling of vegetation or collapse of tunnels) is possible as surveyors traverse and measure the burrow system and investigate its limits. Because the analysis tools are the same for monitoring program item #4 above, it presents the same risks as those described for the other programs. The risks to Point Arena mountain beavers are greatly outweighed by the conservation value of the information derived from the HCP/NCCP’s conservation and management measures.

Under the Proposed Action, MRC would implement HCP/NCCP conservation measures intended to minimize and mitigate the effects of incidental take on Point Area mountain beaver, including 200-ft (61-m) no-harvest buffer zones around Point Area mountain beaver habitat, and restrictions on road construction, traffic, rodent control, and ground disturbance (Section 2, Alternatives). Implementation of these conservation measures under the Proposed Action would protect the species from direct effects due to mortality and indirect effects due to alteration or modification of habitat. Measures also include improvement and/or creation of habitat as part of monitoring and adaptive management efforts, which may include manipulation of coarse woody debris loading and distribution or tree density within the limits of the burrow system and its standard buffer. These protection measures coupled with efforts to create habitat would result in **beneficial effects** on the species.

Other species of concern

In addition to the following analyses for other species of concern, site-specific effects would be assessed and appropriate mitigation measures developed under the Proposed Action through completion of individual PTHPs, subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with applicable mitigation requirements.

Based on the specialized wildlife communities query using information from the California Wildlife Habitat Relationships database for the Proposed Action, (described above in Section 3.6.2.1), habitat values are expected to substantially decrease (greater than -66%) for white-tailed kite, golden eagle, northern goshawk, and Humboldt marten. However, specific nest protection measures and considerations such as changes in advanced-successional patch size and connectivity, and availability of critical habitat elements such as snags and downed logs (described below) for several of these species would offset some of the predicted effects related strictly to changes in overall forest structure. Habitat values are expected to remain similar (less than +/- 66%) for great blue heron (rookery), great egret (rookery), osprey, bald eagle, American peregrine falcon, olive-sided flycatcher, pallid bat, Townsend’s big-eared bat, California ringtail, Pacific fisher, and Sonoma tree vole. Habitat values are expected to substantially increase (greater than +66%) for Vaux’s swift and purple martin.

Forest management activities (e.g., harvest, hauling, road maintenance, and helicopter yarding) could potentially cause indirect disturbance due to structural changes in habitat and changes in tree species composition, and/or direct disturbance of nests from noise, vibration, and human activity. Such disturbance could result in nest failure or abandonment or disruption of breeding/denning for the following species of concern (which include a description of strategies and/or habitat analyses under this alternative that may counteract potential negative effects):

- **Great blue heron (rookery) and great egret (rookery).** Since there are no specific strategies under the Proposed Action to minimize direct disturbance of great blue heron or great egret rookeries, the 2012 CFPRs (14 CCR §919.3) apply, which include consultation with CDFG, a 300-ft (91-m) buffer zone around active nests, and a critical period where operations near active nests are restricted. The Proposed Action does include conservation measures in the HCP/NCCP to retain existing and actively recruit snags and wildlife trees, which would incidentally provide important habitat elements for nesting great blue herons and great egrets.
- **Osprey and bald eagle.** Since there are no specific strategies under the Proposed Action to minimize direct disturbance of osprey and bald eagle nests, the 2012 CFPRs apply (14 CCR §919.3), which include consultation with CDFG, a 5- to 18-ac (2- to 7-ha) buffer zone for osprey nest trees, and a 10- to 40-ac (4- to 16-ha) buffer zone for bald eagle nest trees; preservation of nest, perch, screening, and replacement trees for both species; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. The Proposed Action does include conservation measures in the HCP/NCCP to retain existing and actively recruit snags and wildlife trees, which would incidentally provide important habitat elements for nesting osprey and bald eagles. A predicted increase in conifer-dominated and advanced-successional habitats over time would also provide an increase in available nesting and winter communal roosting habitat for these species under the Proposed Action.
- **White-tailed kite.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for white-tailed kite to decline by 98% from year 0 to year 80 under the Proposed Action. However, the California Wildlife Habitat Relationships database associates white-tailed kite with only one of the habitat combinations mapped on MRC lands: Redwood habitat type with size class 2 and cover code “open.” This specific habitat combination is predicted to decrease by year 80 because of the increase in mid- and advanced-successional conditions, and explains the decrease in habitat value for white-tailed kite. White-tailed kite breeds in lowland grasslands, oak woodlands or savannah, and wetlands with open areas. There are only a few acres of grassland in the primary assessment area and the grasslands are not affected by timber management activities, although they could be indirectly affected by such activities in adjacent forest habitat (which would be addressed during site-specific PTHP review). Since white-tailed kite is not associated with habitat conditions that are present in managed portions of the primary assessment area, there are no anticipated effects on this species. However, impacts to this and other species using non-timber habitat are possible if PTHP activities are in or near to these non-timber types. Agency review will address these instances on a site-specific basis.
- **Golden eagle.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for golden eagle to decline by 81% from year 0 to year 80 under the Proposed Action. This can be attributed to the association of golden eagle with Montane Hardwood, Montane Hardwood Conifer, and open or sparse Redwood habitat types in the California Wildlife Habitat Relationships database query, and the projected decline in those habitat types through year 80 under the

Proposed Action. However, under the Proposed Action, the 2012 CFPRs (14 CCR §919.3) apply, which include consultation with CDFG, a minimum 8-ac (3-ha) buffer zone for nests; preservation of nest, perch, screening, and replacement trees; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. The Proposed Action also includes conservation measures in the HCP/NCCP to retain existing and actively recruit snags and wildlife trees, which would incidentally provide important habitat elements for nesting golden eagles. In addition, MRC would retain oak-woodlands, true oak stands, and oak stands that are a result of natural processes rather than intensive harvest, which would enhance habitat for golden eagles (see subsection above titled "Hardwoods stands and hardwoods within conifer stands").

- **Northern goshawk.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for northern goshawk to decline by 74% from year 0 to year 80 under the Proposed Action. This can be attributed to the decline of Montane Hardwood and Montane Hardwood Conifer habitat types in the California Wildlife Habitat Relationships database query, and the projected decline in those habitat types through year 80 under the Proposed Action (the California Wildlife Habitat Relationships database shows a weak association of northern goshawk feeding habitat with Redwood habitat types). Redwood habitat is anticipated to increase, but not at a rate that would compensate for the decrease in habitat value associated with the decrease in Montane Hardwood and Montane Hardwood Conifer habitat types according to the California Wildlife Habitat Relationships system. However, the 2012 CFPRs (14 CCR §919.3) apply under the Proposed Action, which include consultation with CDFG, a 5- to 20-ac (2- to 8-ha) buffer zone for nest trees; preservation of nest, perch, screening, and replacement trees; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. In addition, there is a projected increase in conifer-dominated and advance-successional habitats over time, suggesting an increase in available habitat for this species.
- **Humboldt marten.** Humboldt marten has not been documented in the primary assessment area, but the primary assessment area is within the historical range of the species. The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for marten to decline by 98% from year 0 to year 80 under the Proposed Action. This can be attributed to the association of marten with only Montane Hardwood Conifer habitat type in the California Wildlife Habitat Relationships database query, and the projected decline in that habitat type through year 80 under the Proposed Action. Further, the importance of a dense and extensive shrubby understory is not captured in the California Wildlife Habitat Relationships modeling, nor is its development under the various silvilutural regimes well understood. However, to the extent that successional condition is more critical to habitat quality for marten, the predicted increase in advanced-successional conifer habitats, a predicted improvement in habitat patch size and connectivity, and management strategies to increase the number of snags and wildlife trees over the 80-year analysis period should improve habitat for marten.

Under the Proposed Action, effects on the above species of concern from disturbance during forest management activities would be minimized by protections provided by the 2012 CFPRs (14 CCR §919.3) including consultation with CDFG; increases in advanced-successional conifer habitats; increases in habitat elements such as snags, wildlife trees, and advanced-successional hardwoods; and predicted improvements in habitat patch size and connectivity. Therefore, these effects are considered **less than significant**.

Under the Proposed Action, there are predicted **beneficial effects** on Vaux's swift, olive-sided flycatcher, purple martin, Pacific fisher, and Sonoma red tree vole because of a predicted increase in advanced-successional conifer habitats, a predicted improvement in habitat patch size and connectivity, and management strategies to increase the number of snags and wildlife trees over the 80-year analysis period (which would also protect Townsend's western big-eared bat habitat). A shift in tree species compostion away from Douglas-fir could be detrimental to the tree vole, as could the invasion of barred owls. Under the Proposed Action, there are anticipated **beneficial effects** on California ringtail since there are conservation measures included to increase the number of snags and wildlife trees (mid-successional habitats are predicted to remain stable). There are no anticipated effects on American peregrine falcon, Townsend's western big-eared bat, and pallid bat, since the Proposed Action includes strategies to protect rocky outcrop habitats.

Effects on wildlife communities

Based on the specialized query using information from the California Wildlife Habitat Relationships database for the Proposed Action, the primary assessment area would continue to provide habitat for species that currently have associated high or moderate habitat values under existing conditions. By year 80, it is estimated that the Proposed Action would result in a substantial overall decrease in habitat value for 1 species of amphibian, 6 species of reptiles, 50 species of birds, and 18 species of mammals; and an overall increase in habitat value for 2 species of amphibians, 0 species of reptiles, 8 species of birds, and 4 species of mammals[39] (Table 3.6-11, Appendix P). The habitat value for the remaining number of species would not change substantially. Appendix P lists each species, its starting habitat value at year 0, and projected change in habitat value (increase or decrease by 33%– 66% or more) for every 20 years under each alternative.

Table 3.6-11. Number of wildlife species for which habitat value (quantity x quality) substantially increases or decreases (> 66% change) or remains similar relative to existing conditions under the Proposed Action, based on California Wildlife Habitat Relationships modeling.

Taxonomic group	Year			
	20	40	60	80
Amphibians				
Increase in habitat value	1	2	2	2
Minimal change in habitat value	18	16	16	16
Decrease in habitat value	0	1	1	1
Reptiles				
Increase in habitat value	0	0	0	0
Minimal change in habitat value	19	13	13	13
Decrease in habitat value	0	6	6	6
Birds				
Increase in habitat value	4	6	8	8
Minimal change in habitat value	138	86	86	86
Decrease in habitat value	2	52	50	50

[39] These tallies include the species of concern discussed under "Other species of concern" above, as well as species not currently considered as species of concern.

Taxonomic group	Year			
	20	40	60	80
Mammals				
Increase in habitat value	3	2	3	4
Minimal change in habitat value	69	55	53	52
Decrease in habitat value	2	17	18	18

The species with predicted large decreases (greater than 66% change at year 80) in habitat value under the Proposed Action are very similar to those listed under the No Action alternative. As described for the No Action alternative above, the California Wildlife Habitat Relationships modeling results do not account for the change in availability of different habitat elements based on unique management scenarios under future projections. Species associated with aquatic habitats may be more likely to be affected by management practices influencing instream habitat than by the dominant species of tree (i.e., type), and species associated with snags, downed logs, and other habitat elements are likewise much more likely to be affected by management of such elements.

Many of the species with predicted decreases in habitat value are weakly associated with existing habitat conditions in the primary assessment area. This means that these species are associated with habitat conditions that are not present in the primary assessment area, and that the primary assessment area can only support relatively low population densities. Most other species showing a decrease in habitat value, including game species, are those largely associated with Montane Hardwood and Montane Hardwood-Conifer California Wildlife Habitat Relationships habitat types, often in combination with smaller size classes and open-canopied forests. As with every alternative, there is a trend under the Proposed Action towards more advanced-successional forest habitat and less early- and/or mid-successional habitat, and a trend toward more redwood-dominated habitat and less hardwood-dominated habitat. See the wildlife community analysis under the No Action alternative for a description of how trends towards more advanced-successional forest habitat and more redwood-dominated habitats would affect wildlife communities.

While certain non-special-status wildlife communities may experience reductions in habitat value (Table 3.6-11), management towards more advanced-successional and conifer habitats under the Proposed Action is expected to: (1) benefit the species of most conservation concern; and (2) not substantially reduce the overall habitat of any wildlife species in a way that would cause a wildlife population or community to drop below self-sustaining levels in California. Therefore, effects on wildlife communities under the Proposed Action are considered **less than significant**.

3.6.2.4 Alternative A

Analysis of trends in terrestrial habitat types and successional stage

As described in Section 3.5.2 (Vegetation and Plant Species of Concern, Environmental effects and mitigation), the predicted overall trend in the dominant California Wildlife Habitat Relationships habitat type under Alternative A is a decrease in both Montane Hardwood and Montane Hardwood-Conifer and an increase in relative proportion of Redwood in most conifer stands. The predicted overall trend in California Wildlife Habitat Relationships size class under Alternative A is a substantial decrease in the percentage composition of younger trees (i.e., classes 1, 2 and 3) a substantial increase in the percentage composition of class 4 and 5 trees, and an increase in the percentage composition of class 6 (larger and mixed-size trees).

Over 80 years under Alternative A, there is a predicted forest-wide decrease in early successional forest with a corresponding increase in advanced-successional forest of approximately 2% to 18% (Figure 3.6-14, Appendix Q [Successional Stage (forest-wide) by Inventory Type]). Despite a small decrease, the acreage of mid-successional forest would remain relatively stable. Successional stage composition in riparian buffer zones is predicted to change dramatically over 80 years, with advanced-successional habitat increasing from approximately 7% to 98% over the 80-year analysis period (Figure 3.6-15, Appendix Q [Successional Stage (riparian) by Inventory Type]).

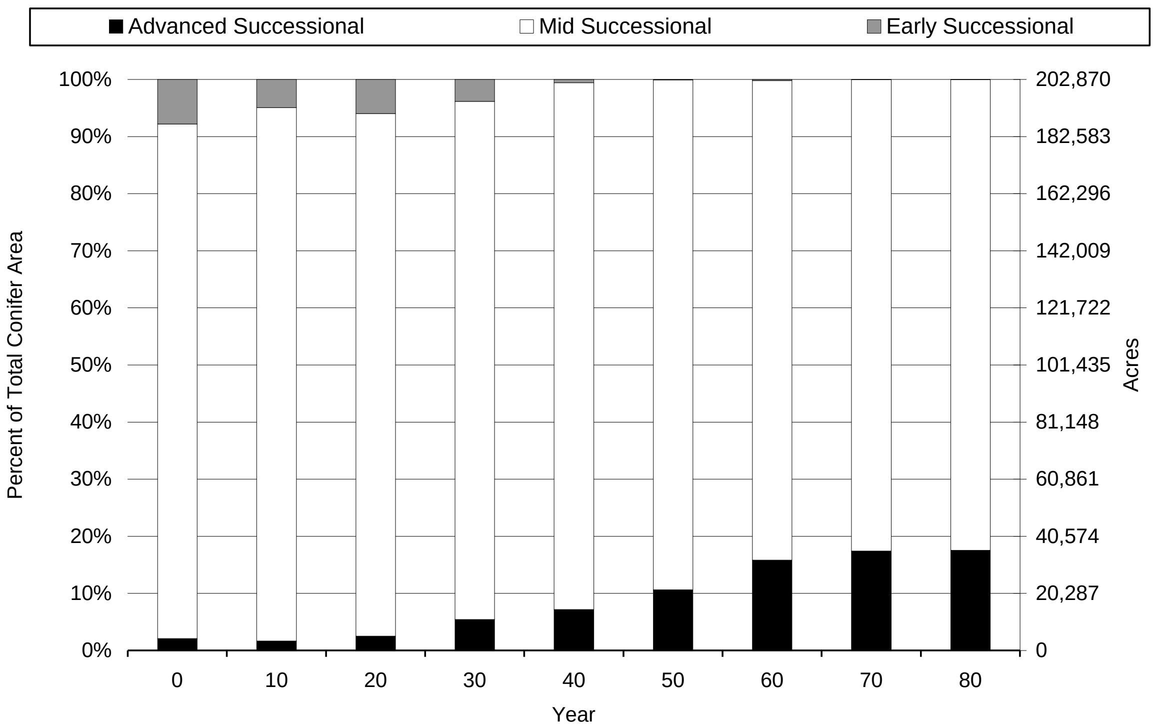


Figure 3.6-14. Successional stage composition predicted forest-wide by decade under Alternative A.

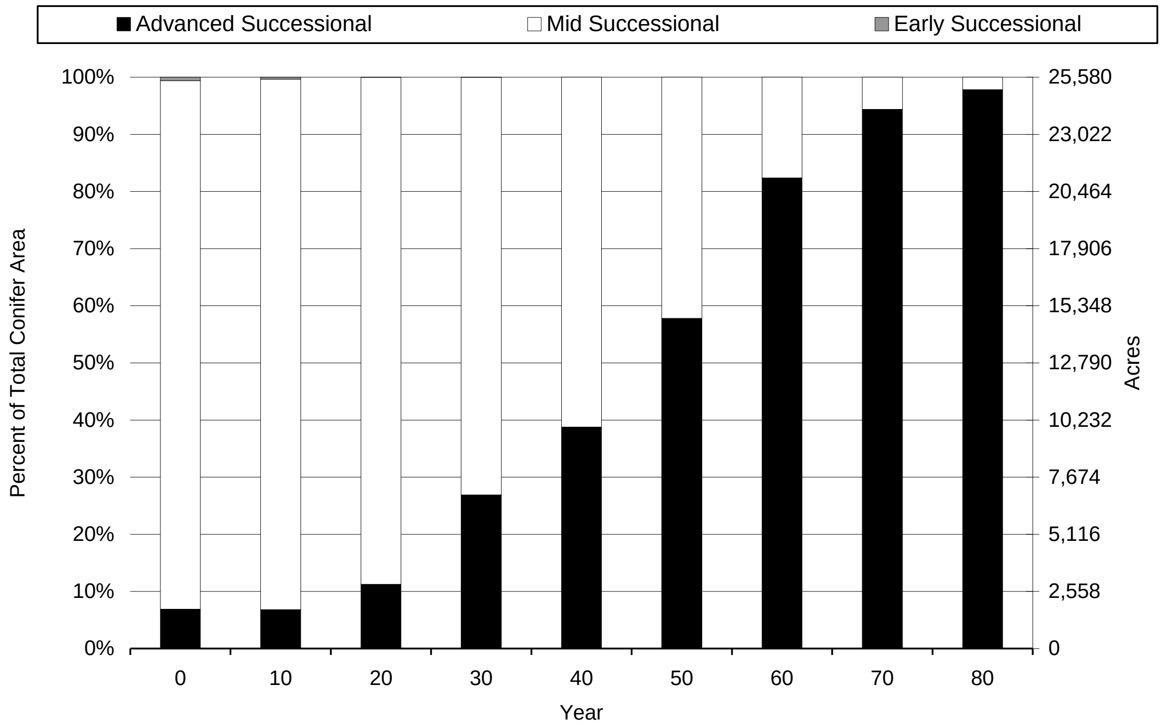


Figure 3.6-15. Successional stage composition predicted in riparian buffer zones by decade under Alternative A.

Effects on advanced-successional patch size and habitat connectivity

Under Alternative A, the number and total area of advanced-successional patches greater than or equal to 80 ac (32 ha) is predicted to increase over 80 years, although with a decrease in the number of such patches during the last 20 years (Table 3.6-12). The number and total area of such patches within 1 mi (1.6 km) of another large patch is also predicted to increase over 80 years, with a decrease in number during the last 20 years (Table 3.6-12, Figure 3.6-16). In years 20 and 80, increase in patch size and connectivity is primarily observed in the Albion and Navarro West inventory blocks, and the southern third of the South Coast inventory block. By year 80, increase in patch size and connectivity is evident throughout the entire primary assessment area. The majority of modeled patches are aggregations of linear, riparian stands, though upland patches are more evident under Alternative A than under the No Action alternative and Proposed Action (Figure 3.6-16). Compared with existing conditions, Alternative A would improve advanced-successional patch size conditions, with increases in patch size and habitat connectivity of predominantly riparian stands.

Table 3.6-12. Number and total area (ac) of advanced-successional patches greater than or equal to 80 ac (32 ha), and within 1 mi (1.6 km) of another patch under Alternative A.

Parameters	Year				
	0	20	40	60	80
Number of patches greater than or equal to 80 ac	6	8	28	57	51
Total area of patches greater than or equal to 80 ac	1,497	2,333	7,546	26,557	32,884
Number of patches greater than or equal to 80 ac AND within 1 mi of another patch	4	7	24	53	50
Total area of patches greater than or equal to 80 ac AND within 1 mi of another patch	1,181	2,170	7,092	25,747	32,697

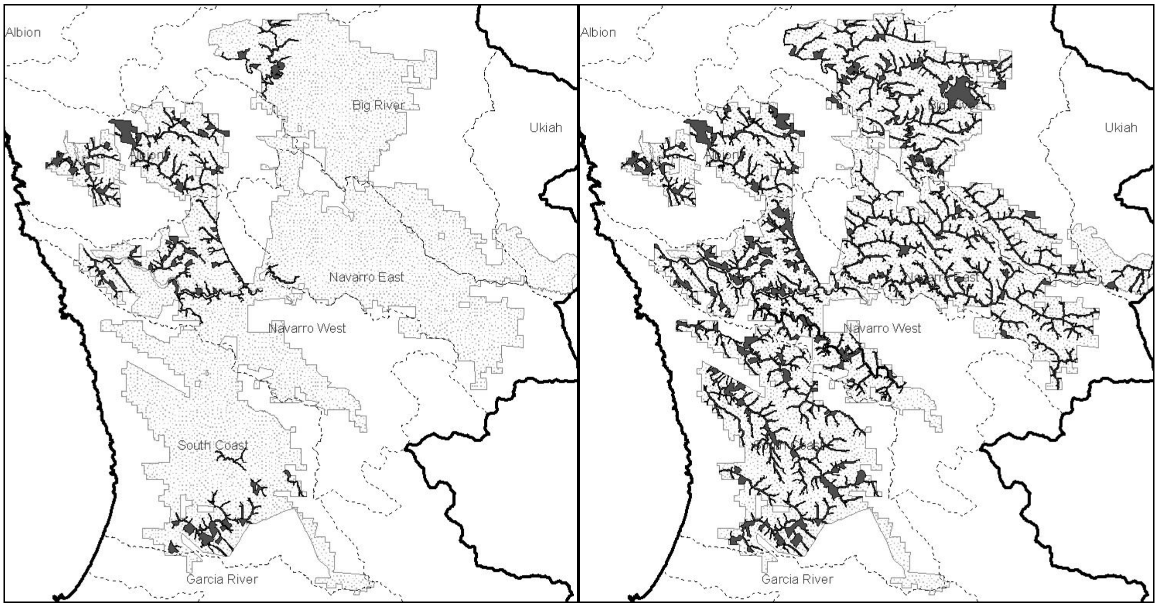


Figure 3.6-16. Distribution of advanced-successional patches greater than 80 ac (32 ha) and within 1 mi (1.6 km) of another patch in a subsection of the primary assessment area modeled for year 40 (left) and year 80 (right) under Alternative A (advanced-successional patches are indicted in dark gray) (existing conditions are shown in Figure 3.6-1).

Under all of the alternatives, MRC forestlands would be used for timber production as opposed to alternate land uses, helping to minimize fragmentation of lands and provide value for terrestrial resources.

Effects on important habitat and habitat elements

The following section analyzes effects on important habitat and habitat elements. Effects determinations are not provided for habitat elements, with the exception of old-growth trees and stands since they are a unique community with intrinsic biological and social value in addition to providing habitat value for wildlife. For analyses of species of concern associated with the following habitat elements, see the subsection below titled “Effects on wildlife species of concern.”

Old-growth trees and stands

Under Alternative A, all 101 ac (40 ha) of Type I old growth and all 520 ac (210 ha) of Type II old growth in the primary assessment area would be retained. There would be no harvest in Type I and Type II old growth, including a 300-ft (91-m) no-cut buffer for Type I and a 300-ft (91-m) silviculture-limited zone for Type II. If any additional Type I or Type II old growth is identified, it would managed the same. Residual old-growth trees would be protected, and screen trees retained. If a residual old-growth tree needs to be felled for safety reasons, the agencies would be notified. In addition, there would be a 1,000-ft (305-m) seasonal activity restriction for nesting marbled murrelets around both types of old-growth stands. Because all Type I and Type II old-growth stands and trees would be retained and stand function likely enhanced, there would be **beneficial effects** on old-growth trees under Alternative A.

Snags, logs, and wildlife trees

Figure 3.4-6 (in Section 3.4 [Aquatic and Riparian Habitats and Species of Concern]), Figure 3.6-17, and Appendix Q show timber modeling results for large tree density for the next 80 years under Alternative A, forest-wide and in riparian buffer zones. Forest-wide, trees with a diameter at breast height of > 32 in (81 cm) are predicted to increase from an estimated 1 tree per acre to approximately 6 trees per acre between years 0 and 80; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 5 trees per acre to approximately 13 trees per acre, with the exception of a slight temporary decrease (approximately 1 tree per acre) between years 0 and 10. In riparian buffer zones, trees with a diameter at breast height of > 32 in (81 cm) are predicted to increase from an estimated 2 trees per acre to approximately 27 trees per acre between years 0 and 80; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 8 trees per acre to approximately 38 trees per acre (Section 3.4 [Aquatic and Riparian Habitats and Species of Concern], Figure 3.4-6). The predicted overall trend for large trees under Alternative A is an increase in trees per acre over 80 years, both forest-wide and in riparian buffer zones. An increase in large tree density in the primary assessment area may enhance snag, log, and wildlife tree recruitment.

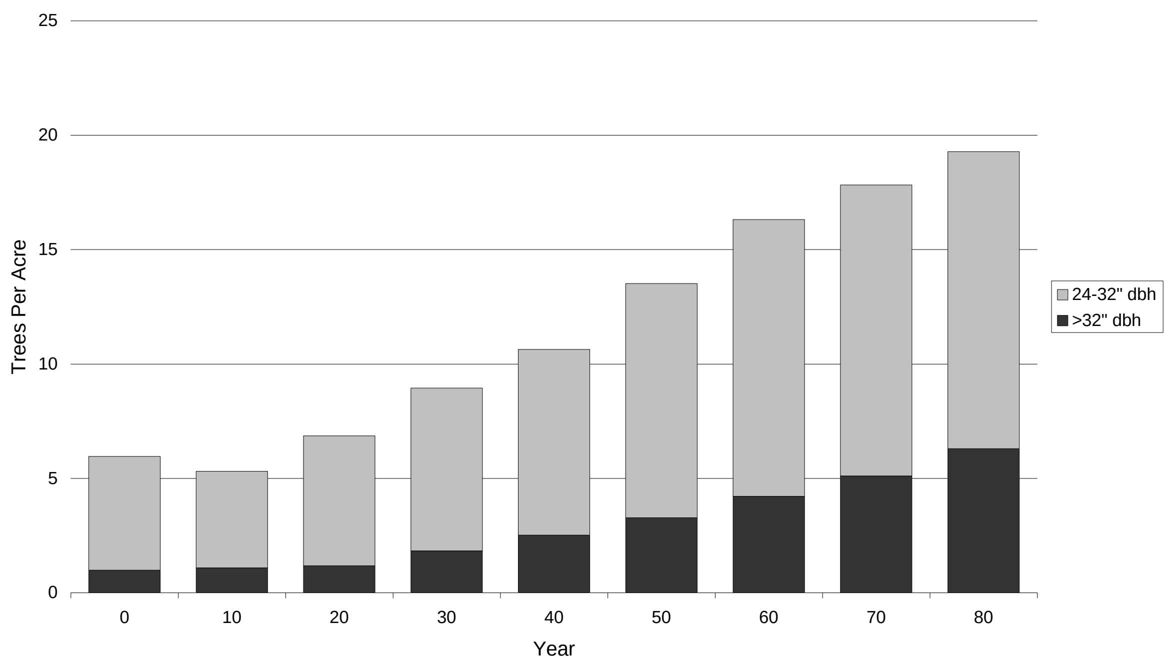


Figure 3.6-17. Large tree density (trees per acre) predicted forest-wide by decade under Alternative A.

Alternative A incorporates explicit conservation measures aimed at retaining and recruiting a specific quantity and distribution of snags, logs, and wildlife trees across the forest in both riparian and upslope areas. Conservation objectives for snags, logs, and wildlife trees include: avoiding cutting wildlife trees; retaining and recruiting trees as wildlife trees from largest 5% of stand diameter distribution; and increasing objectives for number of wildlife trees per acre by one (e.g., from 2 per acre to 3 per acre), in each tree class. Incorporation of such measures, in combination with the increase in availability of large trees over time that may serve to recruit new snags, logs, and wildlife trees, would enhance conditions for native wildlife species by improving the abundance and distribution of these habitat elements.

Hardwoods stands and hardwoods within conifer stands

Under Alternative A, MRC's habitat conservation measures would include protection of hardwood forest at locations where site conditions favor hardwoods as the natural, advanced-successional habitat type. In addition to the measure described for the Proposed Action, all true oak and madrone trees > 16 in (41 cm) diameter at breast height would be retained with few exceptions, and hardwood-dominated stands would be retained where hardwood or hardwood-conifer stands make up < 15% of a planning watershed. Such strategies would retain representations of early-mid successional hardwood stands. While there would be a trend towards more redwood-dominated habitat and less hardwood-dominated habitat and associated wildlife species, hardwood retention and protection would continue to provide wildlife value under Alternative A.

Rocky outcrops

As with the Proposed Action, Alternative A incorporates conservation measures to preserve and maintain the existing 63 ac (25 ha) of rocky outcrops in the primary assessment area. Newly discovered rocky outcrops would be surveyed for sensitive species if there are plans to convert them to quarries; if sensitive species are not present, MRC may convert the site to a quarry; if sensitive species are present, MRC would consult with and obtain approval of the wildlife agencies prior to converting the site to a quarry. Other conservation measures for rocky outcrops specific to peregrine falcon are discussed in the subsection below titled "Effects on wildlife species of concern." In addition, Alternative A includes a 20-ac (8-ha) timber management buffer, and seasonal closure if needed from 1 January to 15 August.

Since Alternative A incorporates measures to preserve and maintain the existing rocky outcrops and avoid and/or minimize effects on special concern species if newly discovered rocky outcrops are considered for conversion to a quarry, it is anticipated that species that use rocky outcrops would be adequately protected.

Effects on wildlife species of concern

In addition to the following analyses for wildlife species of concern, site-specific effects would be assessed and appropriate mitigation measures developed under Alternative A through completion of individual PTHPs, subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with applicable mitigation requirements.

Under Alternative A, the effects of post-fire timber salvage on terrestrial habitat and wildlife species of concern would be the same as under the Proposed Action. Site-specific measures would be implemented to retain old-growth trees, retain additional snags, and protect wildlife trees (including potential nest trees for northern spotted owl, potential nest trees for marbled murrelet, and trees with known raptor nests). MRC would need to consult with the wildlife agencies before taking actions in the Lower Alder Creek Management Area (the proposed marbled murrelet protection area), and would not conduct salvage operations within 100 ft (30 m) of known Point Arena mountain beaver burrow systems. These measures would provide additional terrestrial habitat protections in burned areas and would reduce the potential for effects on wildlife species of concern compared with existing conditions and the No Action alternative.

Marbled murrelet

Alternative A would include the use of radar and ground-based surveys to monitor marbled murrelet populations. The agencies find risk of harm, harassment, or mortality due to radar surveys to be so remote as to result in an estimate of zero marbled murrelets adversely affected over the 80-year term of the HCP/NCCP. Likewise, survey and monitoring efforts for other species do not alter marbled murrelet habitat and should not alter marbled murrelet behavior; the risk that they would lead to impacts is limited to attracting predators to occupied habitat. The agencies believe this source of incidental harm or harassment also approaches zero over the term of the plan.

Under Alternative A, the predicted overall trend for potentially suitable marbled murrelet habitat from year 0 to year 80 is an increase by approximately 11,500 ac (4,653 ha) for Zone 1 and an increase by approximately 2,270 ac (918 ha) for Zone 2 (Figure 3.6-18, Appendix Q [Marbled Murrelet Habitat Plan Area]). In Zone 3, there is a decrease in potentially suitable marbled murrelet habitat from year 0 during years 10–70, though there is an increase in potentially suitable marbled murrelet habitat by approximately 150 ac (60 ha) when comparing year 80 with year 0. Appendix F, Figures F-24 and F-25 show projected distribution of marbled murrelet habitat for years 40 and 80 under Alternative A.

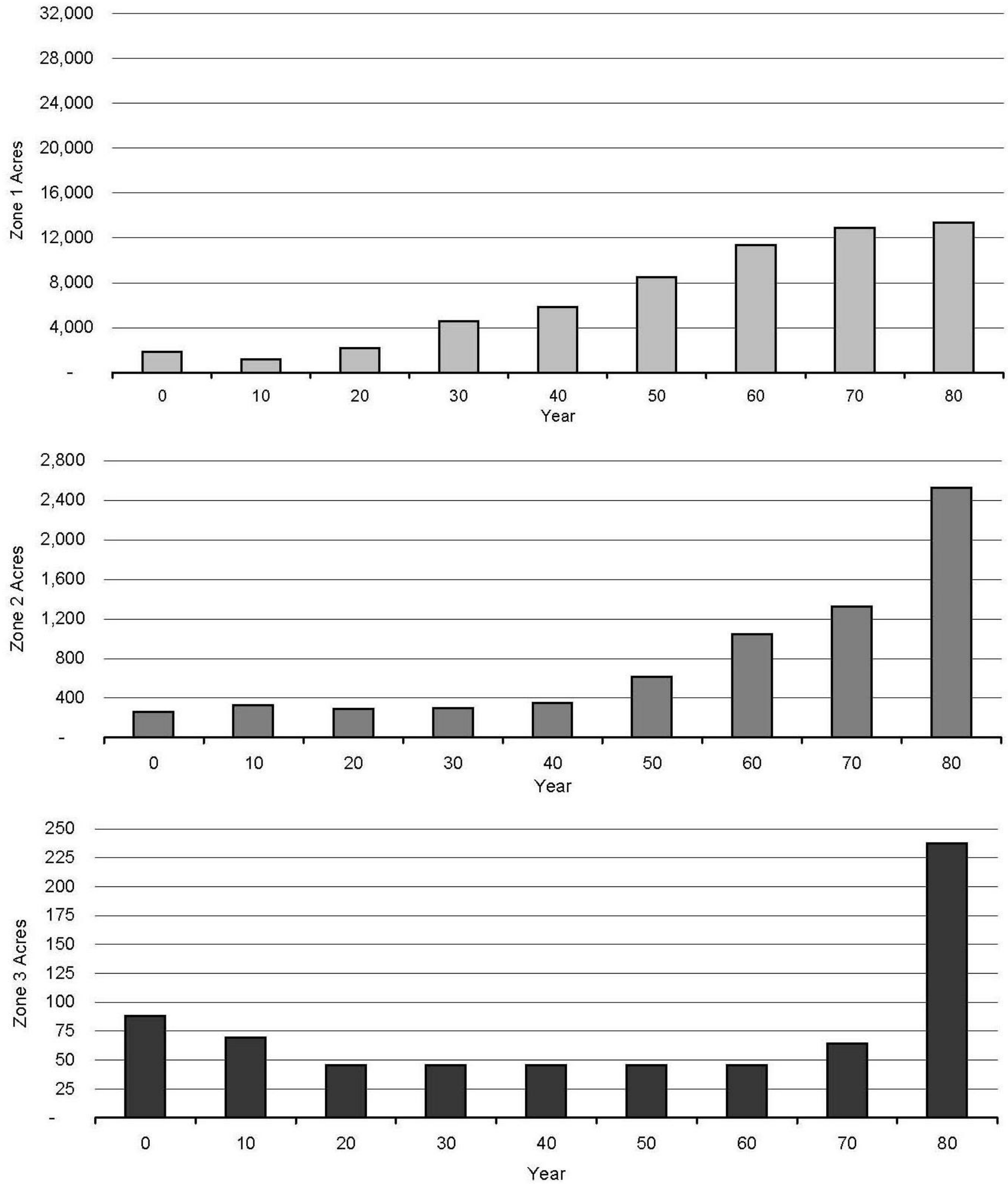


Figure 3.6-18. Potentially suitable marbled murrelet habitat predicted by decade under Alternative A.

In the terrestrial habitat analysis presented above for Alternative A, there would be an increase in advanced-successional habitat and connectivity, predominantly in riparian stands. Old-growth stands, including screen trees, would be protected through conservation measures outlined in the HCP/NCCP, which also includes strategies to retain and recruit wildlife trees.

The HCP/NCCP outlines conservation measures intended to minimize and mitigate the effects of incidental take of marbled murrelets. As discussed above for the Proposed Action, specific conservation measures aimed at protecting marbled murrelets and habitat would promote the development of mature and advanced-successional forest in 1,237 ac (500 ha) designated as the Lower Alder Creek Management Area, and in Aquatic Management Zones. Restrictions on forest operations in the Lower Alder Creek Management Area would be the same as under the Proposed Action. If marbled murrelet populations are observed to decline, management of corvids in the Lower Alder Creek Management Area would possibly be implemented as part of monitoring and adaptive management.

Timber management activities (e.g., harvest, hauling, and road maintenance) could potentially cause direct disturbance of marbled murrelet nests from noise, vibration, and human activity resulting in nest failure or abandonment, and/or indirect disturbance resulting from removal or degradation of habitat. However, since: (1) there would be thorough measures in place under Alternative A to protect marbled murrelet individuals, nest sites, and habitat; (2) there are predicted trends showing an increase in the index for potentially suitable marbled murrelet habitat compared with existing conditions; and (3) there would be an extensive monitoring and adaptive management program that would monitor presence of the species, its habitat, and the effectiveness of management strategies, there would be **beneficial effects** on marbled murrelet under Alternative A.

Northern spotted owl

Alternative A includes banding northern spotted owls for the purposes of long-term monitoring and adaptive management. Details of northern spotted owl surveys and monitoring, including estimates of northern spotted owls captured and handled, would be the same as described above for the Proposed Action.

Under Alternative A, forest-wide nesting/roosting habitat for northern spotted owl is predicted to decrease slightly during year 10; this can be explained by some conifer stands being harvested for the first time (having met harvest triggers) by year 10, and because variable retention and rehabilitation are increasing in the first ten years. In years 20–80, nesting/roosting habitat is predicted to increase and fluctuate between an additional 10,500 and 39,000 ac (4,249 and 15,782 ha) as compared with year 0 (29–43% of the total acreage in the primary assessment area) (Figure 3.6-19, Appendix Q [Northern Spotted Owl Habitat (forest-wide) Plan Area]). The trend for foraging habitat is to remain relatively stable (between 52 and 62% of total area) through year 80. Non-suitable habitat is predicted to slightly decrease over 80 years as compared with year 0. Overall, there would be more nesting/roosting habitat over 80 years, with 26,200 ac (10,603 ha) more than year 0 by year 80. Appendix F, Figures F-26 and F-27 show projected distribution of northern spotted owl habitat for years 40 and 80 under Alternative A.

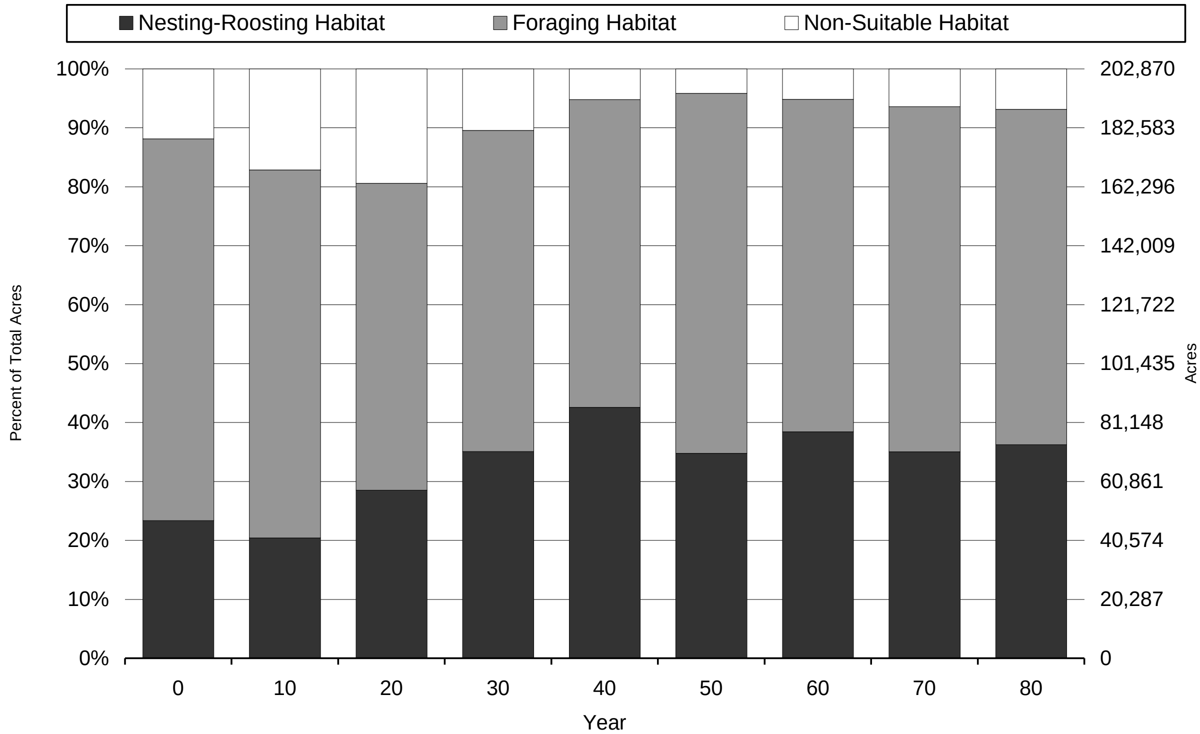


Figure 3.6-19. Northern spotted owl habitat predicted by decade under Alternative A.

In the terrestrial habitat analysis presented above for Alternative A, there would be several predicted trends and protections that would support northern spotted owls. There would be an increase in advanced-successional habitat and connectivity, predominantly in riparian stands. Old-growth stands, including screen trees, would be protected through conservation measures outlined in MRC's HCP/NCCP, which also includes strategies to retain and recruit wildlife trees. Management strategies under the HCP/NCCP would also include hardwood retention and protection that would preserve northern spotted owl foraging habitat.

The HCP/NCCP outlines conservation measures intended to minimize and mitigate the effects of incidental take of northern spotted owls. Specific conservation measures aimed at protecting northern spotted owls and habitat would maintain and increase productive owl territories and increase the area of nesting/roosting habitat. Strategies are also included in the HCP/NCCP to minimize disturbance of nesting spotted owls, manage invasive barred owls, and incorporate intensive long-term monitoring/surveying of the northern spotted owl population. In addition, Alternative A would incorporate larger no-harvest and protection buffers than under the Proposed Action (Section 2, Alternatives).

It is difficult to predict the result of barred owl management on northern spotted owl populations in the primary assessment area. With effective barred owl management, there is a reasonable likelihood that a viable northern spotted owl population could be maintained over time in the primary assessment area, although there is a possibility that barred owl control efforts would eventually fail. If barred owl management failed, there is a possibility that spotted owl populations would be extirpated from the primary assessment area.

It is difficult to estimate the number of barred owls that would be captured, relocated, sterilized, and/or removed using lethal means over the 80-year permit term. After initial implementation of barred owl management, the number of barred owls requiring capture and/or removal would possibly decrease within the primary assessment area and vicinity, but in the absence of a larger, range-wide management program, the numbers would presumably rebound. For the purposes of this assessment, a reasonable assumption is that approximately 30 barred owls would require capture and/or removal in the primary assessment area each year to meet the goals and objectives of the spotted owl management plan under Alternative A. During the 80-year term of the incidental take authorizations, this estimate would equate to the capture and/or removal of a total of approximately 2,400 barred owls. Under a completely successful barred owl management program, barred owl would be nearly or completely extirpated from the primary assessment area. Given the extent of the barred owl invasion and the relatively small area of the primary assessment area relative to the remainder of California, there would likely be no substantial effect on the remainder of the barred owl population in California. There would certainly be no substantial effect on the status of barred owl populations throughout the remainder of North America.

Timber management activities (e.g., harvest, hauling, road maintenance, and helicopter yarding) could potentially cause direct disturbance of northern spotted owl nests from noise, vibration, and human activity resulting in nest failure or abandonment, and/or indirect disturbance resulting from removal or degradation of habitat. However, since: (1) there would be thorough measures in place under Alternative A to protect northern spotted owl nesting, roosting, and foraging habitat; (2) the HCP/NCCP provides for minimization of disturbance of nesting spotted owls; (3) there are predicted trends showing an overall increase in nesting/roosting habitat compared with existing conditions; and (4) there would be an extensive monitoring and adaptive management program that would monitor presence of the species, its habitat, and the effectiveness of management strategies (and trigger improvements in specific management actions based on monitoring results), there would be **beneficial effects** on northern spotted owl under Alternative A.

Point Arena mountain beaver

Alternative A includes monitoring Point Arena mountain beaver for the purposes of long-term monitoring and adaptive management. Details of Point Arena mountain beaver surveys and monitoring would be the same as described above for the Proposed Action.

Under Alternative A, MRC would implement HCP/NCCP conservation measures intended to minimize and mitigate the effects of incidental take on Point Arena mountain beaver, including 150-ft (46-m) no-harvest buffer zones around Point Area mountain beaver habitat, and restrictions on road construction, traffic, rodent control, and ground disturbance (Section 2, Alternatives). Measures also include creation of habitat as part of adaptive management efforts. Implementation of these conservation measures under Alternative A would protect the species from direct effects due to mortality and indirect effects due to alteration or modification of habitat; in addition, efforts to protect and create habitat would result in **beneficial effects** on the species.

Other species of concern

In addition to the following analyses for other species of concern, site-specific effects would be assessed and appropriate mitigation measures developed under Alternative A through completion of individual PTHPs, subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with applicable mitigation requirements.

Based on the specialized wildlife communities query using information from the California Wildlife Habitat Relationships database for Alternative A (described above in Section 3.6.2.1), habitat values are expected to substantially decrease (greater than -66%) for northern goshawk, white-tailed kite, golden eagle, and Humboldt marten. However, specific nest protection measures and considerations such as changes in advanced-successional patch size and connectivity, and availability of critical habitat elements such as snags and downed logs for several of these species would offset some of the predicted effects related strictly to changes in habitat quality and quantity. Habitat values are expected to remain similar (less than +/- 66%) for great egret (rookery), osprey, bald eagle, American peregrine falcon, olive-sided flycatcher, pallid bat, Townsend's big-eared bat, California ringtail, and Pacific fisher. Habitat values are expected to substantially increase (greater than +66%) for great blue heron (rookery), Vaux's swift, purple martin, and Sonoma tree vole.

Forest management activities (e.g., harvest, hauling, road maintenance, and helicopter yarding) could potentially cause indirect disturbance due to structural changes in habitat and changes in tree species composition, and/or direct disturbance of nesting individuals from noise, vibration, and human activity. Such disturbance could result in nest failure or abandonment or disruption of breeding/denning for the following species of concern (which include a description of strategies and/or habitat analyses under this alternative that may counteract potential negative effects):

- **Great blue heron (rookery) and great egret (rookery).** Since there are no specific strategies under Alternative A to minimize direct disturbance of great blue heron or great egret rookeries, the 2012 CFPRs (14 CCR §919.3) apply, which include consultation with CDFG, a 300-ft (91-m) buffer zone around active nests, and a critical period where operations near active nests are restricted. Alternative A does include the conservation measures in the HCP/NCCP that would retain existing and actively recruit snags and wildlife trees, which would incidentally provide important habitat elements for nesting great blue herons and great egrets.
- **Osprey and bald eagle.** Since there are no specific strategies under Alternative A to minimize direct disturbance of osprey and bald eagle nests, the 2012 CFPRs apply (14 CCR §919.3), which include consultation with CDFG, a 5- to 18-ac (2- to 7-ha) buffer zone for osprey nest trees, and a 10- to 40-ac (4- to 16-ha) buffer zone for bald eagle nest trees; preservation of nest, perch, screening, and replacement trees for both species; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. Alternative A does include the conservation measures in the HCP/NCCP that would retain existing and actively recruit snags and wildlife trees, which would incidentally provide important habitat elements for nesting osprey and bald eagles. A predicted increase in advanced-successional habitats over time would also provide an increase in available nesting and winter communal roosting habitat for these species under Alternative A.
- **White-tailed kite.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for white-tailed kite to decline by 99% from year 0 to year 80 under Alternative A. However, the California Wildlife Habitat Relationships database associates white-tailed kite with only one of the habitat combinations mapped on MRC lands: Redwood habitat type with size class 2 and cover code "open." This specific habitat combination is predicted to decrease by year 80 because of the increase in mid- and advanced-successional conditions, and explains the decrease in habitat value for white-tailed kite. White-tailed kite breeds in lowland grasslands, oak woodlands or savannah, and wetlands with open areas. There are only a few acres of grassland in the primary assessment area and the grasslands would not be directly affected by timber management activities, although they could be indirectly affected by such

activities in adjacent forest habitat (which would be addressed during site-specific PTHP review).

- **Golden eagle.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for golden eagle to decline by 87% from year 0 to year 80 under Alternative A. This can be attributed to the association of golden eagles with Montane Hardwood, Montane Hardwood Conifer, and sparse or open Redwood habitat types in the California Wildlife Habitat Relationships database query, and the projected decline in those habitat types through year 80 under Alternative A. However, under Alternative A, the 2012 CFPRs (14 CCR §919.3) apply, which include consultation with CDFG, a minimum 8-ac (3-ha) buffer zone for nests; preservation of nest, perch, screening, and replacement trees; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. Alternative A also includes conservation measures in the HCP/NCCP to retain existing and actively recruit snags and wildlife trees, which would incidentally provide important habitat elements for nesting golden eagles.
- **Northern goshawk.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for northern goshawk to decline by 75% from year 0 to year 80 under Alternative A. This can be attributed to the association of northern goshawk with Montane Hardwood and Montane Hardwood Conifer habitat types in the California Wildlife Habitat Relationships database query, and the projected decline in those habitat types through year 80 under Alternative A (the California Wildlife Habitat Relationships database also shows a weak association of northern goshawk feeding habitat with Redwood habitat types). Redwood habitat is anticipated to increase, but not at a rate that would compensate for the decrease in habitat value associated with the decrease in Montane Hardwood and Montane Hardwood Conifer habitat types according to the California Wildlife Habitat Relationships system. However, the 2012 CFPRs (14 CCR §919.3) apply under Alternative A, which include consultation with CDFG, a 5- to 20-ac (2- to 8-ha) buffer zone for nest trees; preservation of nest, perch, screening, and replacement trees; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. In addition, there is a projected increase in advanced-successional habitats over time, suggesting an increase in available habitat for this species.
- **Humboldt marten.** Humboldt marten has not been documented in the primary assessment area, but the primary assessment area is within the historical range of the species. The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for marten to decline by 99% from year 0 to year 80 under Alternative A. This can be attributed to the association of marten with only Montane Hardwood Conifer habitat type in the California Wildlife Habitat Relationships database query and the projected decline in that habitat type through year 80 under Alternative A. Further, the importance of a dense and extensive shrubby understory is not captured in the California Wildlife Habitat Relationships modeling, nor is its development under the various silvilutural regimes well understood. However, to the extent that successional condition is more critical than the dominant tree species to habitat quality for marten, the predicted increase in advanced-successional habitats, a predicted improvement in habitat patch size and connectivity, and management strategies to increase the number of snags and wildlife trees over the 80-year analysis period should improve habitat for marten.

Under Alterntive A, anticipated effects on effects on the above species of concern from disturbance during forest management activities are minimized by protections provided by the

2012 CFPRs (14 CCR §919.3) including consultation with CDFG; increases in advanced-successional habitats; increases in habitat elements such as snags, wildlife trees, and advanced-successional hardwoods; and predicted improvements in habitat patch size and connectivity. Therefore, these effects are considered **less than significant**.

Effects on wildlife communities

Based on the specialized query using information from the California Wildlife Habitat Relationships database for Alternative A, the primary assessment area would continue to provide habitat for species that currently have associated high or moderate habitat values under existing conditions. By year 80, it is estimated that Alternative A would result in a substantial overall decrease in habitat value for 1 species of amphibian, 6 species of reptiles, 50 species of birds, and 19 species of mammals; and an overall increase in habitat value for 2 species of amphibians, 0 species of reptiles, 8 species of birds, and 3 species of mammals[40] (Table 3.6-13, Appendix P). The habitat value for the remaining number of species would not change substantially. Appendix P lists each species, its starting habitat value at year 0, and projected change in habitat value (increase or decrease by 33%–66% or more) for every 20 years under each alternative.

Table 3.6-13. Number of wildlife species for which habitat value (quantity x quality) substantially increases or decreases (> 66% change) or remains similar relative to existing conditions under Alternative A, based on California Wildlife Habitat Relationships modeling.

Taxonomic group	Year			
	20	40	60	80
Amphibians				
Increase in habitat value	1	2	2	2
Minimal change in habitat value	18	16	16	16
Decrease in habitat value	0	1	1	1
Reptiles				
Increase in habitat value	0	0	0	0
Minimal change in habitat value	18	13	13	13
Decrease in habitat value	1	6	6	6
Birds				
Increase in habitat value	4	7	8	8
Minimal change in habitat value	118	85	86	86
Decrease in habitat value	22	52	50	50
Mammals				
Increase in habitat value	2	2	3	3
Minimal change in habitat value	67	55	52	52
Decrease in habitat value	5	17	19	19

The species with predicted large decreases (greater than 66% change at year 80) in habitat value under Alternative A are very similar to those listed under the No Action alternative. As described for the No Action alternative, the California Wildlife Habitat Relationships modeling results above do not account for the change in availability of different habitat elements based on unique management scenarios under future projections. Species associated with aquatic habitats may be

[40] These tallies include the species of concern discussed under "Other species of concern" above, as well as species not currently considered as species of concern.

more likely to be affected by management practices influencing instream habitat than by the dominant tree species (i.e., type), and species associated with snags, downed logs, and other habitat elements are likewise much more likely to be affected by management of such elements.

Many of the species with predicted decreases in habitat value are weakly associated with existing habitat conditions in the primary assessment area. This means that these species are associated with habitat conditions that are not present in the primary assessment area, and that the primary assessment area can only support relatively low population densities. Most other species showing a decrease in habitat value, including game species, are those largely associated with Montane Hardwood and Montane Hardwood-Conifer California Wildlife Habitat Relationships habitat types, often in combination with smaller size classes and open-canopied forests. As with every alternative, there is a trend under Alternative A towards more advanced-successional forest habitat and less early- and/or mid-successional habitat, and a trend toward more redwood-dominated habitat and less hardwood-dominated habitat. These trends would affect wildlife communities in the same ways as described above for the No Action alternative.

While certain non-special-status wildlife communities may experience reductions in habitat value (Table 3.6-13), management towards more advanced-successional and conifer habitats under Alternative A is expected to: (1) benefit the species of most conservation concern; and (2) not substantially reduce the overall habitat of any wildlife species in a way that would cause a wildlife population or community to drop below self-sustaining levels in California. Therefore, effects on wildlife communities under Alternative A are considered **less than significant**.

3.6.2.5 Alternative B

Analysis of trends in terrestrial habitat types and successional stage

As described in Section 3.5.2 (Vegetation and Plant Species of Concern, Environmental effects and mitigation), the predicted overall trend in the dominant California Wildlife Habitat Relationships habitat type under Alternative B is a slight increase in Montane Hardwood and Redwood and a decrease in Montane Hardwood-Conifer percentage composition. The predicted overall trend in California Wildlife Habitat Relationships size class under Alternative B is a slight increase in the percentage composition of younger trees (i.e., classes 1, 2 and 3) a substantial decrease in the percentage composition of class 4 trees, and a substantial increase in the oldest trees, classes 5 and 6.

Over 80 years under Alternative B, there is a forest-wide increase in advanced-successional forest of approximately 2% to 34% with a corresponding decrease in mid-successional forest. There is also a small overall predicted increase forest-wide in early successional forest (Figure 3.6-20, Appendix Q [Successional Stage (forest-wide) by Inventory Type]). Successional stage composition in riparian buffer zones is predicted to change noticeably over 80 years, with advanced-successional habitat increasing from approximately 7% to 68% over the 80-year analysis period (Figure 3.6-21, Appendix Q [Successional Stage (riparian) by Inventory Type]).

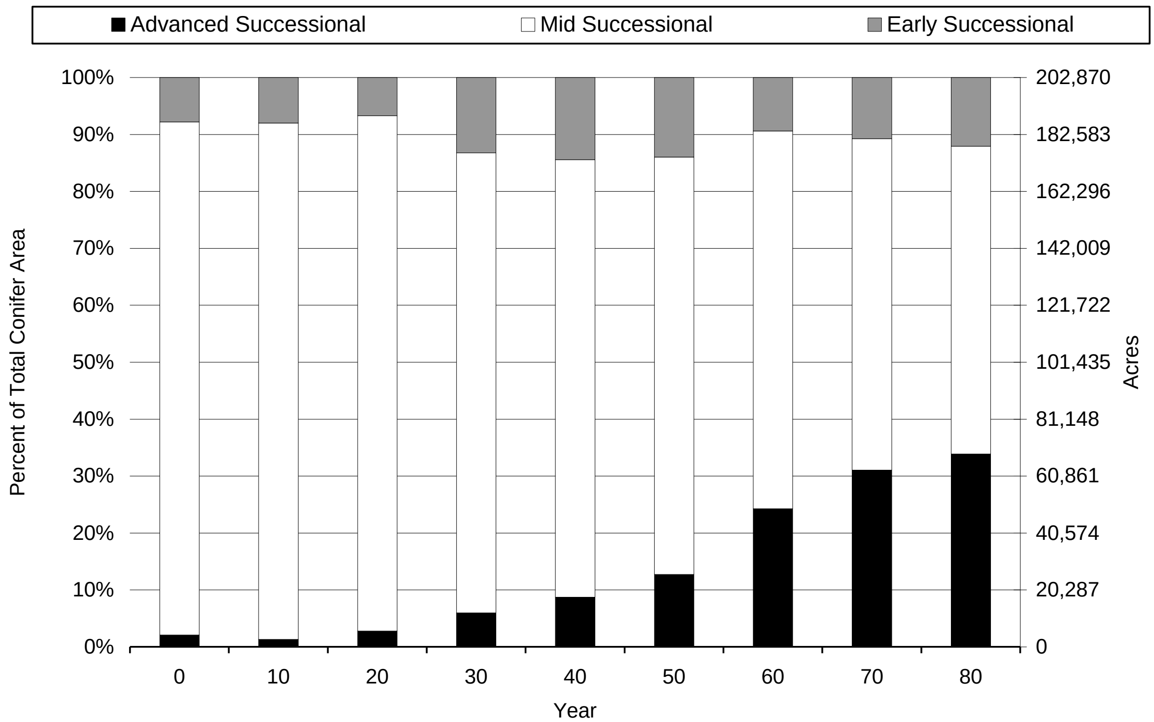


Figure 3.6-20. Successional stage composition predicted forest-wide by decade under Alternative B.

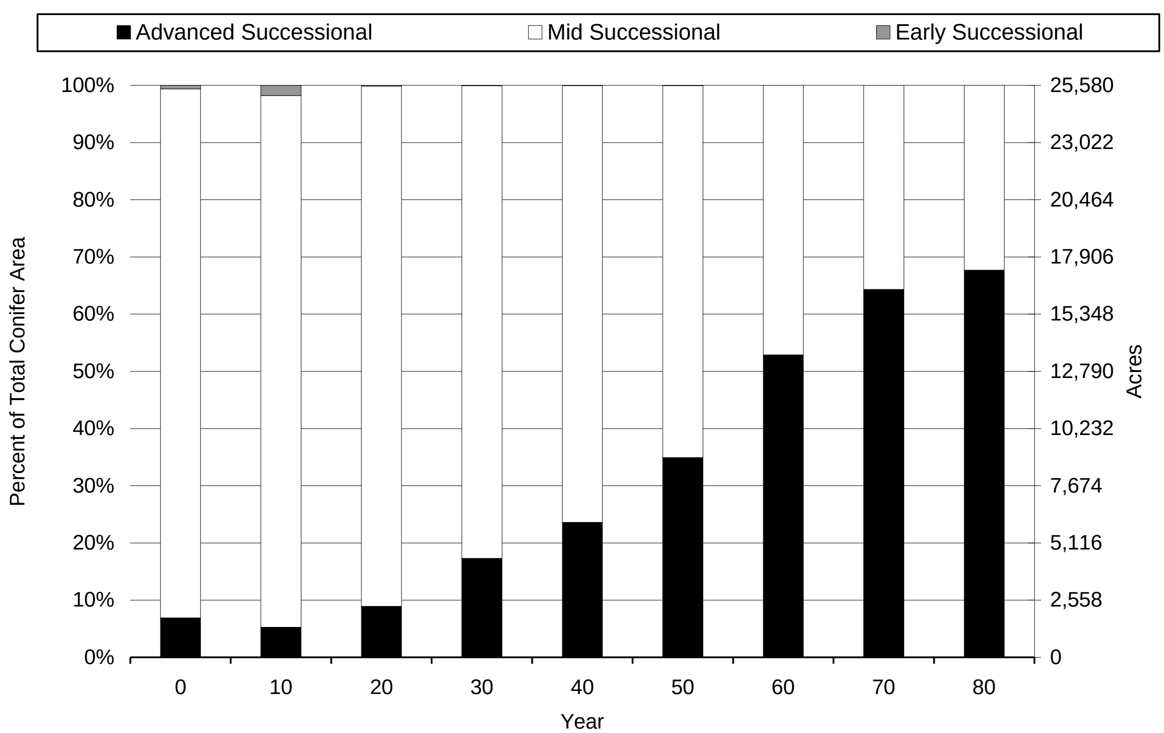


Figure 3.6-21. Successional stage composition predicted in riparian buffer zones by decade under Alternative B.

Effects on advanced-successional patch size and habitat connectivity

Under Alternative B, the number and total area of advanced-successional patches greater than or equal to 80 ac (32 ha) is predicted to increase over 80 years (Table 3.6-14). The number and total area of such patches within 1 mi (1.6 km) of another large patch is also predicted to increase over 80 years, with a small decrease in number during the last 20 years (Table 3.6-14, Figure 3.6-22). In years 20 and 80, increase in patch size and connectivity is primarily observed in the Albion and Navarro West inventory blocks, the southern third of the South Coast inventory block, and small sections of other inventory blocks. By year 80, increase in patch size and connectivity is very evident and substantial throughout the entire primary assessment area. There are a considerable number of upland patches in areas to be set aside as terrestrial reserves, along with aggregated connecting riparian stands (Figure 3.6-22); the increase in patch size and connectivity throughout the assessment area is predominantly within these terrestrial reserves boundaries. Compared with existing conditions, Alternative B would substantially improve advanced-successional patch size conditions, with increases in patch size and habitat connectivity of upland and riparian stands; this increase is predominantly inside the terrestrial reserves.

Table 3.6-14. Number and total area (ac) of advanced-successional patches greater than or equal to 80 ac (32 ha), and within 1 mi (1.6 km) of another patch under Alternative B.

Parameters	Year				
	0	20	40	60	80
Number of patches greater than or equal to 80 ac	6	10	34	60	58
Total area of patches greater than or equal to 80 ac	1,497	2,841	9,725	41,063	62,380
Number of patches greater than or equal to 80 ac AND within 1 mi of another patch	4	9	26	57	52
Total area of patches greater than or equal to 80 ac AND within 1 mi of another patch	1,181	2,659	8,555	40,623	59,403

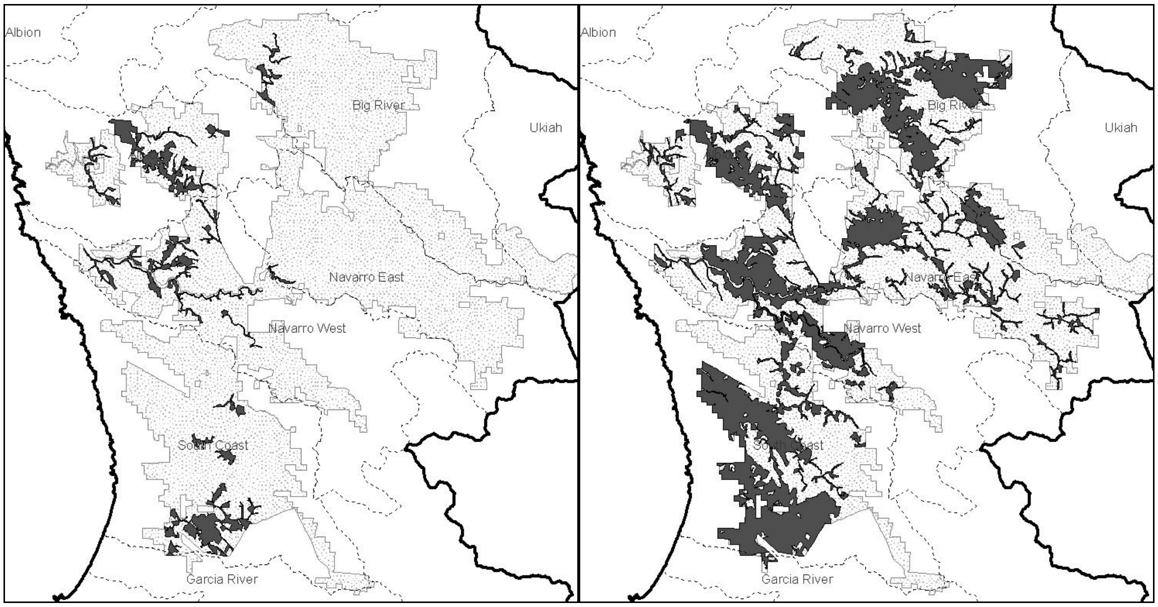


Figure 3.6-22. Distribution of advanced-successional patches greater than 80 ac (32 ha) and within 1 mi (1.6 km) of another patch in a subsection of the primary assessment area modeled for year 40 (left) and year 80 (right) under Alternative B (advanced-successional patches are indicated in dark gray) (existing conditions are shown in Figure 3.6-1).

Under all of the alternatives, MRC forestlands would be used for timber production as opposed to alternate land uses, helping to minimize fragmentation of lands and provide value for terrestrial resources.

Effects on important habitat and habitat elements

The following section analyzes effects on important habitat and habitat elements. Effects determinations are not provided for habitat elements, with the exception of old-growth trees and stands since they are a unique community with intrinsic biological and social value in addition to providing habitat value for wildlife. For analyses of species of concern associated with the following habitat elements, see the subsection below titled “Effects on wildlife species of concern.”

Old-growth trees and stands

Impact 3.6-2: Effects on old-growth trees and stands from timber harvest activities. Under Alternative B, no old growth would be harvested within the terrestrial reserves, and all Type I old growth in the primary assessment area would be fully protected from forest management activities. Outside the terrestrial reserves, CFPR (14 CCR §913.1) measures apply, where old-growth stands are subject to harvest using even-aged management (clearcut) or other silvicultural methods. Because an estimated 36% of total Type II old growth (approximately 200 ac [80 ha]) in the primary assessment area occurs outside of the terrestrial reserves boundary, these stands are subject to harvest under CFPR (14 CCR §913.1) measures. Since old-growth forests are a unique community with biological and social value, direct effects on old-growth trees and stands by harvesting would be a **potentially significant effect**.

Mitigation Measure 3.6-1: **Restrict harvest of old-growth trees and stands, and protect screen trees.** Mitigation measures to protect old-growth trees and stands under Alternative B would be to incorporate restrictions on harvest of old growth outside of the terrestrial reserves, as well as implementing protections for screen trees. Such measures would reduce effects on old-growth trees and stands to **no effect**.

Snags, logs, and wildlife trees

Figure 3.4-8 (in Section 3.4 [Aquatic and Riparian Habitats and Species of Concern]), Figures 3.6-23, and Appendix Q (Large Tree Density [forest-wide] by Inventory Block and Large Tree Density [riparian] by Inventory Block) show timber modeling results for large tree density for the next 80 years under Alternative B, forest-wide and in riparian buffer zones. Forest-wide, trees with a diameter at breast height of > 32 in (81 cm) are predicted to increase from an estimated 1 tree per acre to approximately 8 trees per acre between years 0 and 80; while trees with a diameter at breast height of 24–32 (60–81 cm) in are predicted to increase from an estimated 5 trees per acre to approximately 16 trees per acre, with the exception of a slight temporary decrease (approximately 1 tree per acre) between years 0 and 10. In riparian buffer zones, trees with a diameter at breast height of > 32 in (81 cm) are predicted to increase from an estimated 2 trees per acre to approximately 16 trees per acre between years 0 and 80; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 8 trees per acre to approximately 27 trees per acre (Section 3.4 [Aquatic and Riparian Habitats and Species of Concern], Figure 3.4-8). The predicted overall trend for large trees under Alternative B is an increase in trees per acre over 80 years, both forest-wide and in riparian buffer zones. An increase in large tree density in the primary assessment area may enhance snag, log, and wildlife tree recruitment.

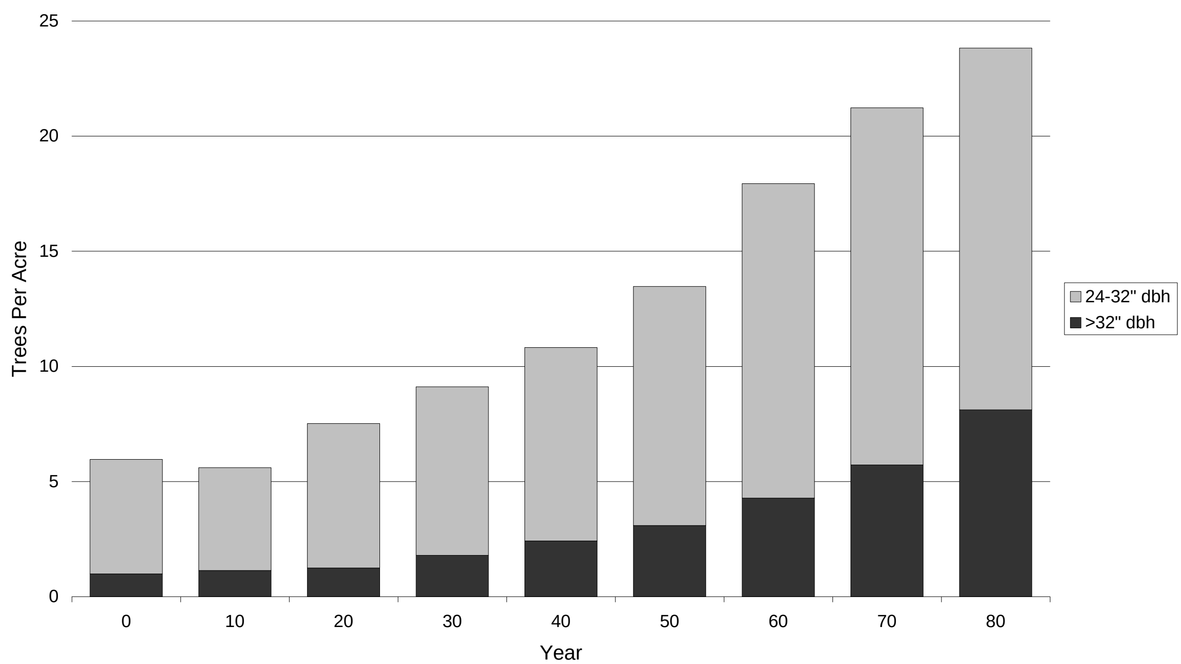


Figure 3.6-23. Large tree density (trees per acre) predicted forest-wide by decade under Alternative B.

In the absence of forest management activities within the terrestrial reserves under Alternative B, habitat elements such as snags, logs, and wildlife trees would naturally establish and provide enhanced benefit for numerous associated wildlife species across a substantial area. Outside of the terrestrial reserves, the 2012 CFPRs (14 CCR §919.1) apply and include some measures to retain snags and nest trees. However, there would be no specific strategy outside of the terrestrial reserves to actively recruit new snags, logs, and/or wildlife trees. Though increase in availability of large trees over time may serve to passively recruit new snags, logs, and wildlife trees, the lack of specific strategies to actively recruit these trees to a density that benefits wildlife could result in loss of these habitat elements and subsequently, could adversely affect the species that use them outside of the terrestrial reserves. Potential effects on species that use snags, logs, and wildlife trees are described below under the subsection titled "Effects on wildlife species of concern."

Hardwoods stands and hardwoods within conifer stands

Under Alternative B, only limited terrestrial habitat management would be permitted within the reserves to meet ecological objectives. Outside of the terrestrial reserves, there would be review of all THPs to identify and retain hardwood trees that enhance wildlife habitat. Such strategies would retain some representations of early- and mid- successional hardwood stands outside of the reserves. While there would be a trend towards more redwood-dominated habitat and less hardwood-dominated habitat and associated wildlife species, hardwood retention and protection would continue to provide wildlife value under Alternative B.

None of the rocky outcrops in the primary assessment area fall within the terrestrial reserve boundary. The CFPRs (14 CCR §919.3) that would apply outside the terrestrial reserve boundary specify timber management restrictions developed to protect sensitive species that may use rocky outcrops, such as limited operating periods during the peregrine falcon nesting season. However, there is no strategy specified under the CFPRs that preserve and maintain the existing 63 ac (25 ha) of rocky outcrops in the primary assessment area. Potential effects on species that use rocky outcrops are described below under the subsection titled "Effects on wildlife species of concern."

Effects on wildlife species of concern

For Alternative B, in addition to the following analyses for wildlife species of concern, site-specific effects outside the reserves would be assessed through the completion of individual THPs, subject to input and review by CDFG, CAL FIRE and review team agencies to ensure compliance with the CFPRs and other applicable mitigation requirements.

Under Alternative B, post-fire timber salvage outside the reserves would be the same as under the No Action alternative, and there would be no effect on terrestrial habitat and wildlife species of concern compared with existing conditions. There would be no timber salvage operations in the reserves.

Marbled murrelet

MRC may continue to conduct certain research and monitoring activities inside the reserves and on its forestlands outside of the reserves under Alternative B, which may include surveys for marbled murrelet. The agencies and MRC would develop additional research and monitoring guidelines for marbled murrelet under Alternative B. MRC may propose the use of radar and ground-based surveys to monitor marbled murrelet populations. The agencies find risk of harm, harassment, or mortality due to radar surveys to be so remote as to result in an estimate of zero marbled murrelets adversely affected over the 80-year term of the HCP. Likewise, survey and monitoring efforts for other species do not alter marbled murrelet habitat and should not alter marbled murrelet behavior; the risk that they would lead to impacts is limited to attracting predators to occupied habitat. The agencies believe this source of incidental harm or harassment also approaches zero over the term of the plan.

Under Alternative B, the predicted overall trend for potentially suitable marbled murrelet habitat from year 0 to year 80 is an increase by approximately 27,500 ac (11,128 ha) for Zone 1 and an increase by approximately 2,170 ac (878 ha) for Zone 2 (Figure 3.6-24, Appendix Q [Marbled Murrelet Habitat Plan Area]). In Zone 3, there is a small decrease in potentially suitable marbled murrelet habitat from year 0 during years 10–70, and a return to the approximate acreage of year 0 by year 80. Appendix F, Figures F-28 and F-29 show projected distribution of marbled murrelet habitat for years 40 and 80 under Alternative B.

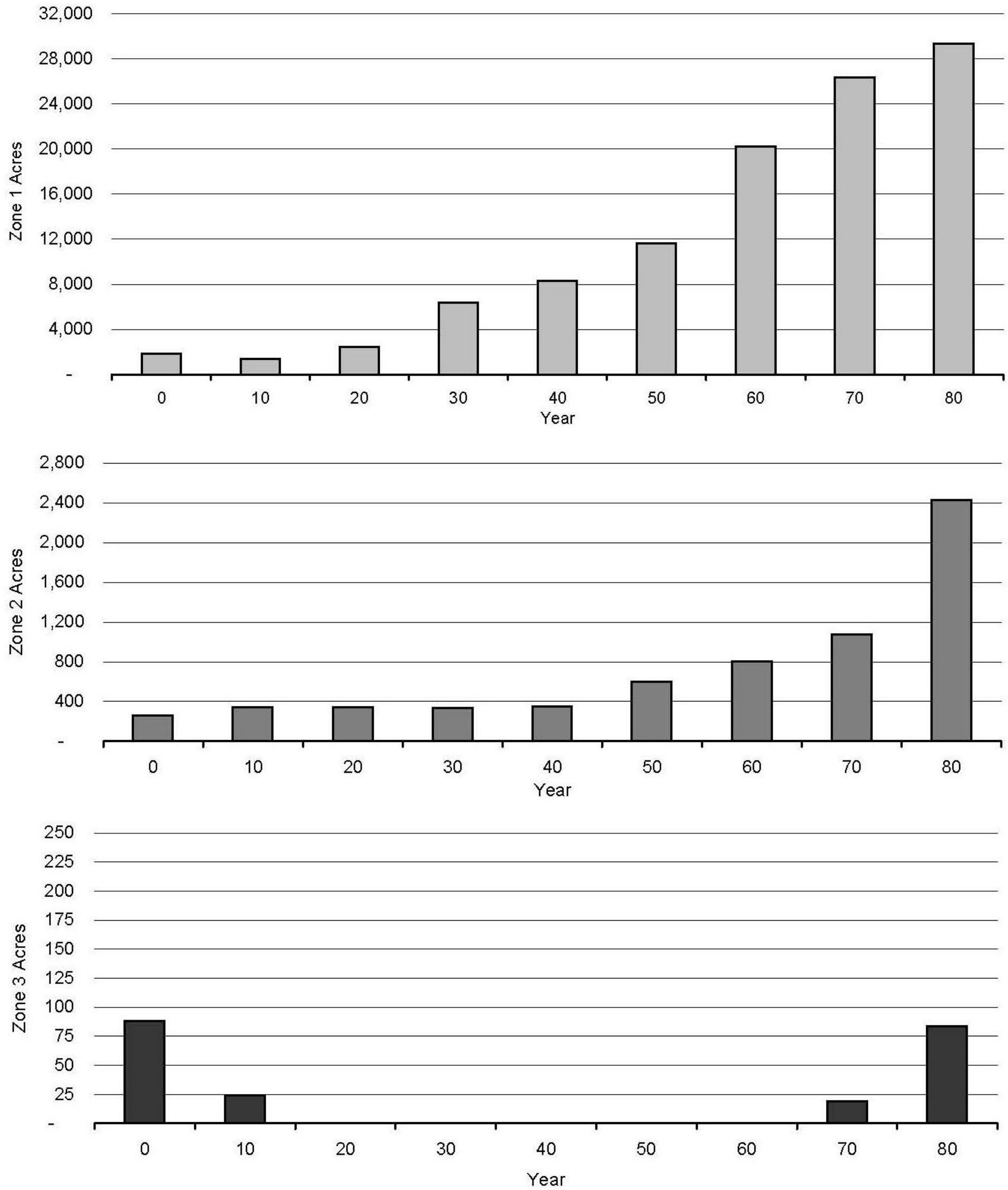


Figure 3.6-24. Potentially suitable marbled murrelet habitat predicted by decade under Alternative B.

In the terrestrial habitat analysis presented above for Alternative B, there would be an increase in advanced-successional habitat and connectivity, in both riparian and upland stands; this increase is predominantly inside the terrestrial reserves. While no old growth would be harvested within the terrestrial reserves, old-growth stands are subject to harvest outside the terrestrial reserves under the CFPRs (14 CCR §913.1); an estimated 36% of total Type II old growth (approximately 200 ac [80 ha]) in the primary assessment area occurs outside of the terrestrial reserves boundary and is subject to harvest. However, Lower Alder Creek is the only place in the primary assessment area where long-term, continuous murrelet activity has been documented.

Under Alternative B, USFWS would issue an 80-year incidental take permit for marbled murrelet outside of the terrestrial reserves, and CDFG would issue an 80-year take permit for marbled murrelet outside of the terrestrial reserves under Fish & Game Code Section 2080.1 or 2081 (Section 2, Alternatives); take would be authorized subject to the terms of the federal and California incidental take authorizations. All lands in Alder Creek drainage owned by MRC (from ridgetop to ridgetop) would be established as a 6,039-ac (2,443 ha) Marbled Murrelet Reserve for the duration of the requested 80-year permit period, within which there would be no harvest except to enhance or protect biological values. Marbled murrelets have been detected at various locations outside of the Alder Creek drainage, although no behavior indicative of breeding has been observed in these locations, and most of these areas consist of one or few residual old-growth trees. Under Alternative B, MRC would implement the following measures to minimize and mitigate the effects of incidental take of this species outside of the terrestrial reserves: (1) retain all primary murrelet trees and screen trees, and (2) permit harvest of secondary murrelet trees only if a ground survey determines that it is unlikely murrelets are occupying the surrounding area.

Timber management activities (e.g., harvest, hauling, road maintenance, and helicopter yarding) outside of the terrestrial reserves could potentially cause direct disturbance of marbled murrelet nests from noise, vibration, and human activity resulting in nest failure or abandonment, and/or indirect disturbance resulting from removal or degradation of habitat. However, since: (1) there would be measures in place under Alternative B to benefit marbled murrelets by retaining primary murrelet trees and screen trees outside of the terrestrial reserves; and (2) there are predicted trends showing an increase in the index for potentially suitable marbled murrelet habitat compared with existing conditions; there would be **beneficial effects** on marbled murrelets under Alternative B.

Northern spotted owl

MRC may continue to conduct certain research and monitoring activities inside the reserves and on its forestlands outside of the reserves under Alternative B, which may include surveys for—and the capture and handling of—northern spotted owls. The agencies and MRC would develop additional research and monitoring guidelines for northern spotted owl under Alternative B. Details of northern spotted owl surveys and monitoring would be similar to those described above for the Proposed Action. Effects on northern spotted owls due to monitoring activities are expected to be minimal, as such efforts would not substantially reduce numbers, cause populations to drop below self-sustaining levels, or restrict the range of the species.

Under Alternative B, forest-wide nesting/roosting habitat for northern spotted owl is predicted to decrease slightly by year 10; this can be explained by some conifer stands being harvested for the first time (having met harvest triggers) by year 10, and because variable retention and rehabilitation are increasing in the first ten years. In years 20–80, nesting/roosting habitat is predicted to increase every subsequent ten years to an additional 67,400 ac (27,275 ha) (compared with year 0) (Figure 3.6-25, Appendix Q [Northern Spotted Owl Habitat (forest-wide) Plan

Area]). This represents an increase from 23% of the total acreage in the primary assessment area to 57% of the total assessment area by year 80. The trend for foraging habitat is to decrease from 65% of total area to 25% by year 80. Non-suitable habitat is predicted to be greater every ten years compared with year 0. Overall, there would be much more nesting/roosting habitat over 80 years compared with year 0 under Alternative B, with 67,400 ac (27,275 ha) more than year 0 by year 80. Appendix F, Figures F-30 and F-31 show projected distribution of northern spotted owl habitat for years 40 and 80 under Alternative B.

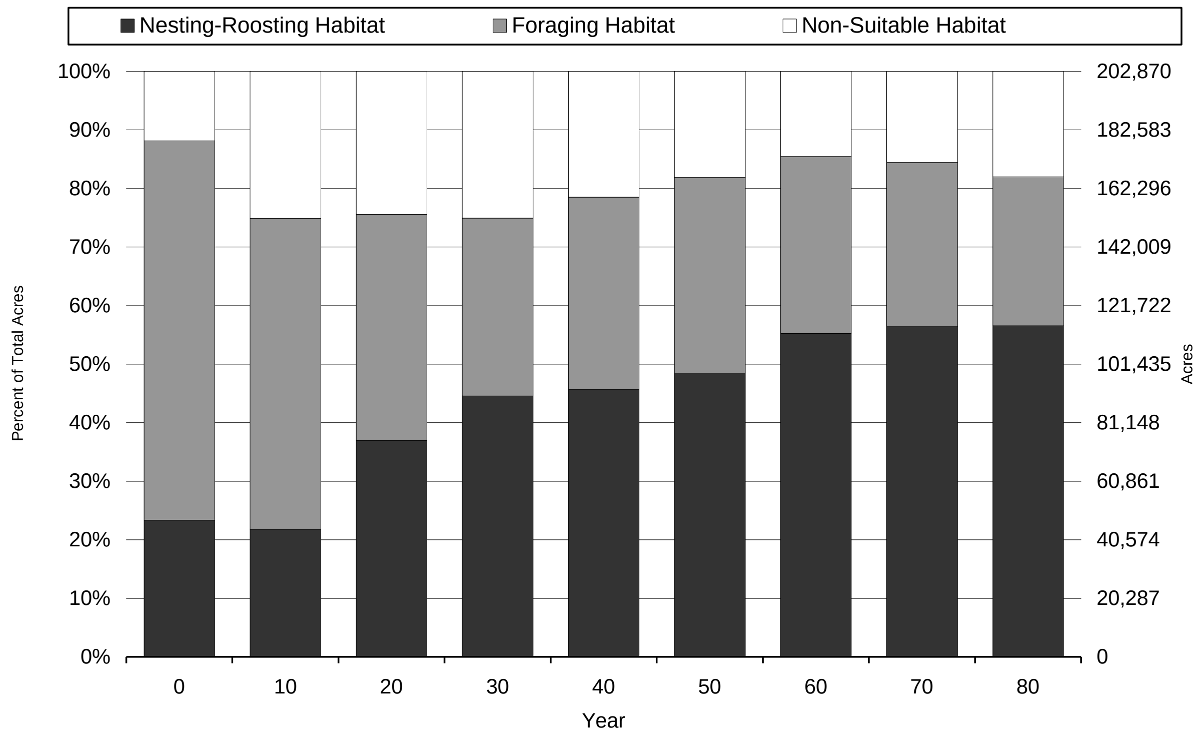


Figure 3.6-25. Northern spotted owl habitat predicted by decade under Alternative B.

In the terrestrial habitat analysis presented above for Alternative B, there would be a substantial increase in advanced-successional habitat and connectivity, in both riparian and upland stands; this increase is predominantly inside the terrestrial reserves. While no old-growth would be harvested within the terrestrial reserves, old-growth stands are subject to harvest outside the terrestrial reserves under the CFPRs (14 CCR §913.1); an estimated 36% of total Type II old growth (approximately 200 ac [80 ha]) in the primary assessment area occurs outside of the terrestrial reserves boundary and could be subject to harvest. Management strategies under the CFPRs (14 CCR §919.9) would include some hardwood retention and protection that would preserve some northern spotted owl foraging habitat outside of the terrestrial reserves; inside the reserves, hardwoods would not be managed or harvested.

Under Alternative B, MRC would not be obligated to participate in barred owl management. It is difficult to predict the eventual result of no barred owl management on northern spotted owl populations on the primary assessment area. The barred owl invasion would be expected to increase until the number of barred owls is greater than the present number of spotted owls. Based on current trends of barred owl population growth and corresponding decreasing occupancy of northern spotted owls both on MRC lands and elsewhere, the numbers of northern spotted owls would decrease over time. The entire northern spotted owl population could possibly be extirpated from the primary assessment area. There would also likely be an adverse effect on northern spotted owl prey species as well as a wide variety of non-nothern spotted owl prey species due to the barred owl population increase.

Under Alternative B, USFWS would issue an 80-year incidental take permit for northern spotted owl outside of the terrestrial reserves (Section 2, Alternatives); incidental take of northern spotted owls outside of the reserves would be authorized subject to the terms of the federal incidental take permit. Conservation measures to minimize incidental take of this species outside the reserves include measures to: protect nest trees with screen trees, incorporate a no-harvest buffer during the nesting season, provide a larger buffer for helicopter operations, and to survey for the species when operations could result in disturbance. Under Alternative B, there would be no harvest within the 15 Northern Spotted Owl Reserves totaling approximately 40,341 ac (16,325 ha), except to enhance or protect biological value. Of the 102 northern spotted owl territories in the primary assessment area, 49 territories (48%) would be located within the reserves where timber harvest would be restricted, and 53 territories (52%) would be located outside of the reserves where habitat would be managed for timber production (MRC, unpublished data). Outside of the reserves, the overall quality of northern spotted owl habitat is expected to improve over time, though it may require owls to move their nest location because of the shifting patchwork distribution pattern, which is typical of clearcut sivicultural regimes.

Timber management activities (e.g., harvest, hauling, road maintenance, and helicopter yarding) could potentially cause direct disturbance of northern spotted owl nests from noise, vibration, and human activity resulting in nest failure or abandonment, and/or indirect disturbance resulting from removal or degradation of habitat. However, since: (1) there would be measures in place under Alternative B outside of the terrestrial reserves intended to prevent direct mortality of northern spotted owls and to retain nest and screen trees that may be used by northern spotted owls decades later, and (2) there are predicted trends showing improvement in potentially suitable habitat compared with existing conditions, there would be **beneficial effects** on northern spotted owls under Alternative B.

Other species of concern

For Alternative B, in addition to the following analyses for other species of concern, site-specific effects outside the reserves would be assessed through the completion of individual THPs, subject to input and review by CDFG, CAL FIRE and review team agencies to ensure compliance with the CFPRs and other applicable mitigation requirements.

Based on the specialized wildlife communities query using information from the California Wildlife Habitat Relationships database for Alternative B (described above in Section 3.6.2.1), habitat values are expected to substantially decrease (greater than -66%) for northern goshawk and Humboldt marten. However, specific nest protection measures and considerations such as changes in advanced-successional patch size and connectivity, and availability of critical habitat elements such as snags and downed logs (described below) for these species, would offset some of the predicted effects related strictly to changes in overall habitat quality and quantity. Habitat values are expected to remain similar (less than +/- 66%) for great blue heron (rookery), great egret (rookery), osprey, white-tailed kite, golden eagle, bald eagle, American peregrine falcon, Vaux's swift, olive-sided flycatcher, pallid bat, Townsend's big-eared bat, California ringtail, Pacific fisher, and Sonoma tree vole. Habitat values are expected to substantially increase (greater than +66%) for purple martin.

Establishment of terrestrial reserves under Alternative B would provide opportunities for large protected areas of habitat to transform over time into habitat conditions that may have naturally existed in the absence of past anthropogenic influence. Within the terrestrial reserves, there would be an increase in conifer-dominated, advanced-successional stands and advanced-successional patch size and connectivity would continue to improve substantially over the 80-year analysis period. Habitat elements—including snags, logs, and wildlife trees—would naturally re-establish in the absence of forest management and old-growth stands in the reserves would be protected. Overall, within the terrestrial reserves, wildlife species of concern would be expected to benefit substantially from the many positive predicted changes to the landscape.

Despite the many predicted benefits within the terrestrial reserves, there are some anticipated potential effects on wildlife species of concern outside of the terrestrial reserves.

Forest management activities (e.g., harvest, hauling, road maintenance, and helicopter yarding) outside of the terrestrial reserves could potentially cause indirect disturbance due to structural changes in habitat and changes in tree species composition, and/or direct disturbance of nests from noise, vibration, and human activity. Such disturbance could result in nest failure or abandonment or disruption of breeding/denning for the following species of concern (which include a description of strategies and/or habitat analyses under this alternative that may counteract potential negative effects):

- **Great blue heron (rookery) and great egret (rookery).** Outside of the terrestrial reserves under Alternative B, 2012 CFPRs (14 CCR §919.3) apply, which include consultation with CDFG, a 300-ft (91-m) buffer zone around active nests, and a critical period where operations near active nests are restricted. Inside of the terrestrial reserves, all habitat and habitat elements for these species would be preserved.
- **Osprey and bald eagle.** Outside of the terrestrial reserves under Alternative B, 2012 CFPRs (14 CCR §919.3) apply, which include consultation with CDFG; 5- to 18-ac (2- to 7-ha) buffer zones for osprey nest trees and 10- to 40-ac (4- to 16-ha) buffer zones for bald eagle nest trees; preservation of nest, perch, screening, and replacement trees for both species; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. A predicted increase in conifer-dominated and advanced-successional habitats over time in across the primary assessment area provides an increase in available nesting and winter communal roosting habitat for these species, though the increase would be predominantly in the terrestrial reserves. Inside of the terrestrial reserves, all habitat and habitat elements for these species would be preserved.
- **Golden eagle.** Outside of the terrestrial reserves under Alternative B, 2012 CFPRs (14 CCR §919.3) apply, which include consultation with CDFG; a minimum 8-ac (3 ha) buffer zone for nest trees; preservation of nest, perch, screening, and replacement trees; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. Inside of the terrestrial reserves, all habitat and habitat elements for this species would be preserved.
- **Northern goshawk.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for northern goshawk to decline by 71% from year 0 to year 80 under Alternative B. This can be attributed to the strong association of northern goshawk with Montane Hardwood and Montane Hardwood Conifer habitat types in the California Wildlife Habitat Relationships database query, and the projected decline in those habitat types through year 80 under Alternative B (the California Wildlife Habitat Relationships database also shows a weak association of northern goshawk feeding habitat with Redwood habitat types). However, the 2012 CFPRs (14 CCR §919.3) apply outside of the terrestrial reserves under Alternative B,

which include consultation with CDFG; 5- to 20-ac (2- to 8-ha) buffer zone for nest trees; preservation of nest, perch, screening, and replacement trees; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. In addition, there is a projected increase in conifer-dominated and advanced-successional habitats over time, suggesting an increase in available habitat for this species. Inside of the terrestrial reserves, all habitat and habitat elements for this species would be preserved.

- **Humboldt marten.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for marten to decline by 95% from year 0 to year 80 under Alternative B. This can be attributed to the association of marten with only Montane Hardwood Conifer habitat type in the California Wildlife Habitat Relationships database query, and the projected decline in that habitat type through year 80 under Alternative B. However, more likely, Humboldt marten habitat would improve because of the predicted increase in advanced-successional conifer habitats, a predicted improvement in habitat patch size and connectivity, and management strategies to increase the number of snags and wildlife trees over the 80-year analysis period.
- **Point Arena mountain beaver.** The known range of the Point Arena mountain beaver in the primary assessment area greatly overlaps with the northern spotted owl and marbled murrelet reserves designated under Alternative B. With the exception of limited activities described in Section 2.5 (Alternatives, Alternative B [Take Authorization and Terrestrial Reserves]), no timber harvest, road building, livestock grazing, or other activities would be allowed within these reserves. Restricting all harvest activities in these reserves would protect Point Arena mountain beavers, resulting in beneficial effects on the species. If the species is encountered outside the reserves, management would be the same as under the No Action alternative (minimum 100-ft no-harvest buffer around burrow areas and up to 400-ft no-harvest buffer around burrows if contiguous habitat extends that far from burrows).

Under Alternative B, effects on the above species of concern from disturbance during forest management activities are minimized by protections provided by the 2012 CFPRs (14 CCR §919.3) including consultation with CDFG, and by the many benefits provided by designation of the terrestrial reserves including an increase in conifer-dominated, advanced-successional stands, improvement of advanced-successional patch size and connectivity, natural establishment of habitat elements including snags, logs, and wildlife trees, and protection of old-growth stands inside the reserves. Therefore, these effects are considered **less than significant**.

Impact 3.6-3: Effects on golden eagle, American peregrine falcon, pallid bat, and/or Townsend's western big-eared bat from potential habitat modifications. Under Alternative B, there is no specific strategy to maintain and preserve rocky outcrops outside of the terrestrial reserves. If MRC opts to convert rocky outcrops (e.g., to a quarry) under Alternative B, it could remove valuable nesting habitat for golden eagle or American peregrine falcon, and roosting habitat for pallid bat or Townsend's western big-eared bat. Because removal of rocky outcrop habitat would adversely affect golden eagle, American peregrine falcon, pallid bat and/or Townsend's western big-eared bat through nesting or roosting habitat modifications or removal of nesting or roosting habitat, this effect is considered **potentially significant**.

Mitigation Measure 3.6-2: Protect rocky outcrops. To protect American peregrine falcon, pallid bat, Townsend's western big-eared bat, and other species that use rocky outcrops, implement measures to preserve and maintain the existing 63 ac (25 ha) of rocky outcrops outside of terrestrial reserves in the primary assessment area and to survey newly discovered rocky outcrops for sensitive species. This measure would reduce this effect to **less than significant**.

Outside the terrestrial reserves, CFPR (14 CCR §913.1) measures apply, where old-growth stands are subject to harvest using even-aged management (clearcut) or other silvicultural methods. Because Type II old growth occurs outside of the terrestrial reserves boundary, these stands are subject to harvest under CFPR strategies. In addition, there is no specific strategy outside of the terrestrial reserves to actively recruit snags or wildlife trees. The removal of old-growth trees and reduction in snags and wildlife trees outside of the terrestrial reserves could adversely affect osprey, bald eagle, northern goshawk, Vaux's swift, olive-sided flycatcher, and/or purple martin by reducing the amount of available nesting habitat. The reduction in amount of available snags, downed logs, and wildlife trees could adversely affect California ringtail, Humboldt marten, and Pacific fisher by reducing available nesting and denning habitat. However, the designation of the terrestrial reserves provides many substantial habitat benefits to these same species across a large area—including an increase in conifer-dominated, advanced-successional stands, improvement of advanced-successional patch size and connectivity, natural establishment of habitat elements including snags, logs, and wildlife trees, and protection of old-growth stands within the reserves; outside of the reserves, there would be fluctuations in habitat value and these habitat elements. Since overall effects are beneficial due to the increased habitat value inside of the reserves, the aforementioned effects on these wildlife species of concern due to habitat modifications are considered **less than significant**.

Since there are only a few acres of grassland in the primary assessment area and grasslands are not affected by timber management activities, there are **no effects** anticipated on white-tailed kite.

Effects on wildlife communities

Based on the specialized query using information from the California Wildlife Habitat Relationships database for Alternative B, the primary assessment area would continue to provide habitat for species that currently have associated high or moderate habitat values under existing conditions. By year 80, it is estimated that Alternative B would result in a substantial overall decrease in habitat value for 1 species of amphibian, 2 species of reptiles, 31 species of birds, and 13 species of mammals; and an overall increase in habitat value for 0 species of amphibians, 1 species of reptiles, 14 species of birds, and 6 species of mammals[41] (Table 3.6-15, Appendix P). The habitat value for the remaining number of species would not change substantially. Appendix P lists each species, its starting habitat value at year 0, and projected change in habitat value (increase or decrease by 33%– 66% or more) for every 20 years under each alternative.

Table 3.6-15. Number of wildlife species for which habitat value (quantity x quality) substantially increases or decreases (> 66% change) or remains similar relative to existing conditions under Alternative B, based on California Wildlife Habitat Relationships modeling.

Taxonomic group	Year			
	20	40	60	80
Amphibians				
Increase in habitat value	1	1	0	0
Minimal change in habitat value	18	17	18	18
Decrease in habitat value	0	1	1	1

[41] These tallies include the species of concern discussed under "Other species of concern" above, as well as species not currently considered as species of concern.

Taxonomic group	Year			
	20	40	60	80
Reptiles				
Increase in habitat value	1	1	1	1
Minimal change in habitat value	18	17	15	16
Decrease in habitat value	0	1	3	2
Birds				
Increase in habitat value	7	12	10	14
Minimal change in habitat value	135	114	99	99
Decrease in habitat value	2	18	35	31
Mammals				
Increase in habitat value	5	5	5	6
Minimal change in habitat value	68	64	57	55
Decrease in habitat value	1	5	12	13

The species with predicted large decreases (greater than 66% change at year 80) in habitat value under Alternative B are very similar to those listed under the No Action alternative. As described for the No Action alternative, the California Wildlife Habitat Relationships modeling results above do not account for the change in availability of different habitat elements based on unique management scenarios under future projections. Species associated with aquatic habitats may be more likely to be affected by management practices influencing instream habitat than by the dominant tree species (i.e., type), and species associated with snags, downed logs, and other habitat elements are likewise much more likely to be affected by management of such elements.

Many of the species with predicted decreases in habitat value are weakly associated with existing habitat conditions in the primary assessment area. This means that these species are associated with habitat conditions that are not present in the primary assessment area, and that the primary assessment area can only support relatively low population densities. Most other species showing a decrease in habitat value, including game species, are those largely associated with Montane Hardwood and Montane Hardwood-Conifer California Wildlife Habitat Relationships habitat types, often in combination with smaller size classes and open-canopied forests. As with every alternative, there is a trend under Alternative B towards more advanced-successional forest habitat and less early- and/or mid-successional habitat, and a trend toward more redwood-dominated habitat and less hardwood-dominated habitat. These trends would affect wildlife communities in the same ways as described above for the No Action alternative.

While certain non-special-status wildlife communities may experience reductions in habitat value (3.6-14), management towards more advanced-successional and conifer habitats under Alternative B is expected to: (1) benefit the species of most conservation concern; and (2) not substantially reduce the overall habitat of any wildlife species in a way that would cause a wildlife population or community to drop below self-sustaining levels in California. Therefore, effects on wildlife communities under Alternative B are considered **less than significant**.

3.6.2.6 Alternative C

Analysis of trends in terrestrial habitat types and successional stage

As described in Section 3.5.2 (Vegetation and Plant Species of Concern, Environmental effects and mitigation), the predicted overall trend in the dominant California Wildlife Habitat Relationships habitat type under Alternative C is a decrease in both Montane Hardwood and

Montane Hardwood-Conifer and an increase in the relative proportion of Redwood in most conifer stands. The predicted overall trend in California Wildlife Habitat Relationships size class under Alternative C is a substantial decrease in the percentage composition of younger, class 1 and 2 stands, a relatively stable representation of classes 3 and 4 stands, a substantial increase in class 5 stands, and a continual, low percentage composition of the larger and mixed-size tree stands (class 6).

Over 40 years under Alternative C, there is a minor predicted forest-wide decrease in early successional forest with a corresponding increase in advanced-successional forest under Alternative C of approximately 2% to 6% (Figure 3.6-26, Appendix Q [Successional Stage (forest-wide) by Inventory Type]). The acreage of mid-successional forest would remain relatively stable. Successional stage composition in riparian buffer zones is predicted to change noticeably over 40 years, with advanced-successional habitat increasing from approximately 7% to 34% over the 40-year analysis period (Figure 3.6-27, Appendix Q [Successional Stage (riparian) by Inventory Type]).

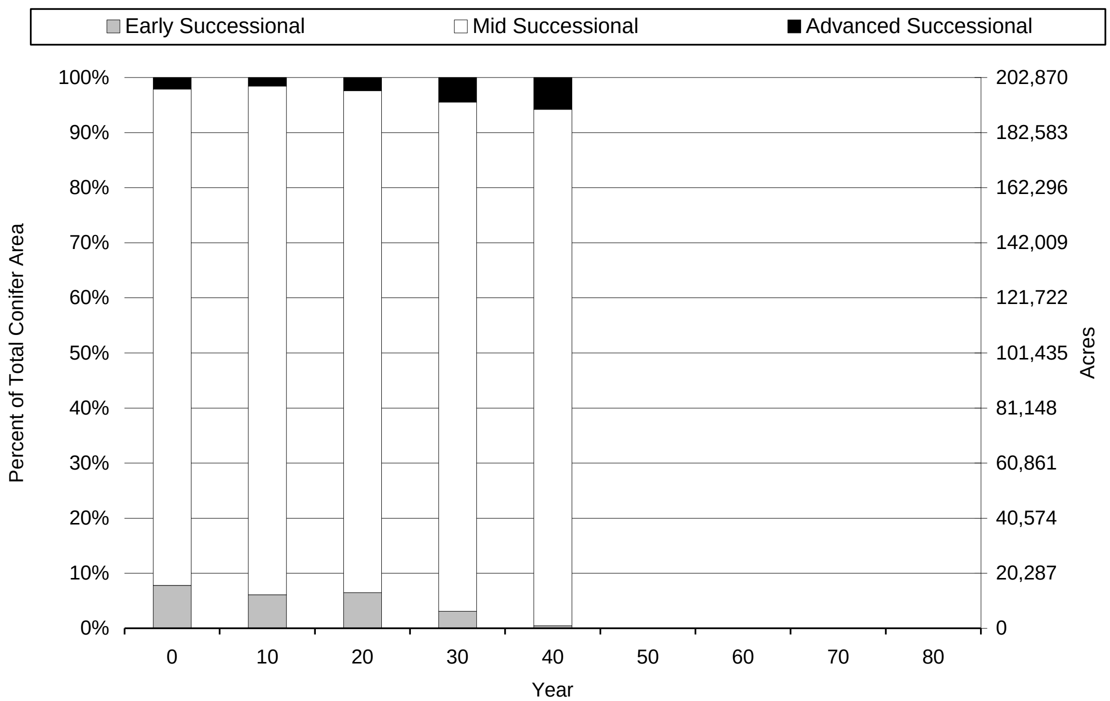


Figure 3.6-26. Successional stage composition predicted forest-wide by decade under Alternative C.

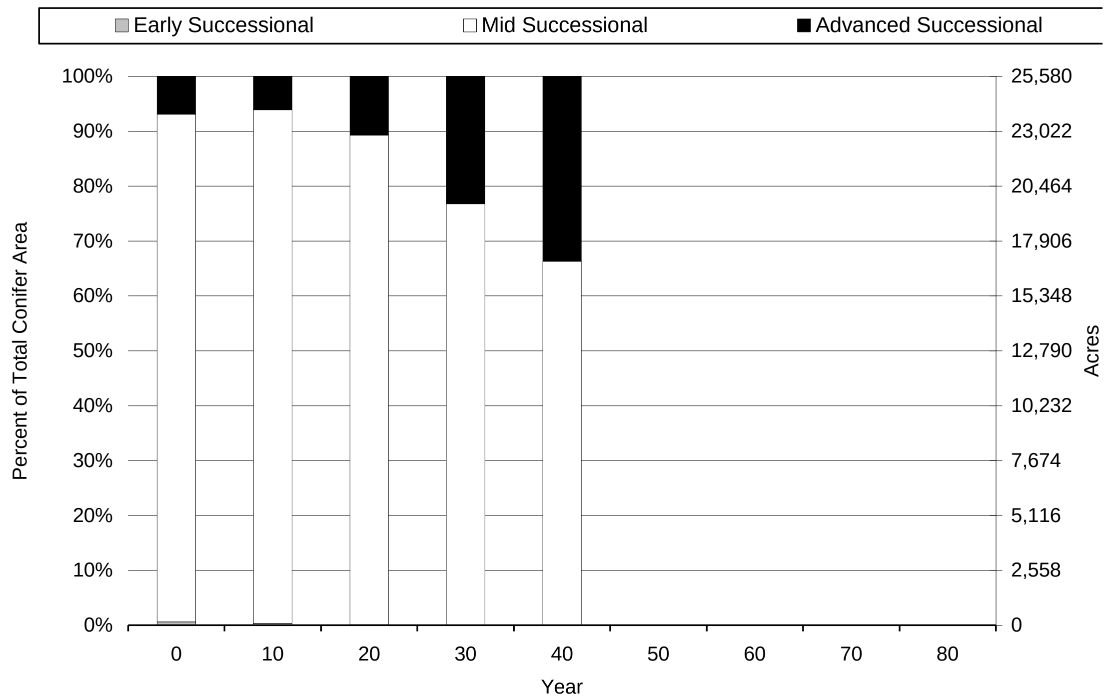


Figure 3.6-27. Successional stage composition predicted in riparian buffer zones by decade under Alternative C.

Effects on advanced-successional patch size and habitat connectivity

Under Alternative C, the number and total area of advanced-successional patches greater than or equal to 80 ac (32 ha) is predicted to increase over 40 years (Table 3.6-16). The number and total area of such patches within 1 mi (1.6 km) of another large patch is also predicted to increase over 40 years (Table 3.6-16, Figure 3.6-28). The majority of patches are aggregations of linear, riparian stands (Figure 3.6-28). Compared with existing conditions, Alternative C would improve advanced-successional patch size conditions, though not to the same extent as over 80 years under the Proposed Action.

Table 3.6-16. Number and total area (ac) of advanced-successional patches greater than or equal to 80 ac (32 ha), and within 1 mi (1.6 km) of another patch under Alternative C.

Parameters	Year		
	0	20	40
Number of patches greater than or equal to 80 ac	6	8	24
Total area of patches greater than or equal to 80 ac	1,497	2,659	6,498
Number of patches greater than or equal to 80 ac AND within 1 mi of another patch	4	7	21
Total area of patches greater than or equal to 80 ac AND within 1 mi of another patch	1,181	2,546	6,047

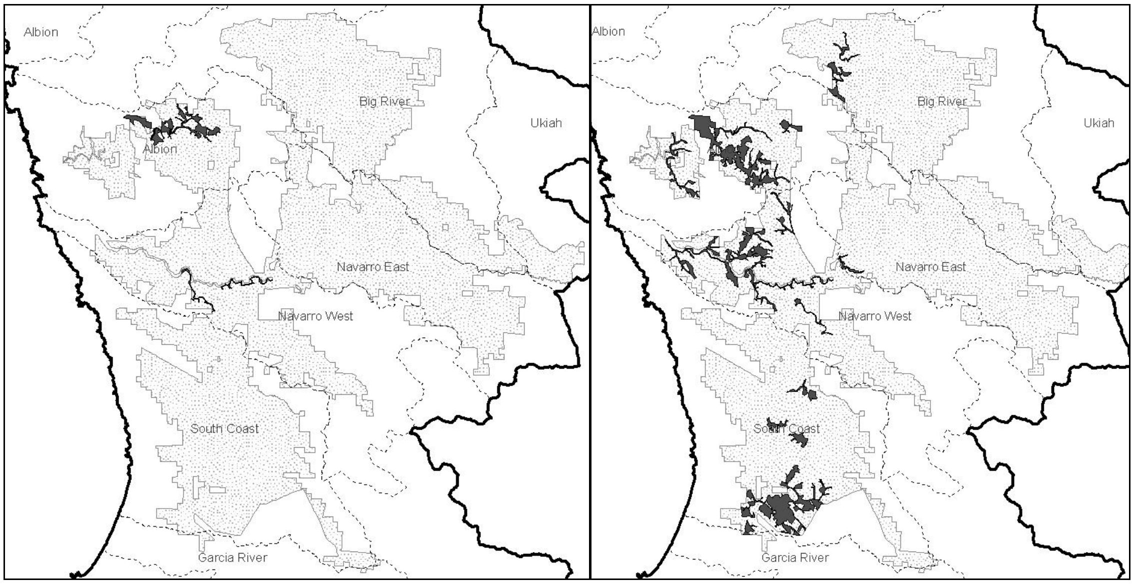


Figure 3.6-28. Distribution of advanced-successional patches greater than 80 ac (32 ha) and within 1 mi (1.6 km) of another patch in a subsection of the primary assessment area modeled for existing conditions (left) and year 40 (right) under Alternative C (advanced-successional patches are indicated in dark gray).

Under all of the alternatives, MRC forestlands would be used for timber production as opposed to alternate land uses, helping to minimize fragmentation of lands and provide value for terrestrial resources.

Effects on important habitat and habitat elements

The following section analyses effects on important habitat and habitat elements. Effects determinations are not provided for habitat elements, with the exception of old-growth trees and stands since they are a unique community with intrinsic biological and social value in addition to providing habitat value for wildlife. For analyses of species of concern associated with the following habitat elements, see the subsection below titled “Effects on wildlife species of concern.”

Under Alternative C, effects on important habitat and habitat elements would be similar to the Proposed Action, except that benefits would be limited to 40 years. The beneficial effects of certain conservation and adaptive management measures may not be realized in 40 years.

Old-growth trees and stands

For specific protections regarding old-growth trees and stands under Alternative C, see the analysis for the Proposed Action. Because all Type I and Type II old-growth stands and residual old-growth trees would be retained and stand function potentially enhanced, **beneficial effects** on old-growth trees are anticipated under Alternative C.

Snags, logs, and wildlife trees

Figure 3.4-10 (in Section 3.4 [Aquatic and Riparian Habitats and Species of Concern]), Figure 3.6-29, and Appendix Q (Large Tree Density [forest-wide] by Inventory Block) show timber modeling results for large tree density for the next 40 years under Alternative C, forest-wide and in riparian buffer zones. Forest-wide, trees with a diameter at breast height of > 32 in (81 cm) are predicted to increase from an estimated 1 tree per acre to approximately 2 trees per acre between years 0 and 40; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 5 trees per acre to approximately 7 trees per acre, with the exception of a slight temporary decrease (approximately 1 tree per acre) between years 0 and 10. In riparian buffer zones, trees with a diameter at breast height of > 32 in (81 cm) are predicted to increase from an estimated 2 trees per acre to approximately 7 trees per acre between years 0 and 40; while trees with a diameter at breast height of 24–32 in (61–81 cm) are predicted to increase from an estimated 8 trees per acre to approximately 19 trees per acre (Section 3.4 [Aquatic and Riparian Habitats and Species of Concern], Figure 3.4-10). The predicted overall trend for large trees under Alternative C is an increase in trees per acre over the 40-year term of the HCP, both forest-wide and in riparian buffer zones. An increase in large tree density in the primary assessment area may enhance snag, log, and wildlife tree recruitment.

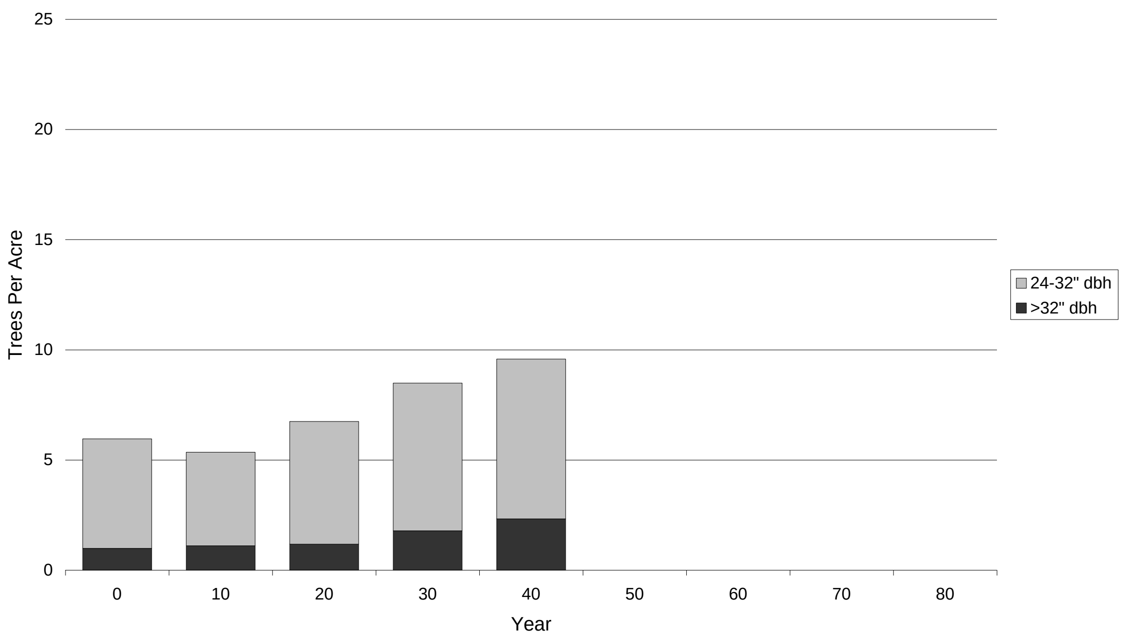


Figure 3.6-29. Large tree density (trees per acre) predicted forest-wide under Alternative C.

See the effects analysis for the Proposed Action (Section 3.6.2.3) for conservation measures aimed at retaining and recruiting a specific quantity and distribution of snags, logs, and wildlife trees across the forest in both riparian and upslope areas. Incorporation of such measures, as well as screen trees for old-growth trees, in combination with the assumed increase in availability of large trees over time that may serve to recruit new snags, logs, and wildlife trees, would enhance conditions for native wildlife species by improving the abundance and distribution of these habitat elements.

Hardwoods stands and hardwoods within conifer stands

As for the Proposed Action effects analysis described under 3.6.2.3, MRC's habitat conservation measures under Alternative C would include protection of hardwood forest at locations where site conditions favor hardwoods as the natural, advanced-successional habitat type. Such measures would retain representations of early-mid successional hardwood stands. While there would be a trend towards more redwood-dominated habitat and less hardwood-dominated habitat and associated wildlife species, hardwood retention and protection would continue to provide wildlife value under Alternative C.

Rocky outcrops

Alternative C incorporates MRC's HCP conservation measures to preserve and maintain the known 63 ac (25 ha) of rocky outcrops in the primary assessment area. Since Alternative C incorporates measures to preserve and maintain the currently known rocky outcrops and avoid and/or minimize effects on special concern species if newly discovered rocky outcrops are considered for conversion to a quarry, species that use rocky outcrops would be better protected than without such measures.

Effects on wildlife species of concern

In addition to the following analyses for wildlife species of concern, site-specific effects would be assessed and appropriate mitigation measures developed under Alternative C through completion of individual PTHPs, subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with applicable mitigation requirements.

Effects of post-fire timber salvage under Alternative C would be the same as under the Proposed Action for the first 40 years, with measures that would provide additional terrestrial habitat protections in burned areas and reduced potential for effects on wildlife species of concern compared with existing conditions and the No Action alternative.

Marbled murrelet

Alternative C would include the use of radar and ground-based surveys to monitor marbled murrelet populations. The agencies find risk of harm, harassment, or mortality due to radar surveys to be so remote as to result in an estimate of zero marbled murrelets adversely affected over the 40-year term of the HCP. Likewise, survey and monitoring efforts for other species do not alter marbled murrelet habitat and should not alter marbled murrelet behavior; the risk that they would lead to impacts is limited to attracting predators to occupied habitat. The agencies believe this source of incidental harm or harassment also approaches zero over the term of the plan.

Under Alternatice C, the predicted overall trend for potentially suitable marbled murrelet habitat from year 0 to year 40 is an increase by approximately 3,115 ac (1,260 ha) for Zone 1 and an increase by approximately 80 ac (32 ha) for Zone 2 (Figure 3.6-30, Appendix Q [Marbled Murrelet Habitat Plan Area]). In Zone 3, there is a small predicted decrease in potentially suitable marbled murrelet habitat of 43 ac (17 ha) from year 0 to year 40. Appendix F, Figure F-20 shows projected distribution of marbled murrelet habitat for year 40.

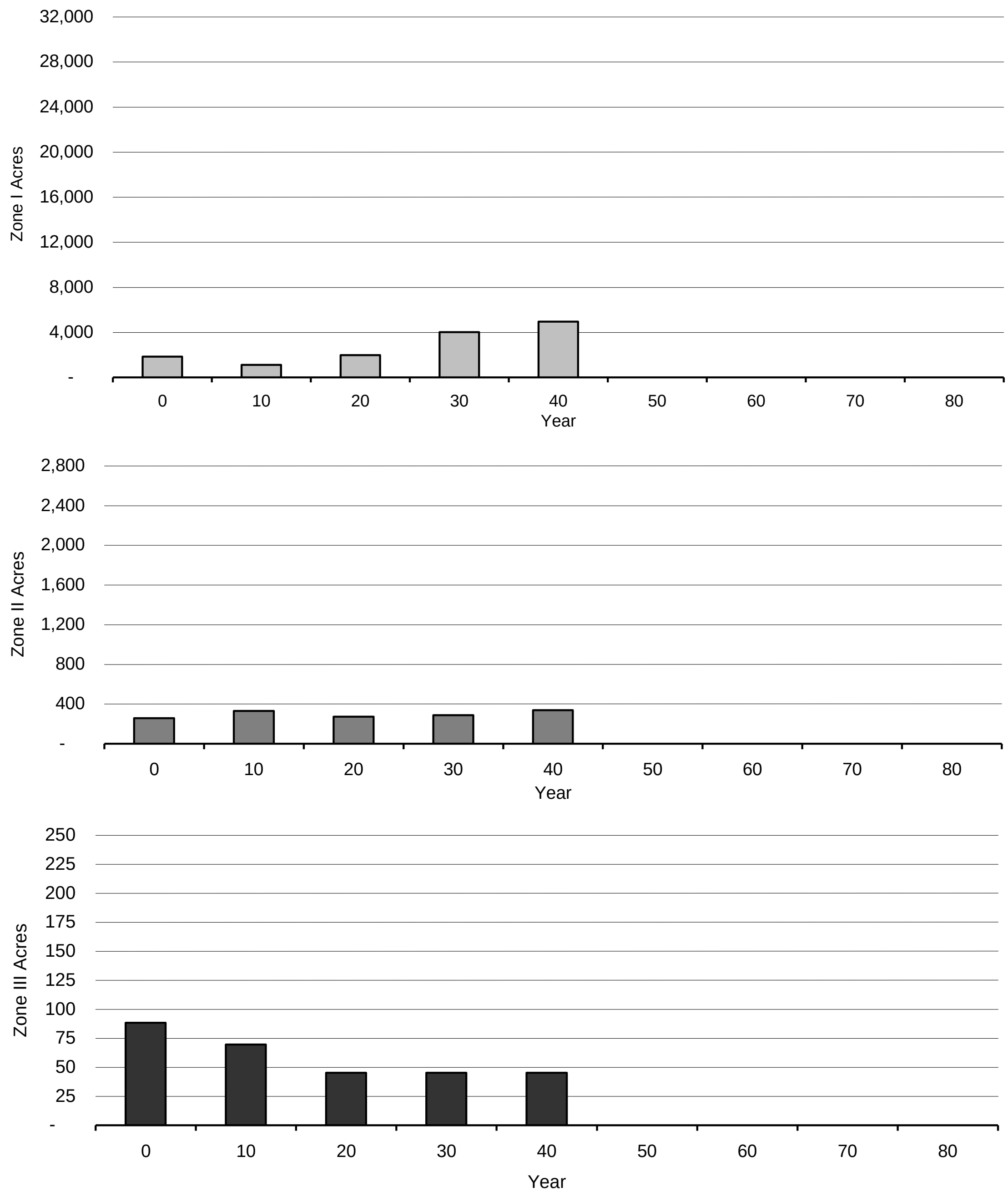


Figure 3.6-30. Potentially suitable marbled murrelet habitat predicted under Alternative C.

The HCP would include conservation measures intended to minimize and mitigate the effects of incidental take of marbled murrelets. There would be **beneficial effects** on marbled murrelet under Alternative C since: (1) there would be thorough measures in place to protect marbled murrelet individuals, nest sites, and habitat; (2) there are predicted trends showing an increase in the index for potentially suitable marbled murrelet habitat compared with existing conditions; and (3) there would be an extensive monitoring and adaptive management program in place (see the analysis for marbled murrelet under the Proposed Action [Section 3.6.2.3] for details).

Northern spotted owl

Alternative C includes banding northern spotted owls for the purposes of long-term monitoring and adaptive management. Details of northern spotted owl surveys and monitoring, including estimates of northern spotted owls captured and handled, would be the same as described above for the Proposed Action.

Under Alternative C, forest-wide nesting/roosting habitat for northern spotted owl is predicted to decrease slightly by year 10, but then increase to 76,900 ac (31,120 ha) (38% of the total acreage in the primary assessment area) by year 40 (Figure 3.6-31, Appendix Q [Northern Spotted Owl Habitat (forest-wide) Plan Area]). The trend for foraging habitat is to remain relatively stable through year 40. Non-suitable habitat is predicted to slightly decrease over 40 years as compared with year 0. Overall, there would be more nesting/roosting habitat over 40 years as compared with year 0 under Alternative C, with 29,500 ac (11,900 ha) more than year 0 by year 40. Appendix F, Figure F-22 shows projected distribution of northern spotted owl habitat for year 40.

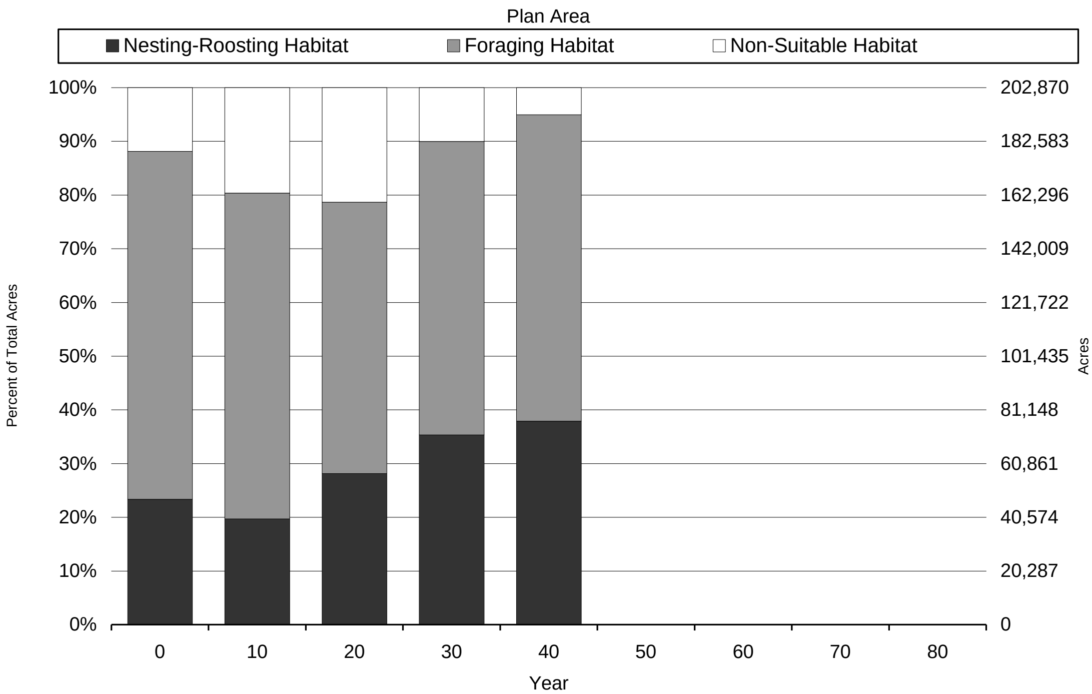


Figure 3.6-31. Northern spotted owl habitat predicted under Alternative C.

It is difficult to predict the result of barred owl management on northern spotted owl populations in the primary assessment area. With effective barred owl management, there is a reasonable likelihood that a viable northern spotted owl population could be maintained over time in the primary assessment area, although there is a possibility that barred owl control efforts would eventually fail. If barred owl management failed, there is a possibility that spotted owl populations would be extirpated from the primary assessment area.

It is difficult to estimate the number of barred owls that would be captured, relocated, sterilized, and/or removed using lethal means over the 40-year permit term. After initial implementation of barred owl management, the number of barred owls requiring capture and/or removal would possibly decrease within the primary assessment area and vicinity, but in the absence of a larger, range-wide management program, the numbers would presumably rebound. For the purposes of this assessment, a reasonable assumption is that approximately 30 barred owls would require capture and/or removal in the primary assessment area each year to meet the goals and objectives of the spotted owl management plan under Alternative C. During the 40-year term of the incidental take authorization, this estimate would equate to the capture and/or removal of a total of approximately 1,200 barred owls. Under a completely successful barred owl management program, barred owl would be nearly or completely extirpated from the primary assessment area. Given the extent of the barred owl invasion and the relatively small area of the primary assessment area relative to the remainder of California, there would likely be no substantial effect on the remainder of the barred owl population in California. There would certainly be no substantial effect on the status of barred owl populations throughout the remainder of North America.

The HCP would outline conservation measures intended to minimize and mitigate the effects of incidental take of northern spotted owls. There would be **beneficial effects** on northern spotted owl under Alternative C since: (1) there would be thorough measures in place to protect specific amounts of northern spotted owl nesting, roosting, and foraging habitat; (2) the HCP would provide for minimization of disturbance of nesting spotted owls; (3) there are predicted trends showing an overall increase in nesting/roosting habitat compared with existing conditions; and (4) there would be an extensive monitoring and adaptive management program that would monitor presence of the species, its habitat, and the effectiveness of management strategies (and trigger improvements in specific management actions based on monitoring results) (see the analysis for northern spotted owl under the Proposed Action [Section 3.6.2.3] for details).

Point Arena mountain beaver

Alternative C includes monitoring Point Arena mountain beaver for the purposes of long-term monitoring and adaptive management. Details of Point Arena mountain beaver surveys and monitoring would be the same as described above for the Proposed Action.

No-take standards for Point Arena mountain beaver under Alternative C include a minimum of 100-ft (30-m) no-harvest buffer zones around burrows, and up to 400-ft (122-m) no-cut buffer zones around burrows, if contiguous habitat extends that far from a burrow (Section 2, Alternatives). Such standards would protect identified burrows, but do not account for un-surveyed areas with potentially suitable habitat. There is potential for direct disturbance of Point Arena mountain beaver from destruction of burrows, or indirect disturbance due to habitat modifications or vibration of heavy equipment resulting from timber harvest activities. However, since USFWS technical assistance would provide additional measures to survey and protect unidentified burrows, effects are expected to be **less than significant**.

Other species of concern

In addition to the following analyses for other species of concern, site-specific effects would be assessed and appropriate mitigation measures developed under Alternative C through completion of individual PTHPs, subject to input and review by CDFG, CAL FIRE, and review team agencies to ensure compliance with applicable mitigation requirements.

Based on the specialized wildlife communities query using information from the California Wildlife Habitat Relationships database for Alternative C (described above in Section 3.6.2.1), habitat values are expected to substantially decrease (greater than -66%) for white tailed kite, golden eagle, northern goshawk, and Humboldt marten. However, specific nest protection measures and considerations such as changes in advanced-successional patch size and connectivity, and availability of critical habitat elements such as snags and downed logs for some of these species would offset some of the predicted effects related strictly to changes in habitat quality and quantity. Habitat values are expected to remain similar (less than +/- 66%) for great blue heron (rookery), great egret (rookery), osprey, bald eagle, American peregrine falcon, olive-sided flycatcher, pallid bat, Townsend's big-eared bat, California ringtail, Pacific fisher, and Sonoma tree vole. Habitat values are expected to substantially increase (greater than +66%) for Vaux's swift and purple martin.

Forest management activities (e.g., harvest, hauling, road maintenance, and helicopter yarding) could potentially cause indirect disturbance due to structural changes in habitat and changes in tree species composition, and/or direct disturbance of nesting individuals from noise, vibration, and human activity. Such disturbance could result in nest failure or abandonment or disruption of breeding/denning for the following species of concern (which include a description of strategies and/or habitat analyses under this alternative that may counteract potential negative effects):

- **Great blue heron (rookery) and great egret (rookery).** Since there are no specific strategies under Alternative C to minimize direct disturbance of great blue heron or great egret rookeries, the 2012 CFPRs (14 CCR §919.3) apply, which include consultation with CDFG, a 300-ft (91-m) buffer zone around active nests, and a critical period where operations near active nests are restricted. Alternative C does include the conservation measures in the HCP/NCCP that would retain existing and actively recruit snags and wildlife trees, which would incidentally provide important habitat elements for nesting great blue herons and great egrets.
- **Osprey and bald eagle.** Since there are no specific strategies under Alternative C to minimize direct disturbance of osprey and bald eagle nests, the 2012 CFPRs apply (14 CCR §919.3), which include consultation with CDFG, a 5- to 18-ac (2- to 7-ha) buffer zone for osprey nest trees, and a 10- to 40-ac (4- to 16-ha) buffer zone for bald eagle nest trees; preservation of nest, perch, screening, and replacement trees for both species; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. Alternative C does include the conservation measures in the HCP/NCCP that would retain existing and actively recruit snags and wildlife trees, which would incidentally provide important habitat elements for nesting osprey and bald eagles. A predicted increase in advanced-successional habitats over time would also provide an increase in available nesting and winter communal roosting habitat for these species under Alternative C.
- **White-tailed kite.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for white-tailed kite to decline by 95% from year 0 to year 40 under Alternative C. However, the California Wildlife Habitat Relationships database associates white-tailed kite with only one of the habitat combinations mapped on MRC lands: Redwood habitat type with size class 2 and cover code "open." This specific habitat combination is predicted to decrease by year 40 because of the increase in mid- and advanced-successional conditions, and explains the decrease in habitat value for white-tailed kite. White-tailed kite breeds in lowland grasslands, oak woodlands or savannah, and wetlands with open areas. There are only a few acres of grassland in the primary assessment area and the grasslands would not be directly affected by timber management activities, although they could be indirectly affected by such activities in adjacent forest habitat (which would be addressed during site-specific PTHP review).
- **Golden eagle.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for golden eagle to decline by 86% from year 0 to year 40 under Alternative C. This can be attributed to the association of golden eagles with Montane Hardwood, Montane Hardwood Conifer, and

sparse or open Redwood habitat types in the California Wildlife Habitat Relationships database query, and the projected decline in those habitat types through year 40 under Alternative C. However, under Alternative C, the 2012 CFPRs (14 CCR §919.3) apply, which include consultation with CDFG, a minimum 8-ac (3-ha) buffer zone for nests; preservation of nest, perch, screening, and replacement trees; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. Alternative C also includes conservation measures in the HCP/NCCP to retain existing and actively recruit snags and wildlife trees, which would incidentally provide important habitat elements for nesting golden eagles.

- **Northern goshawk.** The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for northern goshawk to decline by 71% from year 0 to year 40 under Alternative C. This can be attributed to the association of northern goshawk with Montane Hardwood and Montane Hardwood Conifer habitat types in the California Wildlife Habitat Relationships database query, and the projected decline in those habitat types through year 40 under Alternative C (the California Wildlife Habitat Relationships database also shows a weak association of northern goshawk feeding habitat with Redwood habitat types). Redwood habitat is projected to increase, but not at a rate that would compensate for the decrease in habitat value associated with the decrease in Montane Hardwood and Montane Hardwood Conifer habitat types according to the California Wildlife Habitat Relationships system. However, the 2012 CFPRs (14 CCR §919.3) apply under Alternative C, which include consultation with CDFG, a 5- to 20-ac (2- to 8-ha) buffer zone for nest trees; preservation of nest, perch, screening, and replacement trees; restrictions on helicopter yarding; and a critical period where operations near active nests are restricted. In addition, there is a projected increase in advanced-successional habitats over time, suggesting an increase in available habitat for this species.
- **Humboldt marten.** Humboldt marten has not been documented in the primary assessment area, but the primary assessment area is within the historical range of the species. The specialized wildlife communities query using information from the California Wildlife Habitat Relationships database predicts habitat values for marten to decline by 93% from year 0 to year 40 under Alternative A. This can be attributed to the association of marten with only Montane Hardwood Conifer habitat type in the California Wildlife Habitat Relationships database query, and the projected decline in that habitat type through year 40 under Alternative C. Further, the importance of a dense and extensive shrubby understory is not captured in the WHR modeling, nor is its development under the various silvilutural regimes well understood. However, to the extent that successional condition is more critical than dominant tree species to habitat quality for marten, the predicted increase in advanced-successional habitats, a predicted improvement in habitat patch size and connectivity, and management strategies to increase the number of snags and wildlife trees over the 40-year analysis period should improve habitat for marten.

Under Alternative C, effects on the above species of concern from disturbance during forest management activities are minimized by protections provided by the 2012 CFPRs (14 CCR §919.3) including consultation with CDFG; increases in advanced-successional habitats; increases in habitat elements such as snags, wildlife trees, and advanced-successional conifers; and predicted improvements in habitat patch size and connectivity. Therefore, these effects are considered **less than significant**.

Effects on wildlife communities

Based on the the specialized query using information from the California Wildlife Habitat Relationships database for Alternative C, the primary assessment area would continue to provide habitat for species that currently have associated high or moderate habitat values under existing conditions. By year 40, it is estimated that Alternative C would result in a substantial overall decrease in habitat value for 1 species of amphibian, 6 species of reptiles, 52 species of birds, and 17 species of mammals; and an overall increase in habitat value for 2 species of amphibians, 0 species of reptiles, 6 species of birds, and 2 species of mammals[42] (Table 3.6-17, Appendix P). The habitat value for the remaining species would not change substantially. Appendix P lists each species, its starting habitat value at year 0, and projected change in habitat value (increase or decrease by 33%– 66% or more) for every 20 years under each alternative.

Table 3.6-17. Number of wildlife species for which habitat value (quantity x quality) substantially increases or decreases (> 66% change), or remains similar relative to existing conditions under Alternative C, based on California Wildlife Habitat Relationships modeling.

Taxonomic group	Year	
	20	40
Amphibians		
Increase in habitat value	1	2
Minimal change in habitat value	18	16
Decrease in habitat value	0	1
Reptiles		
Increase in habitat value	0	0
Minimal change in habitat value	19	13
Decrease in habitat value	0	6
Birds		
Increase in habitat value	4	6
Minimal change in habitat value	138	86
Decrease in habitat value	2	52
Mammals		
Increase in habitat value	3	2
Minimal change in habitat value	69	55
Decrease in habitat value	2	17

The species with predicted large decreases (greater than 66% change at year 40) in habitat value under Alternative C are very similar to those listed under the No Action alternative. The California Wildlife Habitat Relationships modeling results do not account for the change in availability of different habitat elements based on unique management scenarios under future projections. Species associated with aquatic habitats may be more likely to be affected by management practices influencing instream habitat than by the dominant tree species (i.e., type), and species associated with snags, downed logs, and other habitat elements are likewise much more likely to be affected by management of such elements.

[42] These tallies include the species of concern discussed under “Other species of concern” above, as well as species not currently considered as species of concern.

Many of the species with predicted decreases in habitat value are weakly associated with existing habitat conditions in the primary assessment area. This means that these species are associated with habitat conditions that are not present in the primary assessment area, and that the primary assessment area can only support relatively low population densities. Most other species showing a decrease in habitat value, including game species, are those largely associated with Montane Hardwood and Montane Hardwood-Conifer California Wildlife Habitat Relationships habitat types, often in combination with smaller size classes and open-canopied forests. As with every alternative, there is a trend under Alternative C towards more advanced-successional forest habitat and less early- and/or mid-successional habitat, and a trend toward more redwood-dominated habitat and less hardwood-dominated habitat. These trends would affect wildlife communities in the same ways as described above for the No Action alternative.

While certain non-special-status wildlife communities may experience reductions in habitat value (Table 3.6-17), management towards more advanced-successional and conifer habitats under Alternative C is expected to: (1) benefit the species of most conservation concern; and (2) not substantially reduce the overall habitat of any wildlife species in a way that would cause a wildlife population or community to drop below self-sustaining levels in California. Therefore, effects on wildlife communities under Alternative C are considered **less than significant**.

3.6.2.7 Comparison of alternatives

Table 3.6-18 provides a summarized comparison of effects on terrestrial habitat and wildlife species under the various alternatives. Overall, the Proposed Action would provide enhanced terrestrial wildlife habitat benefits compared with the No Action alternative, but the effects would not be as beneficial as those under Alternative A. Alternative B provides further enhanced wildlife habitat benefits within the terrestrial reserves, especially pertaining to advanced-successional patch size and connectivity, large tree recruitment, and improvement to marbled murrelet and northern spotted owl habitat. However, management strategies outside of the terrestrial reserves would have negative effects on older-forest associated species outside the reserves. Contrarily, Alternative B would have relatively positive effects on early-successional-associated species. Effects on terrestrial habitats under Alternative C are similar to the Proposed Action, except that many benefits of conservation and adaptive management measures would not be realized in 40 years. For example, conversion of early- and mid-successional habitat to advanced-successional habitat and increase in large tree density for recruitment of snags, logs, and wildlife trees require long periods of time to considerably improve habitat for wildlife species of concern.

Under every alternative, there is a shift from Montane Hardwood and Montane Hardwood-Conifer to Redwood, representing a shift to more conifer-dominated habitats. Forest-wide, advanced-successional habitat is predicted to increase under all alternatives. The largest increase in total area of advanced-successional habitat and predicted increase in advanced-successional patch size and connectivity is under Alternative B, though improvement in such habitat would be restricted to within the terrestrial reserves. The smallest increase in advanced-successional habitat and corresponding increase in patch size and connectivity is under the No Action alternative. Under the Proposed Action and Alternative A, the majority of increase in advanced-successional habitat and patch size connectivity is in riparian buffer zones and the Lower Alder Creek Management Area.

There are potentially significant effects on Type II old-growth stands outside the terrestrial reserves under Alternative B, due to lesser protections afforded by the CFPRs for old growth.

There is a predicted increase in large tree density per acre under all alternatives, which would promote snag, log, and wildlife tree recruitment. In addition, the No Action alternative, Proposed Action, Alternative A, and Alternative C include management strategies to actively recruit new snags, logs, and/or wildlife trees. Alternative B does not include strategies to actively recruit new snags, logs, and wildlife trees outside of the terrestrial reserves. The No Action alternative and Alternative B do not include specific management strategies to adequately protect rocky outcrops.

Effects on wildlife communities are similar under each alternative. The trend under all of the alternatives is towards more advanced-successional forest habitat and less early- and/or mid-successional habitat, except for Alternative B, where there is a predicted increase in early-successional habitat by year 80. Because many species are associated with early- and mid-successional conditions and these species are common, this similar trend among alternatives is expected to reduce overall (cumulative) habitat value for wildlife. However, the trend towards more advanced-successional conditions is expected to benefit the species of highest conservation concern, because most of these species are associated with more advanced-successional conditions.

The Proposed Action and Alternative A offer the most protections for wildlife species of concern forest-wide, including marbled murrelet, northern spotted owl, and Point Arena mountain beaver, as a result of habitat and wildlife management strategies that would improve conditions for these species under the Proposed Action and Alternative A over the 80-year analysis period. Using existing information strongly based on California Wildlife Habitat Relationships, the agencies did not identify potentially significant effects on other wildlife species of concern under these two alternatives. This EIS/PTEIR attempts to address potential species-specific and site-specific impacts at the scale of analysis (i.e., the primary and secondary assessment areas). As individual projects (i.e., PTHPs) are developed, more information on site-specific conditions, improved knowledge of species' habitat relationships, and changes in species status may identify and mitigate impacts that have not been addressed. In such cases, the agencies would evaluate the effects and develop appropriate mitigation measures under these two alternatives through the PTHP review process. Effects on terrestrial habitats under Alternative C are similar to the Proposed Action, except many benefits of conservation and adaptive management measures may not be realized in 40 years. The No Action alternative and Alternative B could have potentially significant effects on species associated with rocky outcrops. Under Alternative B, wildlife species of concern would be expected to benefit substantially from the many positive predicted changes to habitats within the terrestrial reserves. However, whereas the Proposed Action, Alternative A, and Alternative C include measures to benefit northern spotted owls, marbled murrelets and other species of concern across the entire primary assessment area, Alternative B would only benefit the species associated with more advanced successional stages and maintain their habitat within 20% of the primary assessment area. Outside the reserves, wildlife species associated with early seral conditions are expected to benefit substantially under Alternative B compared with the other alternatives.

There are potentially significant effects on terrestrial wildlife species of concern under the No Action alternative and Alternative B. Mitigation measures proposed under Alternative B, if implemented, would reduce anticipated potentially significant effects to less than significant.

Table 3.6-18. Comparison of alternatives for terrestrial habitat and wildlife species of concern.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Terrestrial habitat types and successional stages	Shift from Montane Hardwood and Montane Hardwood-Conifer to Redwood. Reduction in area of size class 1 and 2 stands, stable area of size class 3 and 4 stands, and increase in area of size class 5 and 6 stands. Decrease in early-successional forest to a trace by year 80, and an increase in advanced-successional forest; **13%** advanced-successional forest-wide and **77%** in riparian buffer zones by year 80.	Shift from Montane Hardwood and Montane Hardwood-Conifer to Redwood. Reduction in area of size class 1, 2 and 3 stands, and increase in area of size class 4, 5, and 6 stands. Decrease in early-successional forest to a trace by year 80, and an increase in advanced-successional forest; **14%** advanced-successional forest-wide and **80%** in riparian buffer zones by year 80.	Shift from Montane Hardwood and Montane Hardwood-Conifer to Redwood. Reduction in area of size class 1, 2 and 3 stands, and increase in area of size class 4, 5, and 6 stands. Decrease in early-successional forest to a trace by year 80 and an increase in advanced-successional forest; **18%** advanced-successional forest-wide and **98%** in riparian buffer zones by year 80.	Shift from Montane Hardwood and Montane Hardwood-Conifer to Redwood. Reduction in area of size class 1, 2, 3, and 4 stands, and increase in area of size class 5 and 6 stands. Increase in early-successional forest to 12% by year 80 and an increase in advanced-successional forest; **34%** advanced-successional forest-wide and **68%** in riparian buffer zones by year 80.	See Proposed Action. Changes in habitat would not be as great due to 40-year plan period. Decrease in early-successional forest to a trace by year 40 and an increase in advanced-successional forest; **6%** advanced-successional forest-wide and **34%** in riparian buffer zones by year 40.
Advanced-successional patch size and connectivity	Increase in patch size and connectivity of advanced-successional forest. **52** patches and **22,000** ac of advanced-successional forest patches > 80 ac and within 1 mi of another patch at year 80.	Increase in patch size and connectivity of advanced-successional forest. **37** patches and **26,000** ac of advanced-successional forest patches > 80 ac and within 1 mi of another patch at year 80.	Increase in patch size and connectivity of advanced-successional forest. **50** patches and **33,000** ac of advanced-successional forest patches > 80 ac and within 1 mi of another patch at year 80.	Increase in patch size and connectivity of advanced-successional forest. **52** patches and **59,000** ac of advanced-successional forest patches > 80 ac and within 1 mi of another patch at year 80.	See Proposed Action. Changes in habitat would not be as great due to 40-year plan period. **21** patches and **6,000** ac of advanced-successional forest patches > 80 ac and within 1 mi of another patch at year 40.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Important habitat and habitat elements	**No effects** on old-growth trees anticipated under the No Action alternative. Increased recruitment of snags, logs, and wildlife trees predicted to result in an increase to **11** large trees per acre forest-wide and **35** trees per acre in riparian buffer zones by year 80. No specific strategy to protect rocky outcrop habitat.	**Beneficial effects** on old-growth trees due to improvement in habitat conditions; a 150-ft buffer around Type I old-growth stands; and improved retention of screen trees around Type II stands. Increased recruitment of snags, logs, and wildlife trees predicted to result in an increase to **16** large trees per acre forest-wide and **50** trees per acre in riparian buffer zones by year 80. Rocky outcrop habitat would be protected.	**Beneficial effects** on old-growth trees due to improvement in habitat conditions; no cut of old-growth stands, a 300-ft buffer, and a 1,000-ft seasonal activity restriction around Type I and II stands. Increased recruitment of snags, logs, and wildlife trees predicted to result in an increase to **19** large trees per acre forest-wide and **65** trees per acre in riparian buffer zones by year 80. Rocky outcrop habitat would be protected, including a 20-ac timber management buffer and seasonal closure around rocky outcrops.	**Potentially significant effects** on old-growth trees outside of reserves due to harvest, despite benefits to old-growth trees inside reserves due to improvement in habitat conditions and no cut of old-growth stands. Increased recruitment of snags, logs, and wildlife trees predicted to result in an increase to **24** large trees per acre forest-wide and **43** trees per acre in riparian buffer zones by year 80. No specific strategy to protect rocky outcrop habitat.	**Beneficial effects;** see Proposed Action. Changes in habitat would not be as great due to 40-year plan period. Increased recruitment of snags, logs, and wildlife trees predicted to result in an increase to **9** large trees per acre forest-wide and **26** trees per acre in riparian buffer zones by year 40. Rocky outcrop habitat would be protected.
Wildlife communities	Decreased habitat value for **1** amphibian, **5** reptiles, **54** birds, and **19** mammals at year 80.	Decreased habitat value for **1** amphibian, **6** reptiles, **50** birds, and **8** mammals at year 80.	Decreased habitat value for **1** amphibian, **6** reptiles, **50** birds, and **19** mammals at year 80.	Decreased habitat value for **1** amphibian, **2** reptiles, **31** birds, and **13** mammals at year 80.	Decreased habitat value for **1** amphibian, **6** reptiles, **52** birds, and **17** mammals at year 40.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Wildlife species of concern					
Behren's silverspot butterfly, lotis blue butterfly	**No effect.** Habitats limited in the primary assessment area and not affected by timber management.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.
Great blue heron (rookery), Great egret (rookery)	**Less than significant effects**. No substantive change in the amount or quality of habitat. Disturbance of nests from noise, vibration, and human activity limited due to continued agency consultation during timber projects.	**Less than significant effects**. Same reasons as No Action.	**Less than significant effects**. Same reasons as No Action.	**Less than significant effects**. Same reasons as No Action.	**Less than significant effects**. Same reasons as No Action.
Osprey, bald eagle	**Less than significant effects**. No substantive change in the amount or quality of habitat. Disturbance of nests from noise, vibration, and human activity limited due to continued agency consultation during timber projects.	**Less than significant effects**. Same reasons as No Action.	**Less than significant effects**. Same reasons as No Action.	Although habitat conditions would improve within the reserves, there would be **less than significant effects** due to disturbance of nests from noise, vibration, and human activity; lack of strategies to actively recruit snags and wildlife trees outside of reserves.	**Less than significant effects**. Same reasons as No Action.
White-tailed kite, Long-eared owl, Grasshopper sparrow	**No effect.** Few acres of grassland in primary assessment area; grasslands not affected by timber management activities; continued agency consultation during timber projects.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Northern harrier, Bryant's savannah sparrow, tricolored blackbird	**No effect.** Wetlands protected under Article 6 of the 2012 CFPRs; continued agency consultation during timber projects.	**No effect.** Wetlands protected under management strategy.	**No effect.** Wetlands protected under management strategy.	**No effect.** Wetlands protected under management strategy.	**No effect.** Wetlands protected under management strategy.
Golden eagle	**Potentially significant effects** due to possible habitat modifications (removal of rocky outcrops), but constrained by continued agency consultation during timber projects.	**Less than significant effects** due to disturbance of nests from noise, vibration, and human activity.	**Less than significant effects**. Same reasons as Proposed Action.	**Potentially significant effects** due to possible habitat modifications (removal of rocky outcrops).	**Less than significant effects**. Same reasons as Proposed Action
Northern goshawk	**Less than significant effects**. Disturbance of nests from noise, vibration, and human activity limited due to continued agency consultation during timber projects.	**Less than significant effects**. Same reasons as No Action.	**Less than significant effects**. Same reasons as No Action.	Although habitat conditions would improve within the reserves, there would be **less than significant effects** due to disturbance of nests from noise, vibration, and human activity; lack of strategies to actively recruit snags and wildlife trees outside of reserves.	**Less than significant effects**. Same reasons as No Action.
American peregrine falcon	**Potentially significant effects** due to possible habitat modifications (removal of rocky outcrops), but constrained by continued agency consultation during timber projects.	**No effect.** Management strategies include protecting rocky outcrops and retaining old-growth trees.	**No effect.** Same reasons as Proposed Action.	**Potentially significant effects** due to possible habitat modifications (removal of rocky outcrops).	**No effect.** Same reasons as Proposed Action.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Western snowy plover	**No effect.** Sand and gravel bars along rivers in the assessment area are considered too narrow for nesting.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.
Marbled murrelet	**No effect**. **11,336** ac potentially suitable habitat in Zone 1 and **1,042** ac in Zone 2 by year 80. Effects minimized by continued agency consultation during timber projects.	**Beneficial effects**. Detailed measures to protect and increase marbled murrelets and their nesting habitats in the Lower Alder Creek Management Area and elsewhere. Improvement in habitat conditions: **11,135** ac potentially suitable habitat in Zone 1 and **2,035** ac in Zone 2 by year 80.	**Beneficial effects**. Detailed measures to protect and increase marbled murrelets and their nesting habitats in the Lower Alder Creek Management Area. Improvement in habitat conditions: **13,359** ac potentially suitable habitat in Zone 1 and **2,530** ac in Zone 2 by year 80.	**Beneficial effects**. No harvest in marbled murrelet reserves and other terrestrial reserves. Measures in place outside of reserves to minimize incidental take. Improvement in habitat conditions: **29,325** ac potentially suitable habitat in Zone 1 and **2,431** ac in Zone 2 by year 80.	**Beneficial effects**. Detailed measures to protect and increase marbled murrelets and their nesting habitats in the Lower Alder Creek Management Area. Improvement in habitat conditions: **4,956** ac potentially suitable habitat in Zone 1 and **337** ac in Zone 2 by year 40.
Northern spotted owl	**Less than significant effects** due to predicted reduction in nesting/roosting habitat: **21%** nesting/roosting habitat and **78%** foraging habitat by year 80. Possible effect due to no barred owl management.	**Beneficial effects.** Detailed conservation measures to protect and increase northern spotted owls and the most productive habitats. Predicted improvement in habitat conditions**: 31%** nesting/roosting habitat and **59%** foraging habitat by year 80. Control measures for barred owls implemented.	**Beneficial effects.** Detailed conservation measures to protect and increase northern spotted owls and most productive habitats. Predicted improvement in habitat conditions: **36%** nesting/roosting habitat and **57%** foraging habitat by year 80. Control measures for barred owls implemented.	**Beneficial effects**. No harvest in northern spotted owl reserves and other terrestrial reserves. Conservation measures in place outside of reserves to minimize incidental take. Predicted improvement in habitat conditions: **57%** nesting/roosting habitat and **25%** foraging habitat by year 80. Possible effect due to no barred owl management.	**Beneficial effects.** Detailed conservation measures to protect and increase northern spotted owls and most productive habitats. Predicted improvement in habitat conditions: **38%** nesting/roosting habitat and **57%** foraging habitat by year 40. Control measures for barred owls implemented.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Vaux's swift, olive-sided flycatcher, purple martin	**Beneficial effects** Improvement in nesting habitat through increase in advanced-successional forest, improvement to patch size and connectivity, and recruitment of snags and wildlife trees.	**Beneficial effects.** Same reasons as No Action.	**Beneficial effects**. Same reasons as No Action.	Although habitat conditions would improve within the reserves, there would be **less than significant effects** due to lack of strategies to actively recruit snags and wildlife trees outside of reserves and potential effects on old growth outside of reserves.	**Beneficial effects.** Same reasons as No Action.
Willow flycatcher, yellow warbler, yellow-breasted chat	**No effect.** Few acres of deciduous riparian habitat in primary assessment area, not affected by timber management activities.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.
Pallid bat	**Potentially significant effects** due to possible habitat modifications (removal of rocky outcrops), although an increase in advanced-successional conifer forest may provide additional habitat.	**No effect.** Management strategies include protecting rocky outcrops and retaining old-growth trees.	**No effect.** Same reasons as Proposed Action	**Potentially significant effects** due to possible habitat modifications (removal of rocky outcrops).	**No effect.** Same reasons as Proposed Action
Western red bat	**No effect.** Few acres of deciduous riparian habitat in primary assessment area, not affected by timber management activities.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Townsend's western big-eared bat	**Potentially significant effects** due to possible habitat modifications (removal of rocky outcrops), although an increase in advanced-successional conifer forest may provide additional habitat in basal hollows.	**No effect**. Management strategies include protecting rocky outcrops, increase in advanced-successional forest, and retaining old-growth trees.	**No effect.** Same reasons as Proposed Action.	**Potentially significant effects**. Same reasons as No Action.	**No effect.** Same reasons as Proposed Action.
California ringtail	**Beneficial effect** due to increased nesting and denning habitat anticipated from increased recruitment of snags, logs, and wildlife trees.	**Beneficial effect.** Same reasons as No Action.	**Beneficial effect.** Same reasons as No Action.	Although habitat conditions would improve within the reserves, there would be **less than significant effects** due to lack of strategies to actively recruit snags, downed logs, and wildlife trees outside of reserves.	**Beneficial effect.** Same reasons as No Action.
Humboldt marten	**Beneficial effects** due to improvements to habitat conditions; increase in advanced-successional forest, recruitment of logs, and improvements in patch size and connectivity.	**Beneficial effects.** Same reasons as No Action.	**Beneficial effects.** Same reasons as No Action.	Although habitat conditions would improve within the reserves, there would be **less than significant effects** due to lack of strategies to actively recruit snags, downed logs, and wildlife trees outside of reserves.	**Beneficial effects**. Same reasons as No Action.

Resource	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
Pacific fisher West Coast Distinct Popoulation Segment	**Beneficial effects** due to improvements to habitat conditions; increase in advanced-successional forest, increased recruitment of logs, and improvements in patch size and connectivity.	**Beneficial effects.** Same reasons as No Action.	**Beneficial effects.** Same reasons as No Action.	Although habitat conditions would improve within the reserves, there would be **less than significant effects** due to lack of strategies to actively recruit snags, downed logs, and wildlife trees outside of reserves.	**Beneficial effects.** Same reasons as No Action.
American badger	**No effects.** Few acres of grassland in primary assessment area; grasslands not affected by timber management activities.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.	**No effect.** Same reasons as No Action.
Point Arena mountain beaver	**Less than significant effects** due to direct or indirect disturbance of burrows during timber harvest activities.	**Beneficial effects.** Conservation measures would protect Point Arena mountain beavers and improve habitat conditions.	**Beneficial effects**. Same reasons as Proposed Action.	**Beneficial effects** due to improvement in habitat conditions; no harvest in terrestrial reserves.	**Beneficial effects**. Same reasons as Proposed Action.
Sonoma (=California red) tree vole	**Beneficial effects** due to improvements to habitat because of increases in advanced-successional forest and patch size and connectivity.	**Beneficial effects.** Same reasons as No Action.	**Beneficial effects.** Same reasons as No Action.	**Beneficial effects.** Same reasons as No Action.	**Beneficial effects.** Same reasons as No Action.

3.6.3 PTEIR alternate standard analysis for the Proposed Action, Alternative A, and Alternative C

In its TMP (Appendix A) and HCP/NCCP, MRC has proposed alternate standards to the current (2012) CFPRs, which would be implemented and included in PTHPs prepared under the Proposed Action, Alternative A, or Alternative C. Alternate standards are not proposed for the No Action alternative because no TMP, HCP, or NCCP would be implemented. Likewise, alternate standards are not proposed for Alternative B because no TMP or NCCP would be implemented. The 2012 CFPRs (14 CCR §1092[b]) authorize CAL FIRE to accept alternate standards in a PTHP where it has been demonstrated in a PTEIR that the alternate standard provides resource protections that are equal to or better than the standard operational rule and its implementation would have a less than significant impact on the environment. Also, where future changes in the CFPRs occur, the current operational standards (2012 CFPRs) may be accepted by CAL FIRE as alternate standards where the PTEIR has similarly demonstrated a less than significant impact.

The proposed alternate standards were reviewed by the lead agencies to determine the resource area(s) to which they apply (see Attachment D to Appendix A). For each alternate standard that applies to Terrestrial Habitat and Wildlife Species of Concern, the analysis in Sections 3.6.2.3, 3.6.2.4, and 3.6.2.6 and the cumulative effects analysis in Sections 4.6.2, 4.6.3, and 4.6.5 demonstrates that its implementation as part of the Proposed Action, Alternative A, or Alternative C would provide equal or better protection to Terrestrial Habitat and Wildlife Species of Concern than the 2012 CFPR standard and its implementation would either (1) not result in adverse environmental impacts or (2) result in impacts that are below the level of significant effect on the environment. This analysis considered the effects of implementing the proposed alternate standards as part of a suite of management and conservation measures contained in the HCP, NCCP, and TMP.

The following are the CFPRs for which alternate standards (or current operational standards, which due to a rule change could become an alternate standard) have been proposed by MRC in its TMP (Appendix A) and/or its HCP/NCCP and are applicable to Terrestrial Habitat and Wildlife Species of Concern:

895.1, 913.1(a)(2)(A), 913.1(a)(2)(E), 913.3(b), 913.3(b)(1-3), 913.4(a), 913.4(b), 913.4(d)(1-2), 913.4(d)(3)(A), 913.4(d)(3)(I), 913.4(d)(3)(J), 913.6(b)(4), 913.6(e)(1), 914.1(a), 914.1(c), 914.1(d), 914.2(d), 915, 915.2(a), 915.3(b-c), 915.4, 916.3(f), 916.4(b), 916.4(b)(6), 917.2, 919.2(b-d), 919.4, 919.9, 919.9(g), 919.9(g)(1-5), 919.11, 919.12(d-e), 919.16(a), 919.16(a)(1-6), and 919.16(b-c).

The EIS/PTEIR analysis demonstrates that these alternate standards would provide equal or better protection to Terrestrial Habitat and Wildlife Species of Concern than the 2012 CFPR standard. Implementation of these alternate standards would have a less than significant impact and would not contribute to cumulative effects on Terrestrial Habitat and Wildlife Species of Concern, and may be proposed in PTHPs by MRC and approved by CAL FIRE (14 CCR §1092[c]).

A complete list of MRC's proposed alternate standards is included in the TMP (Appendix A) as Attachment D. Attachment D of the TMP also includes a reference to the location of each alternate standard in the TMP and/or HCP/NCCP, and the CFPR standard (rule) it would replace.

3.7 Air Quality

This section describes the air quality within the primary and secondary assessment areas and the potential effects of implementing the alternatives on air quality concerns. The air quality assessment area is broken down into the primary assessment area and secondary assessment areas (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1).

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is similar to the primary assessment area and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects are assumed to therefore be similar to those in the primary assessment area.

3.7.1 Affected environment/Environmental setting

The primary assessment area is located within the North Coast Air Basin and is under the jurisdiction of the Mendocino County Air Quality Management District. The District's legal boundaries are coterminous with the County boundaries; however the District is part of the larger North Coast Air Basin, which includes Del Norte, Trinity, Humboldt, Mendocino and part of Sonoma County.

The air quality of a region is determined by the quantities and types of pollutants emitted, and by the concentrations and accumulations of those pollutants under the influence of local meteorology and topography. The North Coast Air Basin is considered to have good air quality.

Mendocino County is in attainment for all federal and state air quality standards with the exception of the state standard for respirable particulate matter (PM_{10}) (CARB 2011b). While particulate matter levels have dropped over the last 20 years, the County still exceeds the state standard several times a year. Table 3.7-1 presents the number of days that the state standard for PM_{10} has been exceeded annually at monitoring sites in Mendocino County over the last decade.

Table 3.7-1. Number of days annually where the state standard for PM_{10} has been exceeded at monitoring sites in Mendocino County (1990–2009).

Year	Willits	Ukiah	Fort Bragg
2009	ND	ND	ND
2008[a]	24	7	ND
2007	0	0	0
2006	ND	0	6
2005	0	0	0
2004	0	0	0
2003	0	0	25
2002	6	6	12
2001	0	0	24
2000	0	0	6

Source: CARB (2011c)
ND indicates there was insufficient (or no) data available to determine the value.
[a]Elevated values in 2008 were likely influenced by extensive wildfires in coastal Mendocino County.

The 2010 estimated emission inventory for Mendocino County indicated that about 92% of PM_{10} emissions come from "area-wide sources" such as solvent evaporation and miscellaneous processes such as residential fuel combustion, farming operations, paved and unpaved road dust, fires, and managed burning. "Stationary sources" such as fuel combustion at manufacturing and industrial plants, cleaning and surface coating, and other industrial processes contribute about 2% and 6.7% comes from on-road motor vehicles and other "mobile" sources (CARB 2011d). Unpaved road dust is responsible for about 62% of area source PM_{10} emissions and residential fuel combustion is responsible for about 12%. Other significant sources include ocean spray (along the coast), pollen from trees and plants, dust from paved roads, and construction and demolition. The sources of PM_{10} vary by season—wood smoke is more prevalent during the winter months when outdoor burning is allowed and wood stoves are in use, while dust levels are higher in the summer and early fall. Along the coast, salt from ocean spray contributes to PM_{10} levels most often when winds blow the salt spray inland. Table 3.7-2 presents the 2010 estimated source contributions to PM_{10} emissions for Mendocino County.

Table 3.7-2. Estimated source contributions to PM_{10} emissions for Mendocino County (2010).

Source	Contribution (%)
Unpaved road dust	62
Paved road dust	10
Farming operations	< 0.5
Other miscellaneous processes	8
Total stationary sources	2
On-road mobile exhaust	1
Off-road mobile exhaust	5
Residential fuel combustion	12
Total	**100**

Source: CARB (2011c)

Incidence of PM_{10} attributable to timber management is typically a result of slash burning (burning of debris and residue from timber harvest activities) and roadway dust entrainment. The county estimates do not specifically characterize slash burning as a separate source of PM_{10} such that the contribution from forest management cannot be estimated. Slash burning is controlled by the Mendocino County Air Quality Management District through the issuance of burn permits, which include provisions for burn restrictions during atmospheric conditions that escalate PM_{10} non-attainment.

3.7.2 Environmental effects and mitigation

Air quality effects are considered significant if the alternatives would:

- Conflict with or obstruct implementation of an applicable air quality plan.
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

There would likely be little or no direct or indirect effects on potential air quality resource issues related to objectionable odors and sensitive receptors as a result of implementing the action alternatives in the primary assessment area, and actions under the alternatives would not conflict with or obstruct applicable air quality plans (e.g., Mendocino County Particulate Matter Attainment Plan [MCAQMD 2005]). These issues are not analyzed in this EIS/PTEIR.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.7.2.7.

3.7.2.1 Analysis approach and methodology

Activities within the North Coast Air Basin are required to comply with the applicable regulations, including restrictions on open burning, wood fired appliances, vineyard heaters, petroleum storage, and federal and state air quality standards. Because Mendocino County is in attainment for all state and federal air quality standards, with the exception of the California standard for PM_{10}, the analysis in this section focuses on whether the Proposed Action or the other alternatives would result in degradation of existing air quality with respect to PM_{10} – the one criteria pollutant for which the County is not in attainment.

Timber harvest modeling was conducted to predict harvest volume under each alternative. Total slash burned and slash burned per acre of harvest were estimated based on the timber harvest modeling. Details of the modeling are provided in Appendix E and results of the modeling are used in the analysis of air quality effects that follows. Harvest volume is used as an indicator of road use and potential roadway dust entrainment from log-truck and other traffic associated with MRC activities under each alternative. Total slash burning for removal (tons) is used as a surrogate for trends in PM_{10} emissions due to forest management activities.

3.7.2.2 No Action alternative

Under the No Action alternative, the levels of emissions from forest management activities would vary over time as the amount of forest management activity varies and forest practices regulations evolve. Exact and meaningful emissions projections cannot be made because of uncertain harvest levels, site-specific forest engineering requirements, location of harvest units, distances to markets, timberland maintenance, and other practices. However, adverse effects on air quality could occur as a result of continued management activities such as slash burning and timber hauling (dust emissions) under the No Action alternative.

Based on timber modeling, timber harvest (volume) under the No Action alternative is anticipated to increase from existing conditions during the first decade and continue to increase over the next 40 years with harvest volume stabilizing after that time (Section 3.9, Timber Resources). This increase in harvest would require a corresponding increase in the use of log trucks and personal vehicles by MRC employees and contractors (Section 3.12, Traffic).

The increase in use of forest roads as a result of increased harvest levels is not anticipated to result in a substantial increase in dust emissions because MRC would continue its existing dust abatement activities. Under the No Action alternative, the most common form of dust abatement would be application of water from streams and rivers to logging roads via water-spray trucks. Alternative forms of dust abatement such as the application of approved materials (magnesium chloride, calcium chloride, and lignin) may also be used. Road maintenance and construction practices would follow the CFPRs (14 CCR §923) and forestry best management practices, which include dust abatement activities to minimize particulate emissions from re-entrained road dust. Therefore, air quality effects under the No Action alternative attributable to dust entrainment from unpaved roads are expected to be **less than significant**.

In addition, California Air Resources Board has adopted new rules that would require the phased overhaul of off-road diesel vehicle fleets, and has drafted legislation requiring on-road trucks to install filters or upgrade their engines to reduce smog-forming and particulate pollution (CARB 2010). Also, the Environmental Protection Agency promulgated a rule to greatly reduce emission standards for 2007 and subsequent model year heavy-duty diesel engines (66 FR 5002, 18 January 2001). Increasing use of retrofitted and replacement on- and off-road vehicles and equipment with lower emissions should counterbalance any increase in particulate emissions associated with increased vehicle use as a result of increased harvest levels under the No Action alternative.

Increases in harvest area and/or volume may also result in greater emissions from forest management activities under the No Action alternative, primarily as a result of the continued practice of slash burning, which results in PM_{10} emissions. Based on the timber harvest modeling, the amount of slash burned for removal is anticipated to increase from existing conditions during the first decade and continue to increase over the next 40 years with the amount of slash burning stabilizing after that time (Figure 3.7-1, Appendix R). Because MRC would continue to follow burning restrictions and any new restrictions that might be adopted by the Mendocino County Air Quality Management District, PM_{10} emissions attributable to slash burning are not anticipated to contribute substantially to the existing PM_{10} levels. Air quality effects under the No Action alternative attributable to slash burning are expected to be **less than significant**.

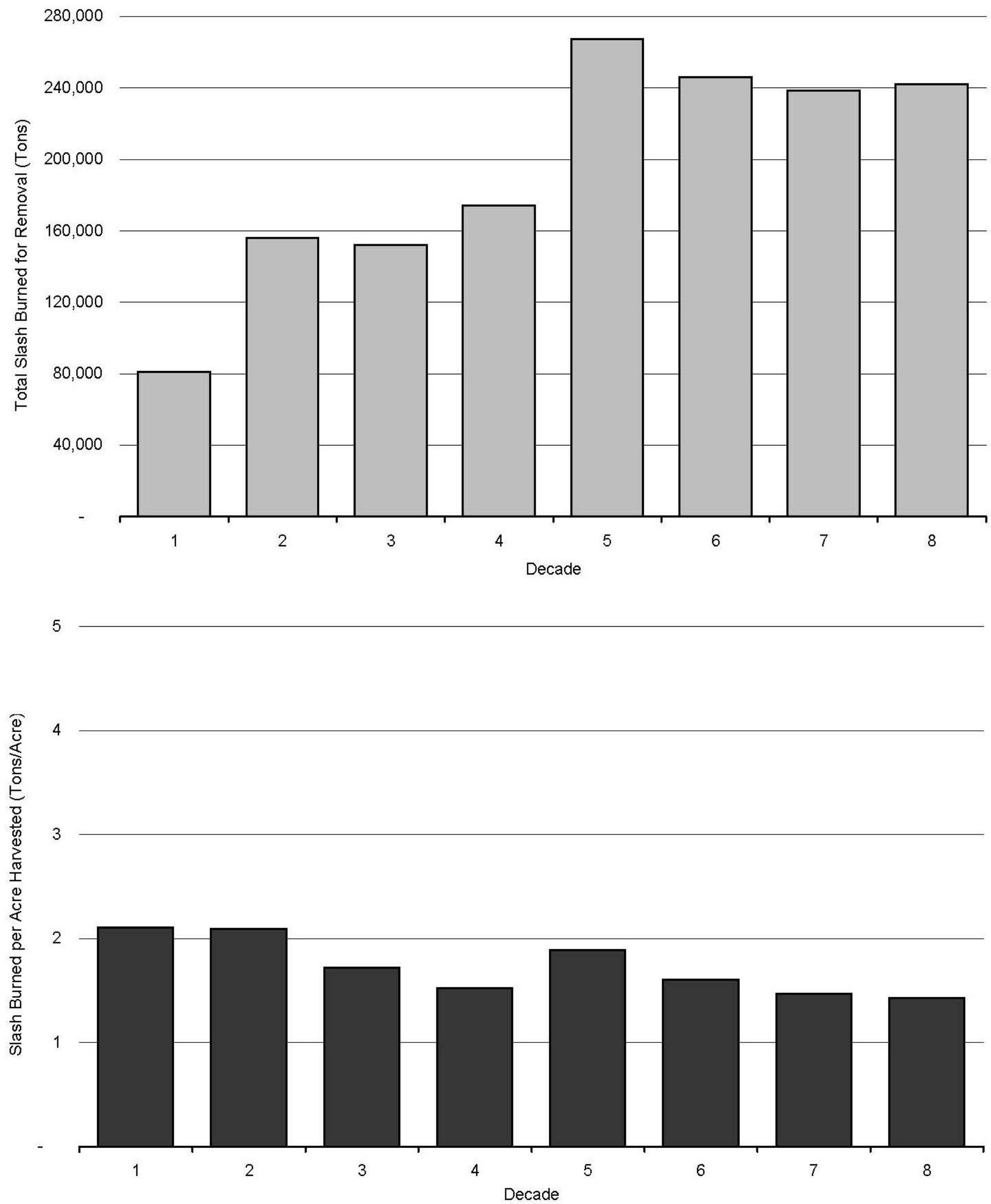


Figure 3.7-1. Total slash burned and slash burned per acre harvested predicted under the No Action alternative.

3.7.2.3 Proposed Action

Conservation measures under the Proposed Action (e.g., restrictions on areas in which timber can be harvested, exclusion of heavy equipment in Aquatic Management Zones) would reduce the level of harvest in some areas. The potential reduction in timber harvesting in these areas is expected to be minor and could be balanced out by increased harvesting in other areas. Overall, the volume of timber harvested from the primary assessment area would increase over the 80-year permit term compared with existing conditions (similar to the No Action alternative), stabilizing at approximately the same level of harvest volume as under the No Action alternative (Section 3.9, Timber Resources). This increase in harvest would require a corresponding increase in the use of log trucks and personal vehicles by MRC employees and contractors (Section 3.12, Traffic).

The increase in use of forest roads as a result of increased harvest levels is not anticipated to result in a substantial increase in dust emissions because MRC would continue its existing dust abatement activities. Road maintenance and construction practices would follow the CFPRs (14 CCR §923) and forestry best management practices, which include dust abatement activities to minimize particulate emissions from re-entrained road dust. Similar to the No Action alternative, the most common form of dust abatement under the Proposed Action would be application of water from streams and rivers to logging roads via water-spray trucks. Alternative forms of dust abatement such as the application of magnesium chloride, calcium chloride, and lignin may also be used. In addition, MRC would comply with California Air Resources Board and Environmental Protection Agency regulations to reduce emissions as described under the No Action alternative. Therefore, effects on air quality attributable to unpaved road use under the Proposed Action are expected to be **less than significant**.

The total amount of slash burning is anticipated to increase over time relative to existing conditions, with the total amount burned reaching levels comparable to what would be expected under the No Action alternative (Figure 3.7-2, Appendix R). Because MRC would continue to follow burning restrictions and any new restrictions that might be adopted by the Mendocino County Air Quality Management District, PM_{10} emissions attributable to slash burning are not anticipated to differ substantially from those anticipated under the No Action alternative. Air quality effects under the Proposed Action attributable to slash burning are expected to be **less than significant**.

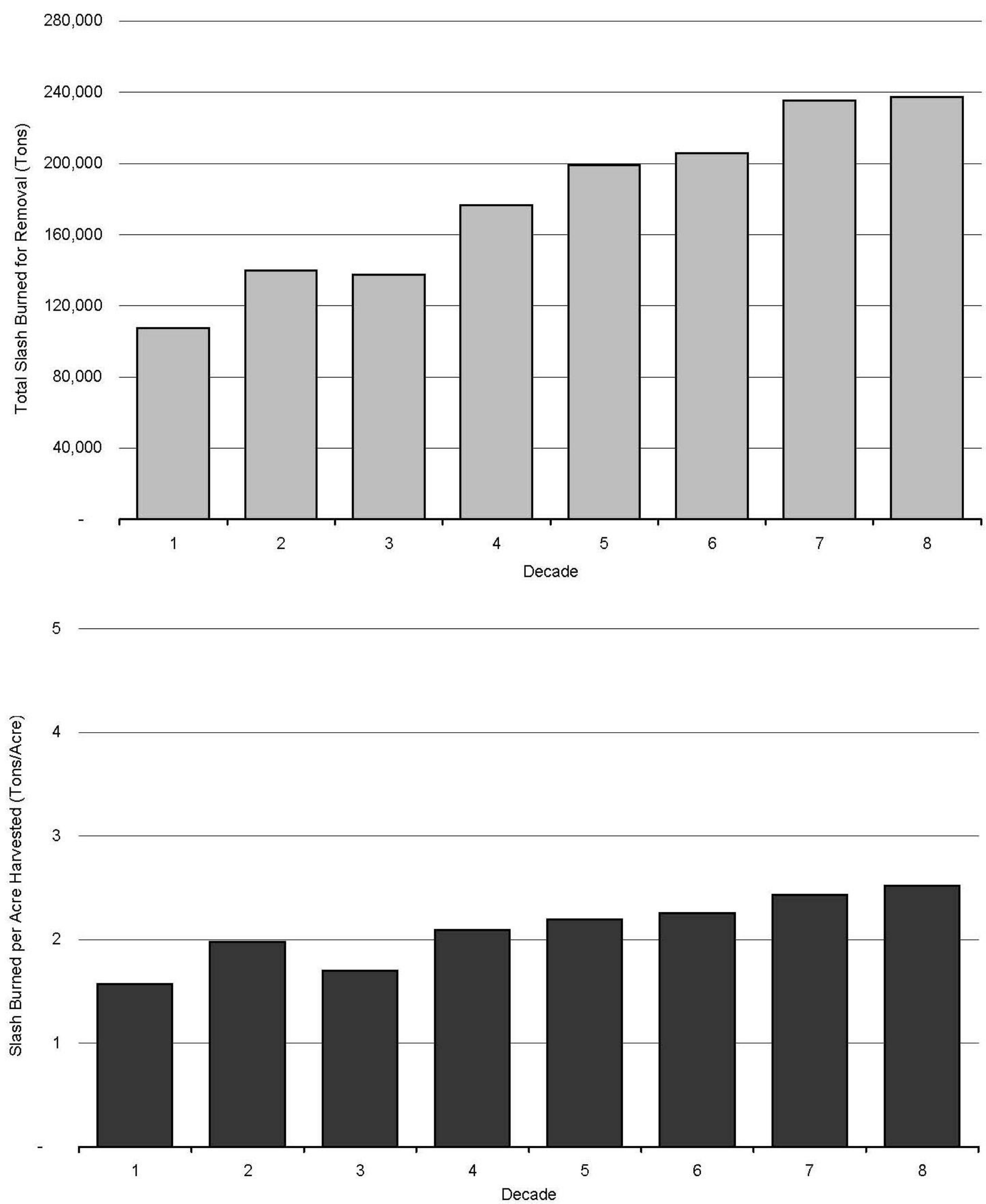


Figure 3.7-2. Total slash burned and slash burned per acre harvested predicted under the Proposed Action.

3.7.2.4 Alternative A

Under Alternative A, no-harvest zones would apply to Class I and II watercourses in the primary assessment area. This could result in the loss of some additional timber volume relative to the No Action alternative. The loss in timber yields is not expected to be substantial and the volume of timber harvested from the primary assessment area would increase over the 80-year permit term compared with existing conditions (similar to the No Action alternative), stabilizing at a harvest volume slightly less than under the No Action alternative (Section 3.9, Timber Resources). This increase in harvest would require a corresponding increase in the use of log trucks and personal vehicles by MRC employees and contractors (Section 3.12, Traffic).

Under Alternative A, MRC would accelerate the development and implementation of a system-wide Road Management Plan, which includes the following road management measure related to dust abatement:

- Mainline haul roads would be treated (after 15 June) so as not to require daily dust abatement by 2020 (with the exception of portions of roads where tractors cannot be trailered).

Implementation of this measure would substantially reduce the amount of fugitive dust generated from use of mainline roads relative to the No Action alternative and other alternatives. For non-mainline roads, MRC would continue water drafting for dust abatement as described above for the No Action alternative. Alternative forms of dust abatement such as the application of magnesium chloride, calcium chloride, and lignin may also be used. In addition, MRC would comply with CARB and Environmental Protection Agency regulations to reduce emissions as described under the No Action alternative. The potential contribution to PM_{10} levels from use of unpaved roads in the primary assessment area under Alternative A is anticipated to be less than under the No Action alternative due to reduced harvest levels and implementation of measures under the Road Management Plan. Therefore, effects on air quality attributable to dust from unpaved roads under Alternative A would be **less than significant**.

Total slash burned would increase over time relative to existing conditions, but at a rate less than and reaching levels lower than under the No Action alternative (Figure 3.7-3, Appendix R). Because MRC would continue to follow burning restrictions and any new restrictions that might be adopted by the Mendocino County Air Quality Management District and the level of slash burning would be lower than under the No Action alternative, PM_{10} emissions attributable to slash burning under Alternative A are anticipated to be less than under the No Action alternative. Air quality effects under Alternative A attributable to slash burning are expected to be **less than significant**.

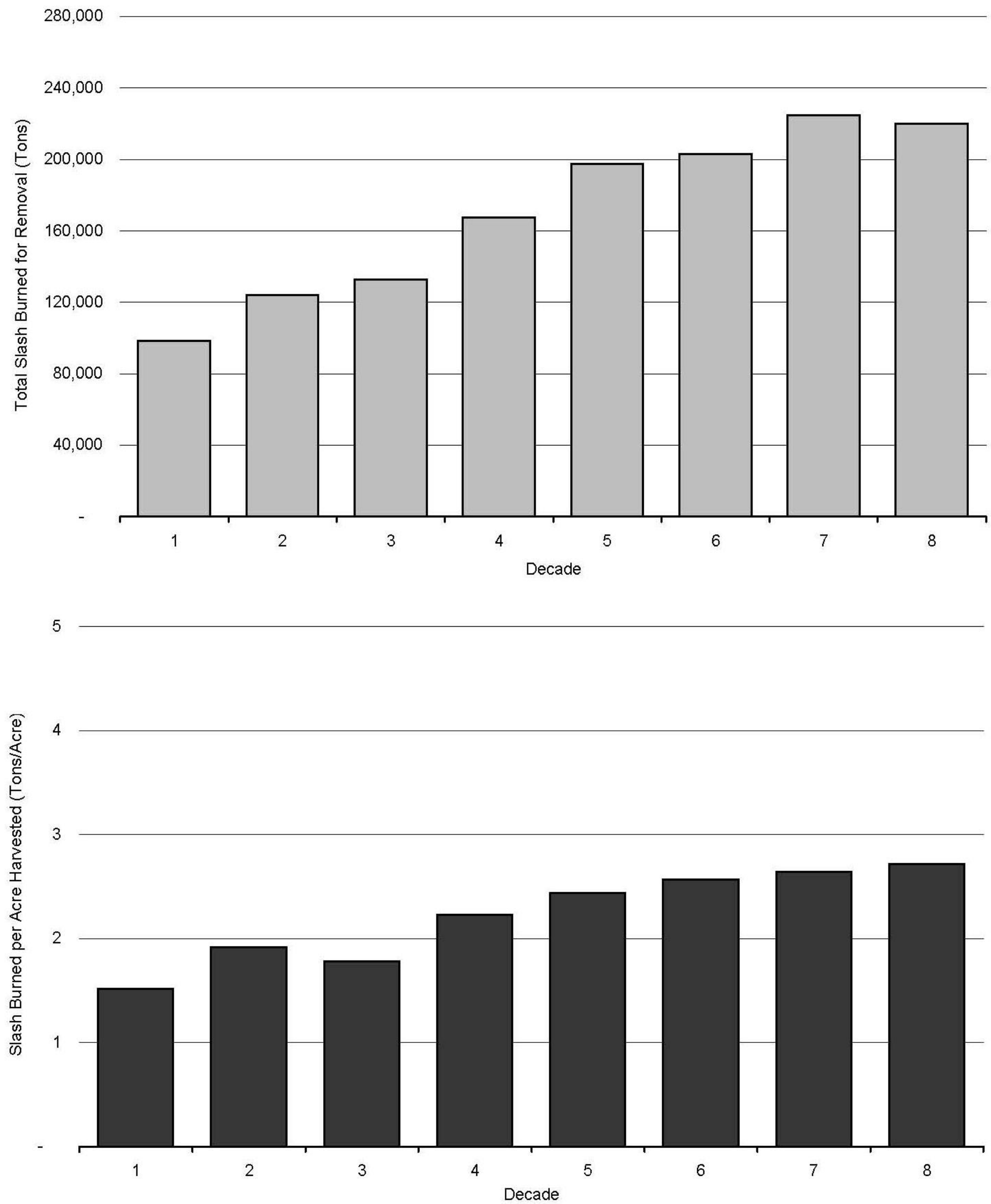
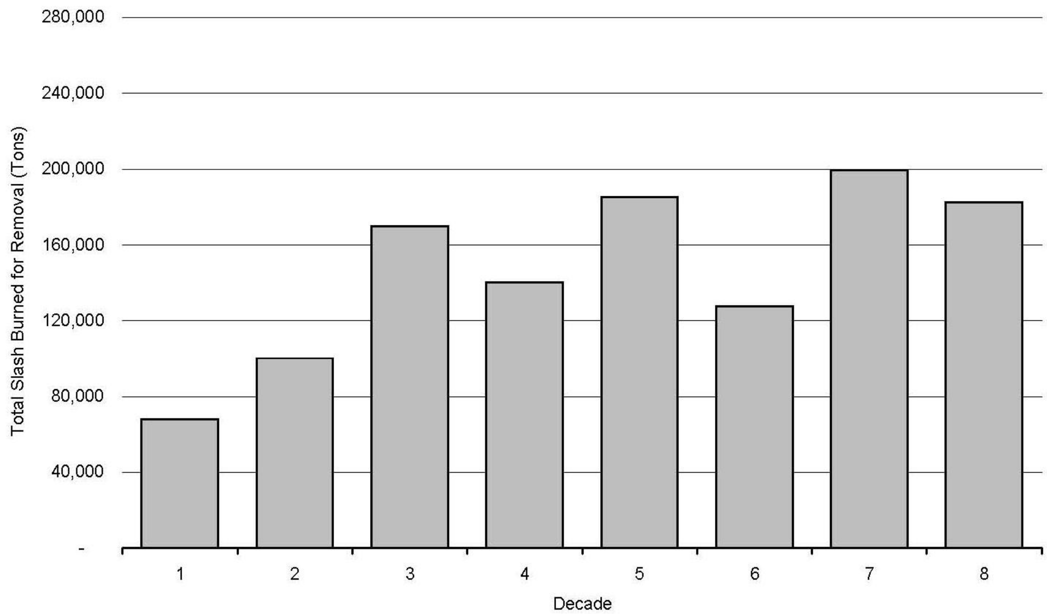


Figure 3.7-3. Total slash burned and slash burned per acre harvested predicted under Alternative A.

3.7.2.5 Alternative B

Under Alternative B, MRC would establish no-harvest terrestrial habitat reserves. Only limited management to meet ecological objectives would be allowed within these reserves. Harvesting and management outside of the reserves would be similar to the No Action alternative. This could result in the loss of some additional timber harvest volume relative to the No Action alternative. Harvest levels under Alternative B would be somewhat higher than under existing conditions in every decade, but less than anticipated under the No Action alternative. The potential for dust entrainment from unpaved forest roads under Alternative B would be comparably lower than under the No Action alternative. MRC would continue water drafting for dust abatement as described above for the No Action alternative and would continue use of approved alternative dust abatement strategies where warranted. Therefore, effects on air quality attributable to dust from unpaved roads under Alternative B would be **less than significant**.

Total slash burned under Alternative B would be substantially less than under the No Action alternative in most decades of the 80-year analysis period (Figure 3.7-4, Appendix R), contributing to lower PM_{10} emissions. Because MRC would continue to follow burning restrictions and any new restrictions that might be adopted by the Mendocino County Air Quality Management District and the level of slash burning would be lower than under the No Action alternative, PM_{10} emissions attributable to slash burning under Alternative B are anticipated to be less than under the No Action alternative. Air quality effects under Alternative B attributable to slash burning are expected to be **less than significant**.



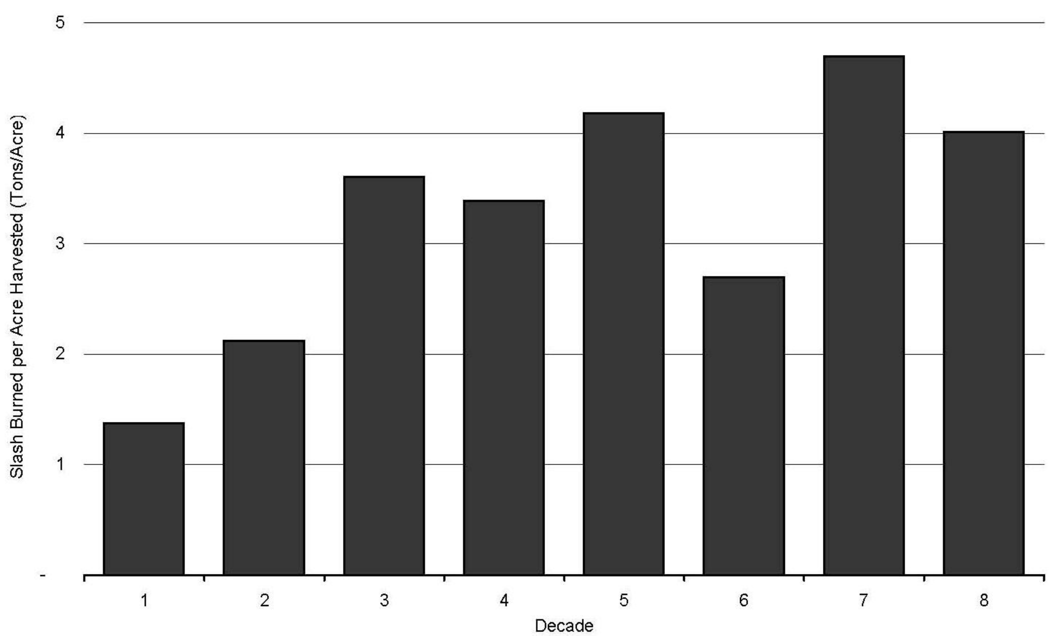


Figure 3.7-4. Total slash burned and slash burned per acre harvested predicted under Alternative B.

3.7.2.6 Alternative C

Effects on air quality under Alternative C would be the same as those of the Proposed Action. The only difference between Alternative C and the Proposed Action affecting air quality is that the HCP conservation measures would apply for a shorter term of 40 years. Therefore, the potential for effects on air quality under Alternative C is expected to be comparable to that described above under the Proposed Action, and would be **less than significant**.

3.7.2.7 Comparison of alternatives

Table 3.7-3 summarizes the effects of the alternatives on air quality. Vehicle emissions would be reduced under all of the alternatives through compliance with Environmental Protection Agency regulations on heavy diesel engines and their fuels. Slash burning under all of the alternatives would be regulated by the Mendocino County Air Quality Management District through the issuance of burn permits, which include burning restrictions during atmospheric conditions that escalate PM_{10} non-attainment. PM_{10} emissions from slash burning would be reduced under Alternatives A and B relative to the No Action alternative due to reduced harvest levels.

Overall, the Proposed Action would provide for a reduction in PM_{10} emissions compared with the No Action alternative, particularly for emissions related to use of unpaved forest roads. This would occur through implementation of a dust abatement plan (included in Appendix E of the proposed HCP/NCCP [MRC 2012]) to address dust in the air and soil erosion from dusty roads. The dust abatement plan would also be implemented under Alternative A and, coupled with the reduction in road use from reduced harvest, would result in a reduction in dust emissions relative to the No Action alternative and the Proposed Action. Dust emissions from unpaved roads under Alternative B would be similar to the No Action alternative, with some reduction due to the prohibition of timber harvest inside of terrestrial reserves. Effects on air quality under Alternative C would be similar to the Proposed Action.

Table 3.7-3. Comparison of alternatives for air quality.

Subcategory	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Vehicle emissions	Increased harvest over time would increase vehicle use; emissions reduced through compliance with Environmental Protection Agency regulations. **Less than significant effect**.	Similar to No Action alternative	Smaller increase than under No Action alternative	Smaller increase than under No Action alternative	Same as Proposed Action for a period of 40 years
PM_{10} Attributable to Unpaved Road Use	Increased harvest over time would increase road use; emissions reduced through dust abatement activities. **Less than significant effect**.	Similar to No Action alternative	Smaller increase than under No Action alternative; emissions reduced through dust abatement measure in Road Management Plan. **Less than significant effect**.	Smaller increase than under No Action alternative. **Less than significant effect**.	Same as Proposed Action for a period of 40 years.

Subcategory	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
PM_{10} Attributable to Slash Burning	Slash burning increased relative to existing conditions; restricted to time periods when slash burning would not contribute to PM_{10} non-attainment (Air Quality Management District). **Less than significant effect**.	Similar to No Action alternative; same restrictions on slash burning.	Similar to No Action alternative; same restrictions on slash burning.	Smaller increase than under No Action alternative; same restrictions on slash burning. **Less than significant effect**.	Same as Proposed Action for a period of 40 years.

3.8 Climate and Climate Change

This section describes the climate and predicted climate change within the assessment area, the effect of climate change on environmental resources in the assessment area, and the effects of implementing the alternatives on climate. The climate change assessment area is broken down into the primary assessment area and the secondary assessment area (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1) which are located within the North Coast climate region.

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is similar to the primary assessment area and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects are assumed to therefore be similar to those in the primary assessment area.

3.8.1 Affected environment/Environmental setting

3.8.1.1 Climate change

Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer) (EPA 2010). Climate change may result from natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun; natural processes within the climate system (e.g., changes in composition of atmosphere, volcanic activity, or ocean circulation); and human activities that could change the atmosphere's composition (e.g., fossil fuel combustion and associated greenhouse gas emissions) and changes in land use (e.g., conversion of forestland) that result in lower levels of carbon sequestration and increased greenhouse gas emissions.

The current consensus view in the scientific community is that climate change at the global scale is underway (Oreskes 2004, IPCC 2007). Available data indicate that climate change has resulted in increased global average surface temperatures of 2.3ºF/century (1.28ºC/century) over the past 50 years (IPCC 2007). Atmospheric greenhouse gas concentrations have also increased over the same period. Climate change in California is also well-documented (Anderson 2009, EPA 2002). Observational studies of air temperature, precipitation, snowpack, runoff, and sea level rise indicate that the state has experienced increased average air temperatures, more extreme hot days, fewer cold nights, a longer growing season, shifts in the water cycle with less winter precipitation falling as snow (i.e., lower snow-water equivalents), and both snowmelt and rain runoff occurring earlier in the year (California Natural Resources Agency [CNRA] 2009, Dettinger and Cayan 1995, Cayan 1996, Cayan et al. 2001). Future projections of climate change under the Fourth Assessment of the International Panel on Climate Change indicate that by late in this century (2080s) average annual surface temperatures in California will rise from current levels by 2–5ºF (1–3ºC) assuming relatively low greenhouse gas emissions (*Special Report on Emissions Scenarios Emissions Scenario B1*[43]) and 5–8ºF (3–4.5ºC) assuming relatively higher emissions (*Special Report on Emissions Scenarios Emissions Scenario A2*). Regional differences in California climate change projections are apparent, with the greatest average air temperature increases along the South Coast and Sacramento-Delta climate regions, and the lowest increases along the North Coast region (Anderson 2009, California Climate Tracker [http://www.wrcc.dri.edu/monitor/cal-mon/] as described in Abatzoglou et al. 2009). The primary and secondary assessment areas are located primarily within the North Coast climate region.

3.8.1.2 Carbon sequestration in forests

Forestlands, in general, act as atmospheric carbon sinks, whereby carbon dioxide is captured from the atmosphere and fixed, through the process of photosynthesis, in wood fiber (OFRI 2006, EPA 2005b). Estimates of carbon sequestration in California forests of the North Coast, Cascade Northeast, and North Sierra regions indicate that these forestlands remove 7.2 million metric tons of carbon dioxide equivalents from the atmosphere each year (California Energy Commission 2004). More recently, CAL FIRE estimated that, statewide, forests sequester over 30 million metric tons net carbon dioxide considering growth, mortality, wildfire, harvest, and wood product storage (CAL FIRE 2010a). Growing forests sequester and store carbon over time, although growth slows as the trees reach maturity. While older trees can sequester carbon through new growth, sequestration occurs at a declining rate. Older trees remain pools of stored carbon until they decay through decline, death, or consumptive use.

3.8.2 Environmental effects and mitigation

The purpose of this section is two-fold: (1) to evaluate the potential effects of the Proposed Action and other alternatives, including the No Action alternative, on climate and climate change in a regional, statewide, and global context; and (2) to evaluate how climate change is likely to affect conditions in the assessment area through changes in surface (air) temperature,

[43] Emissions scenarios are defined in the IPCC Third Assessment Report (2000) Special Report on Emissions Scenarios and are currently also used for the IPCC Fourth Assessment. Scenarios are run using multiple global circulation models (GCMs) including BCCR-BCM2.0, CGCM3.1(T47), CNRM-CM3, CSIRO-Mk3.0, GFDL-CM2.0, GFDL-CM2.1, GISS-ER, INM-CM3.0, IPSL-CM4, MIROC3.2(medres), ECHO-G, ECHAM5/MPI-OM, MRI-CGCM2.3.2, CCSM3, UKMO-HadCM3 UK, as well as a multimodel ensemble average. Data accessed via The Nature Conservancy's Climate Wizard on 11 September 2009 (http://www.climatewizard.org/).

precipitation patterns (including fog), the timing and magnitude of flood events, wildfires, and sea level.

Effects on climate change are considered significant if the alternatives would:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases (see Section 1.6, Purpose and Need, Regulatory context, for regulatory context of climate and climate change).

A summary and comparison of the potential effects of the alternatives are presented in Section 3.8.2.8.

3.8.2.1 Analysis approach and methodology

Carbon sequestration in forests

The analysis approach for the potential effects of the alternatives on climate change focuses on the degree to which implementing the alternatives results in changes in the amount of carbon sequestration. Timber growth and harvest modeling (Appendix E) is used to predict harvest volume and stand inventory under each alternative, providing the basis for modeling of carbon emissions and storage. Assumptions used for the carbon accounting were developed utilizing the built in assumptions of the CAL FIRE Greenhouse Gas Calculator (CAL FIRE 2010b), and MRC-specific data, such as fuel usage, described in Appendix S.

Stand inventory characteristics from the timber model are used to generate estimates of the net amount of carbon sequestered each decade (primarily through tree growth) and the carbon dioxide equivalent. Carbon emissions (losses) in the accounting process included conifer harvest, conversion of hardwood stands to conifer, fuel usage for timber harvest operations, site preparation, and losses from solid wood products during the milling process.

Climate change projections for the assessment area

Surface temperature and precipitation

End-of-century projected surface temperature increases for the North Coast climate region (Table 3.8-1), including the assessment area, include average annual surface temperature increases projected to range from 2 to 3°F (1 to 1.5°C) under low greenhouse gas emissions scenarios (*Special Report on Emissions Scenarios Emissions Scenario B1*). Temperature increase projections under high greenhouse gas emissions scenarios (*Special Report on Emissions Scenarios Emissions Scenario A2*) range from 3° to 4°F (1.5° to 2°C). For mid-century and end-of-century projections, these increases would be roughly equivalent to increases of 0.05 to 0.08°F per year.

Changes in annual precipitation for the assessment area are predicted by existing regional climate models with less certainty; trends currently indicate either a small decrease or no change in annual precipitation, depending on the emissions scenario, for mid-century (-0.9% per year to 0.0% per year) and a larger decrease by end-of-century (-3.3% per year to -0.4 % per year). Regardless of the direction of change in annual precipitation amounts, interannual precipitation variability is expected to increase under climate change (i.e., more frequent wet and drought years and extended droughts [Anderson 2009]).

Table 3.8-1. Summary of mid-century and end-of-century predicted change in surface temperature and percent precipitation in the vicinity of the assessment area based on B1 (low) and A2 (high) Special Report on Emissions Scenarios emissions scenarios.[a]

Difference from 1951 to 2006 average surface temperature								**Difference from 1951 to 2006 average annual precipitation**	
Mid-Century (2050s)									
	Annual[b]		January[b]		August[b]			Annual[b]	
	Low B1	High A2	Low B1	High A2	Low B1	High A2		Low B1	High A2
°F	2.6	3.2	2.1	2.5	3.5	4.3	%	-0.9	0.0
°C	1.5	1.8	2.2	2.8	1.9	2.4			
Late-Century (2080s)									
	Annual[b]		January[b]		August[b]			Annual[b]	
	Low B1	High A2	Low B1	High A2	Low B1	High A2		Low B1	High A2
°F	3.6	5.6	2.9	4.7	4.5	7.2	%	-3.3	-0.4
°C	2.0	3.1	1.6	2.6	2.5	4.0			

[a] All data from http://www.climatewizard.org/ Accessed 8 July 2010. Location: lat (39.19°) long (-123.37°).
[b] Values shown are an ensemble average, using results from 16 global circulation models (see footnote 50) downscaled to 12-km resolution.

Fog

Coastal fog is a critical climate element in the North Coast region, providing from 10 to 40% of the annual water supply for coastal vegetation, particularly during the summer months when precipitation is low and fog cover is frequent (Dawson and Siegwolf 2007). While the net effects of climate change on coastal fog formation are not clear, recent work suggests linkages between fog formation, the Pacific Decadal Oscillation, and the strength of the surface temperature inversion. The Pacific Decadal Oscillation is a recurring pattern in northern Pacific Ocean temperatures, occurring over decadal time scales that alternates between cool cycles associated with increased precipitation during October through March and warm cycles associated with decreased precipitation (Nigam et al. 1999).

Using the historical relationship between the coastal-inland surface temperature differential and fog frequency, a recent study estimated that a 33% decrease in fog frequency appears to have occurred between the 1901–1925 time period and the 1951–2008 time period (Dawson and Johnstone 2008). Within the 1951–2008 time period, intervals of high fog frequency correlate with those of the warm Pacific Decadal Oscillation cycle and its primary indicator, high sea surface temperatures along the northern coast of California. Other Pacific Decadal Oscillation characteristics also correlate with increased fog frequency, such as location of the North Pacific High pressure cell, strong northerly coastal winds, and coastal upwelling. Most recent science demonstrates an overall downward trend in California coastal fog frequency during the 20th Century, with potential linkages between reduced fog frequency and the cool (negative) phase of the Pacific Decadal Oscillation cycle.

Streamflow and seasonal storm events

The North Coast climate region is influenced by both the El Niño Southern Oscillation and the Pacific Decadal Oscillation. In California and the Pacific Northwest, the El Niño Southern Oscillation produces predominantly cool and dry weather, with events lasting 6 to 18 months, and complete cycles building and declining over a 2- to 7-year period (ISAB 2007). The current ambiguity in the El Niño Southern Oscillation response to global climate change and the need for further resolution of Pacific Decadal Oscillation cycle length, frequency, and underlying mechanism means that predicted direct and indirect effects on the assessment area with respect to global climate change are still highly uncertain. However, some generalizations may be drawn. In California and across western North America, warmer surface (air) temperatures have been linked to earlier onset of springtime snowmelt and streamflow (Hamlet and Lettenmaier 1999, Regonda et al. 2005, Stewart et al. 2005), and lower streamflow in the summer (Hamlet and Lettenmaier 1999, Stewart et al. 2005). Since precipitation in the assessment area occurs predominately in the form of rain (i.e., snowfall is hydrologically insignificant) (Section 3.3.1; Hydrology, Beneficial Uses of Water, and Water Quality; Affected environment/Environmental setting), the projected higher air temperatures in winter and early spring are not expected to result in considerable changes to the intra-annual timing and magnitude of the spring runoff peak. The intensity and frequency of storm events may shift as a result of changes to the El Niño Southern Oscillation cycle related to long-term climate change. Currently, river basins which are south of 41ºN, including the assessment area, display higher flood peaks during El Niño Southern Oscillation conditions (NOAA 2008), with the difference between average El Niño Southern Oscillation and non-El Niño Southern Oscillation floods being greatest in southern California and generally less pronounced along the North Coast (Andrews et al. 2004). A climate-change induced shift in the North Pacific High pressure cell situated over northern California/southern Oregon may alter the El Niño Southern Oscillation hydrograph and the associated inter-annual timing and magnitude of peak floods in the assessment area. Increased erosion and sedimentation may occur in the assessment area as a result of the increased intensity and frequency of storm events.

Stream temperature

Warmer stream temperatures may also result from increased annual surface (air) temperatures and lower annual precipitation. Further north in the North Coast climate region, decreases in snow water equivalents and increased water temperatures have already been detected in the Klamath River basin (Bartholow 2005, VanKirk and Naman 2008). Bartholow (2005) estimates that the length of the mainstem Klamath River exhibiting temperatures suitable for salmonids has decreased by 8.2 km (5 mi) per decade over the period 1962–2000 (Bartholow 2005). However, the available data do not confirm global climate change effects because they span crossover periods within the Pacific Decadal Oscillation (Mantua et al. 1997, ISAB 2007) and therefore the observed temperature changes may have been driven by Pacific Decadal Oscillation effects. If global climate model and regional climate model climate change projections are reasonably accurate, the next warm phase of the Pacific Decadal Oscillation may bring greater extremes in water temperature to the North Coast climate region, including the assessment area, by mid-century. However, the recently proposed linkage between increased coastal fog frequency, the warm phase of the Pacific Decadal Oscillation cycle, and the North Pacific High pressure cell suggests that during the next warm Pacific Decadal Oscillation phase, coastal fog might serve as a temporary (as long as the warm Pacific Decadal Oscillation phase lasts) mitigating factor for expected mid-century increases in water temperatures and decreases in precipitation.

Drought stress and wildfires

The combination of warmer surface (air) temperatures, changes in annual precipitation, and long-term decreases in fog frequency could result in greater evaporative demand on coastal redwoods, Douglas-fir, and other trees in the assessment area, increasing their drought stress and vulnerability to pest infestation, and likely reducing growth rates and recruitment of new trees (University of California – Berkeley 2010). Increased water loss from coastal vegetation may also mean more frequent wildfires. As demonstrated in the Lake Tahoe basin, interactions between drought cycles and susceptibility to pest infestation can result in high fuel loads. Increases in the

North Coast human population (20% and 55% predicted for Humboldt and Mendocino counties, respectively, by 2050) (State of California 2007), combined with a greater frequency of storm events are likely to create more fire ignitions. The net effects of increased fuel loading and fire ignitions could increase wildfire frequency and severity.

The linkage between predicted changes in climate and fire frequency, intensity, and length of the fire season is well established for boreal, tropical, and Mediterranean systems (Flannigan and vanWagner 1991, Stocks et al. 1998, Bergeron and Flannigan 1995, Simard and Main 1987, Wotton and Flannigan 1993). Fewer studies examine climate-related effects on wildfire for the Pacific Northwest and more specifically, the North Coast (e.g., Spracklen et al. 2009; Westerling and Bryant 2006, 2008, et al. 2009; Fried et al. 2004). Based on past relationships between climatic factors and wildfire frequency and extent, Spracklen et al. (2009) used global climate model forecasts of future climatic conditions to estimate a 78% increase in burned area in the Pacific Northwest by 2050. Westerling and Bryant (2006, 2008) used *Special Report on Emissions Scenarios* emissions scenarios A2 and B1 to predict the frequency of wildfires covering areas greater than 495 ac (200 ha) in northern coastal California, with modest (1–2%) increases over 1961–1990 fire frequency rates for the 2005–2064 period, and slightly greater increases (2–4%) for the 2065–2100 period. These predictions hold large uncertainties regarding climate change related effects on wildfire in the region. For example, large uncertainties in global climate model forecasts of precipitation and ecosystem level feedbacks, such as effects of prolonged drought and pest infestation on fuel loading, need to be addressed in order to improve forecasts of changes in wildfire for North Coast in general, and the assessment area in particular.

Sea level rise

Lastly, mean sea level along the California coast is projected to rise 4–28 in (11–72 cm) in the next 80 years (Cayan et al. 2006). Combined with the increase in extreme events, mean sea level rise is likely to cause an increase in the frequency of coastal storm surges, or coastal flooding events. Increases in mean sea level will also result in 'marine transgression' (landward migration of the shoreline), landward migration of coastal wetland salinity gradients, and changes in size and extent of estuaries and coastal lagoons. Within the assessment area, increases in mean sea level would potentially impact conditions at the mouths of relatively larger rivers, such as the Albion, Navarro, Noyo, and Big rivers.

Aquatic and terrestrial habitats and species of concern

Projected climate change-induced effects on aquatic and terrestrial habitats and species of concern in the assessment area are predicted to occur, in part, from a combination of aforementioned changes in air temperature, water temperature, storm frequency, flooding, peak flows, and sedimentation in the assessment area. Ecological changes as a result of climate change have already been documented in California over the past century (Loarie et al. 2008, PRBO Conservation Science 2011), and include those in animal and plant species' ranges and abundance, timing of life cycles, morphology and physiology, community composition, and interactions with other biota (Schneider and Root 2002). Changes in intensity and frequency of stormflow events and subsequent increase in erosion and sedimentation may alter habitat conditions for all life stages of covered salmonids and other sensitive aquatic and riparian species. Effects of climate change on terrestrial species in northwestern California may result in large part from changes in terrestrial vegetation communities, including a possible decrease in conifer-dominated vegetation (PRBO Conservation Science 2011). Wildlife species have been documented migrating earlier or later, or extending their migration patterns in search of suitable habitat. Some plants and animals have been found in the northern portion of their ranges earlier in the season, or extending ranges into areas where they have not been previously recorded. As species redistribute across the landscape, there may be a broader, cumulative change in species interactions and community assemblages (Stralberg et al. 2009). Changes in distribution are also predicted for vegetation; it has been projected that up to 66% of California flora will experience > 80% reductions in range size within a century, depending on the magnitude of future emissions and on the ability of species to disperse from current locations (Loarie et al. 2008). In addition, increases in tree vulnerability to pests, fire, and disease may accelerate invasion of weeds.

3.8.2.2 No Action alternative

Under the No Action alternative, the amount of carbon sequestered in forest biomass is anticipated to increase over time as MRC has discontinued the use of traditional clearcutting and is transitioning towards uneven-aged silviculture. Even-aged management would be used in some situations, such as restoration of stands from hardwood to conifer dominance. No significant environmental effect of climate change that would affect management of MRC's commercial timberlands under this alternative can be predicted given the current state of scientific knowledge. As MRC transitions to more uneven-aged management, it is anticipated that there would be a substantial amount of carbon sequestered on its forestlands (Figure 3.8-1, Appendix S). While increased carbon sequestration is generally considered beneficial with respect to greenhouse gas emissions, effects on climate change at the assessment, regional, and global scale under the No Action alternative would be **beneficial** but negligible, given the relatively small amount of carbon sequestration on MRC's lands compared with the amount of carbon dioxide entering the atmosphere worldwide under all emission scenarios.

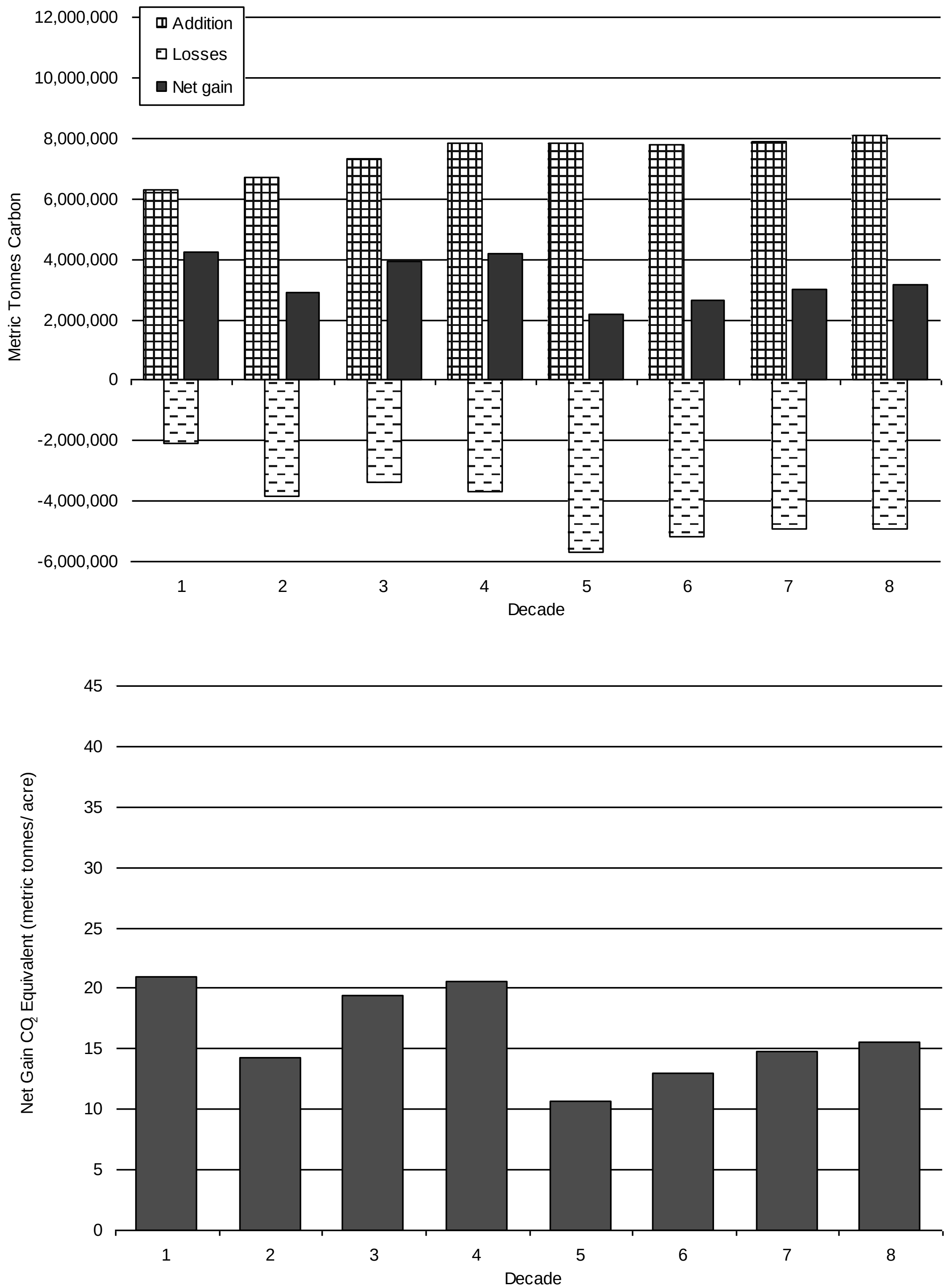


Figure 3.8-1. Predicted change in total carbon (top), and net gain in carbon dioxide equivalent per acre (bottom) under the No Action alternative.

3.8.2.3 Proposed Action

As under the No Action alternative, no significant environmental effect of climate change that would affect management of MRC's commercial timberlands under the Proposed Action can be predicted given the current state of scientific knowledge. The enhanced riparian buffer widths may mitigate the effects of climate change on covered species and their habitats over time under the Proposed Action.

Under the Proposed Action, the amount of carbon sequestered is anticipated to increase over time as MRC has discontinued the use of traditional clearcutting and is transitioning towards uneven-aged silviculture. In addition, the enhanced riparian buffer widths for Class I and II streams are anticipated to result in higher levels of carbon sequestration than under the No Action alternative, particularly after the first two decades (Figure 3.8-2, Appendix S). While increased carbon sequestration is generally considered beneficial with respect to greenhouse gas emissions, effects on climate change at the assessment, regional, and global scale under the Proposed Action would be **beneficial**, but negligible, given the relatively small increase and the small amount of carbon sequestration on MRC's lands compared with the amount of carbon dioxide entering the atmosphere worldwide under all emission scenarios.

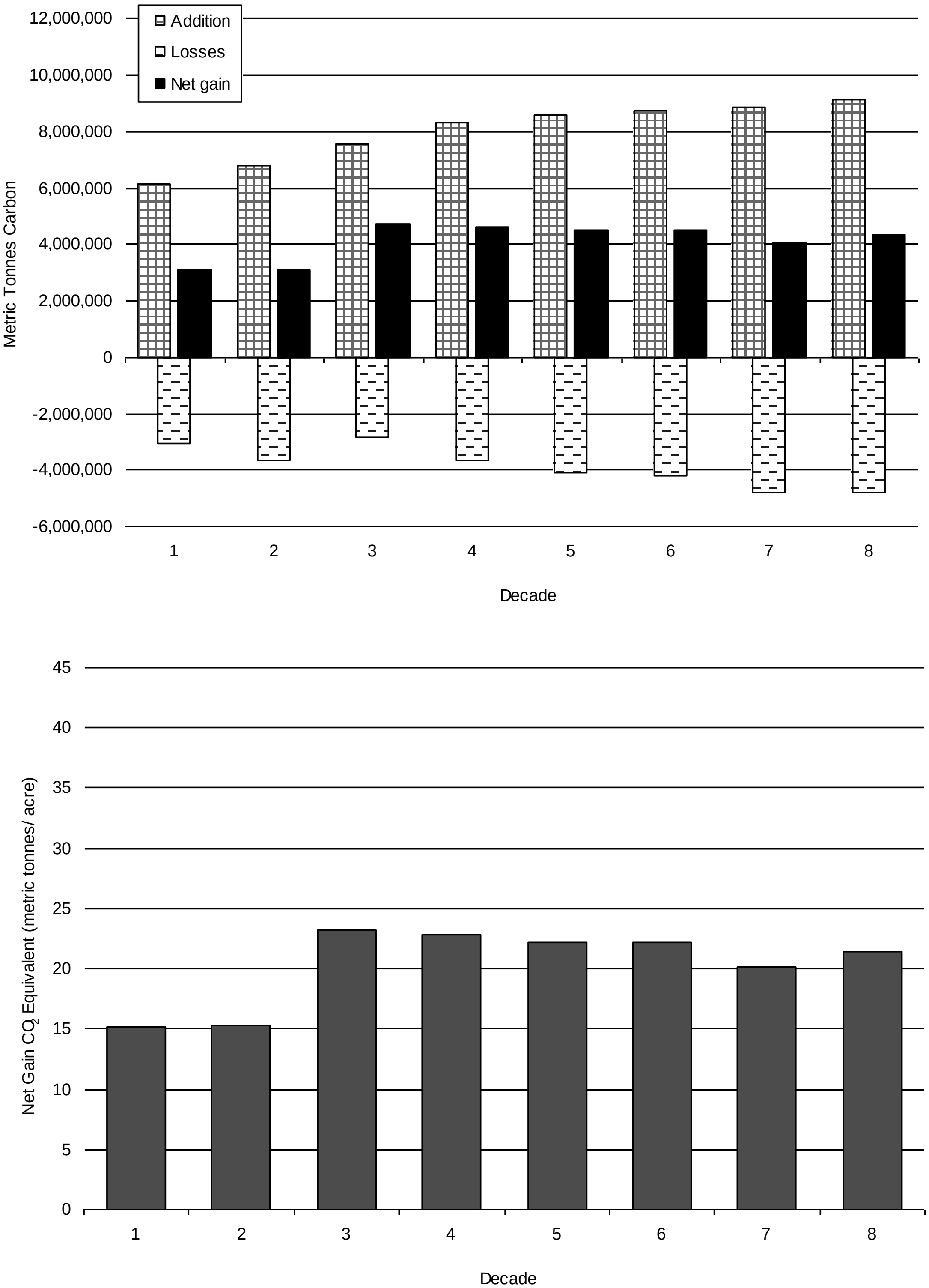


Figure 3.8-2. Predicted change in total carbon (top), and net gain in carbon dioxide equivalent per acre (bottom) under the Proposed Action.

3.8.2.4 Alternative A

Under Alternative A, harvesting and management activities would be the same as the Proposed Action, with additional measures to enhance conservation of key aquatic and terrestrial habitats. Therefore, additional stands would be subject to harvest restrictions that could enhance their ability to sequester carbon. As under the No Action alternative, no significant environmental effect of climate change that would affect management of MRC's commercial timberlands under Alternative A can be predicted given the current state of scientific knowledge.

Under Alternative A, the amount of carbon sequestered is anticipated to increase over time as MRC has discontinued the use of traditional clearcutting and is transitioning towards uneven-aged silviculture. In addition, the enhanced riparian buffer widths for Class I and II streams and restricted harvest activities in other stands are anticipated to result in higher levels of carbon sequestration than under the No Action alternative, particularly after the first two decades (Figure 3.8-3, Appendix S). While increased carbon sequestration is generally considered beneficial with respect to greenhouse gas emissions, effects on climate change at the assessment, regional, and global scale under Alternative A would be **beneficial** but negligible, given the relatively small increase and the small amount of carbon sequestration on MRC's lands compared with the amount of carbon dioxide entering the atmosphere worldwide under all emission scenarios.

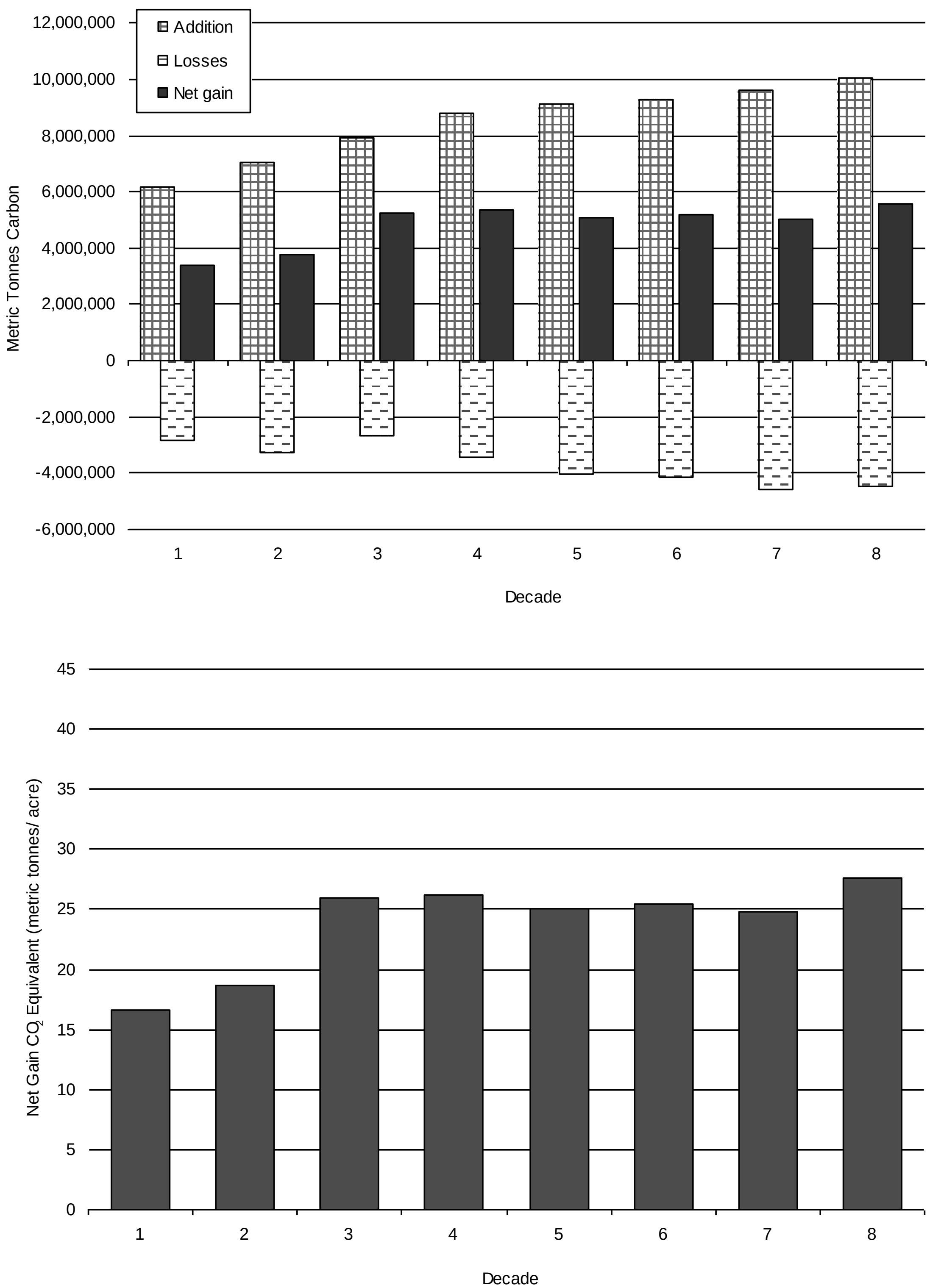


Figure 3.8-3. Predicted change in total carbon (top), and net gain in carbon dioxide equivalent per acre (bottom) under Alternative A.

3.8.2.5 Alternative B

Harvesting and management outside of the reserves under Alternative B would be similar to the No Action alternative. As under the No Action alternative, no significant environmental effect of climate change that would affect management of MRC's commercial timberlands under Alternative B can be predicted given the current state of scientific knowledge.

Under Alternative B, establishment of reserves would result in reduced timber harvesting within these areas and, therefore, the ability of these reserve stands to sequester carbon would be increased. Overall, the level of carbon sequestration under Alternative B would be increased relative to the No Action alternative, particularly after the first three decades (Figure 3.8-4, Appendix S). While increased carbon sequestration is generally considered beneficial with respect to greenhouse gas emissions, effects on climate change at the assessment, regional, and global scale under Alternative B would be **beneficial** but negligible, given the relatively small increase and the small amount of carbon sequestration on MRC's lands compared with the amount of carbon dioxide entering the atmosphere worldwide under all emission scenarios.

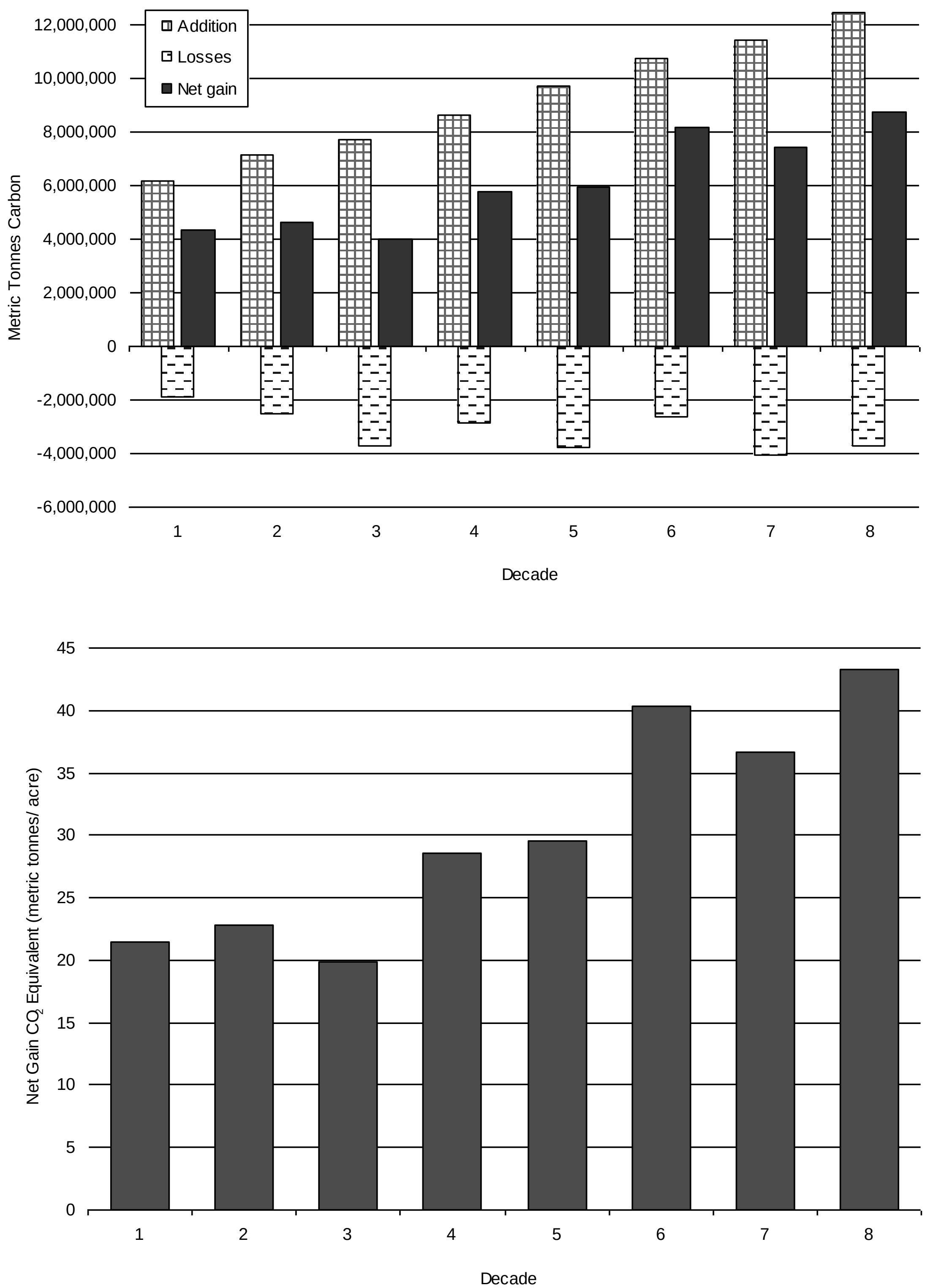


Figure 3.8-4. Predicted change in total carbon (top), and net gain in carbon dioxide equivalent per acre (bottom) under Alternative B.

3.8.2.6 Alternative C

Under Alternative C, the potential for effects on climate change would be comparable to the Proposed Action because the proposed HCP conservation measures affecting carbon sequestration would be the same under Alternative C as they are under the Proposed Action. The only difference between Alternative C and the Proposed Action for climate change is that the conservation measures described under the Proposed Action would apply for a shorter term of 40 years. Therefore, climate change effects under Alternative C would be the same as under the Proposed Action for years 10 through 40, and would be **less than significant**.

3.8.2.7 Climate change effects on the assessment area

Although there is a large degree of uncertainty regarding the long-term effects of global climate change on the North Coast region, including the assessment area, the following climate effects are reasonably likely to occur, given the current state of scientific knowledge:

- Increased average seasonal (i.e., summertime) air temperatures; increases may be somewhat mitigated by increased coastal fog formation, should the latter occur.
- Increased stream water temperatures; as described above for air temperatures, water temperature increases may be somewhat mitigated by increased coastal fog formation.
- Increased intensity and frequency of storm events, shifts in inter-annual timing and magnitude of peak floods, and the possibility of increased erosion and sedimentation.
- Increased frequency and magnitude of coastal storm surges/flooding events due to sea level rise.

Climate change predictions are still highly uncertain with regard to precipitation patterns and wildfire frequency and intensity.

Effects on aquatic and terrestrial habitats related to changes in air temperature, water temperatures, storm frequency, flooding, peak flows, and sedimentation could be exacerbated or attenuated as a result of climate change. However, conclusions regarding specific effects on aquatic, riparian, and terrestrial species of concern due to climate change in the primary assessment area are speculative at this time.

3.8.2.8 Comparison of alternatives

Table 3.8-2 summarizes the anticipated climate change effects. Overall, the Proposed Action would provide enhanced carbon sequestration compared with the No Action alternative, but the effects would be less than those under Alternative B. The increase in carbon sequestration under Alternative A would be intermediate to those of the Proposed Action and Alternative B. Alternative C would be similar to the Proposed Action; however there is a limited time frame for forest growth.

Table 3.8-2. Comparison of alternatives for climate and climate change.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Effects of Project Alternatives on Climate Change	Net carbon sequestration predicted to range from approximately 2.2 to 4.2 million metric tonnes carbon dioxide equivalent per decade. **Less than significant effect**.	Carbon sequestration is expected to increase, predicted to range from approximately 3.1 to 4.7 million metric tonnes carbon dioxide equivalent per decade. **Less than significant effect**.	Carbon sequestration is expected to increase predicted to range from approximately 3.4 to 5.6 million metric tonnes carbon dioxide equivalent per decade. **Less than significant effect**.	Carbon sequestration is expected to increase predicted to range from approximately 4.0 to 8.8 million metric tonnes carbon dioxide equivalent per decade. **Less than significant effect**.	Same as Proposed Action for a period of 40 years (predicted to range from approximately 3.1 to 4.7 million metric tonnes carbon dioxide equivalent per decade. **Less than significant effect**.

3.9 Timber Resources

This section describes the timber resources within the assessment area, as well as the effects of implementing the alternatives on timber resources. The timber resources assessment area is the primary assessment area (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1).

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is similar to the primary assessment area and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects are assumed to therefore be similar to those in the primary assessment area.

3.9.1 Affected environment/Environmental setting

MRC began operations with the purchase of the primary assessment area (and additional lands not included in the proposed HCP/NCCP) on 30 June 1998. The forestlands for which MRC is seeking coverage under the proposed HCP/NCCP are located in two distinct areas: (1) the Rockport Tract (39,188 ac [15,858 ha]) just south of the Humboldt County line; and (2) the major ownership block (180,722 ac [73,135 ha]) south of and including the headwaters of the Noyo River, generally north of the ridge between the Garcia and the Gualala River in southern Mendocino County, east of the Pacific Ocean, and west of Highway 101 (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1). Most of the forestlands in the primary assessment area are young growth stands of redwood and Douglas-fir, mixed conifers and hardwoods, or mixed hardwoods. Stand characteristics and the vegetative character of the primary assessment area are described in Section 3.5 (Vegetation and Plant Species of Concern). Existing conifer inventory in the primary assessment area (2008 basis) is 2,726 million board feet.

3.9.2 Environmental effects and mitigation

Effects on timber resources are considered significant if the alternatives would:

- Preclude attainment of maximum sustained production of high quality timber products as mandated under the CFPRs (14 CCR §913.11).
- Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220[g]) or timberland (as defined in Public Resources Code Section 4526).
- Result in the loss of forest land or conversion of forest land to non-forest use.
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of forest land to non-forest use.

None of the alternatives would conflict with existing zoning or cause rezoning of forest land, result in the loss of forest land through conversion to non-forest use, or result in changes in the existing environment which could result in the conversion on forest land to non-forest use. Therefore, effects on timber resources would be significant only if activities would preclude the attainment of maximum sustained production.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.9.2.7.

3.9.2.1 Analysis approach and methodology

The Z'berg-Nejedly Forest Practice Act of 1973 authorizes regulations to achieve the goal of maximum sustained production of high-quality timber products, while giving consideration to various other forest benefits and amenities. The CFPRs (14 CCR §913.11) specify that, for lands which neither a nonindustrial TMP or a Sustained Yield Plan has been approved (as is the case for the primary assessment area), maximum sustained production would be achieved by meeting three standards: (1) balancing growth and harvest over time as defined in the CFPRs (14 CCR §913.11)[44], (2) maintaining a timber inventory capable of sustaining the long-term sustained yield, and (3) having the projected annual harvest level for all future rolling 10-year periods not exceed the long-term sustained yield.

As described in Appendix E, MRC conducted timber inventory, growth, and yield modeling for each alternative to demonstrate compliance with the three criteria for demonstrating maximum sustained production specified in the CFPRs (14 CCR §913.11). It is assumed that as long as harvest does not exceed growth such that net growth is positive over time, the first standard (balancing growth and harvest) would be met. Similarly, if the projected inventory resulting from harvesting over time is capable of sustaining the average annual yield achieved during the last decade of the planning horizon, the second standard would be met. The CFPRs (14 CCR §895.1)

[44] As noted in 14 CCR §913.11, "the projected inventory resulting from harvesting over time shall be capable of sustaining the average annual yield achieved during the last decade of the planning horizon. The average annual projected yield over any rolling 10-year period, or over appropriately longer time periods for ownerships which project harvesting at intervals less frequently than once every ten years, shall not exceed the projected long-term sustained yield."

define long-term sustained yield as "the average growth sustainable by the inventory predicted at the end of a 100-year planning horizon". MRC determined the long-term sustained yield by utilizing the estimate of growth from the last decade of a 100-year planning horizon. Average annual harvest levels for future rolling 10-year periods are compared with the calculated value for long-term sustained yield for each alternative to demonstrate compliance with the third standard for meeting maximum sustained production.

3.9.2.2 No Action Alternative

Harvest levels under the No Action alternative are anticipated to be somewhat higher than existing conditions for the first decade and increase over time for approximately 50 years. Under the No Action alternative, harvest never exceeds growth and net growth as a percentage of inventory is positive in all decades, indicating that harvest and growth are balanced. The conifer inventory within the primary assessment area under the No Action alternative is predicted to increase over time, demonstrating that harvest levels during the last decade of the 100-year planning horizon are sustainable (long-term sustained yield) (Table 3.9-1). The average annual harvest level in any decade would not exceed the long-term sustained yield such that timber management and harvesting under the No Action alternative would contribute to achievement of maximum sustained production. Therefore, there would be **no effect** on timber resources under the No Action alternative.

Table 3.9-1. Conifer harvest, inventory, and growth projections within the primary assessment area under the No Action alternative.

Decade	Inventory (board feet per acre)	Growth (board feet per acre per year)	Harvest (board feet per acre per year)	Net Growth[a] (% of inventory)	Harvest (% of growth)	Harvest (% of long-term sustained yield[b])
1	14,583	488	182	21	37	28
2	16,802	518	349	10	67	53
3	18,892	565	341	12	60	52
4	20,915	607	390	10	64	60
5	21,983	606	599	0	99	91
6	22,293	602	552	2	92	84
7	22,843	611	534	3	87	82
8	23,667	626	542	4	87	83
9	24,526	641	566	3	88	87
10	25,165	651	581	3	89	89

[a] Net growth = growth minus harvest; expressed here as a percentage of inventory.
[b] Long-term sustained yield: estimated at 651 board feet per acre per year.

3.9.2.3 Proposed Action

Commercial timber harvesting would be limited within 190 ft (58 m) and 50–100 ft (15–30 m) of Class I and II watercourses, respectively. Overall, harvest as a percentage of growth would be less than under the No Action alternative and net growth as percentage of inventory would be higher than under the No Action alternative in most decades (Table 3.9-2). The conifer inventory within the primary assessment area under the Proposed Action is predicted to increase over time, demonstrating that harvest levels are sustainable. The average annual harvest level in any decade would not exceed the long-term sustained yield such that timber management and harvesting under the Proposed Action would contribute to achievement of maximum sustained production. Therefore, similar to the No Action alternative, there would be **no effect** on timber resources under the Proposed Action.

Table 3.9-2. Conifer harvest, inventory, and growth projections within the primary assessment area under the Proposed Action.

Decade	Inventory (board feet per acre)	Growth (board feet per acre per year)	Harvest (board feet per acre per year)	Net growth[a] (% of inventory)	Harvest (% of growth)	Harvest (% of long-term sustained yield[b])
1	14,170	473	241	16	51	33
2	16,155	523	313	13	60	43
3	18,564	584	308	15	53	42
4	21,341	642	396	12	62	54
5	23,562	665	446	9	67	61
6	25,763	674	461	8	68	63
7	27,566	687	527	6	77	72
8	29,274	707	531	6	75	72
9	30,803	719	586	4	82	82
10	32,204	734	588	5	80	80

[a] Net growth = growth minus harvest; expressed here as a percentage of inventory.
[b] Long-term sustained yield: estimated at 734 board feet per acre per year.

3.9.2.4 Alternative A

Under Alternative A, harvesting and management activities would be the same as the Proposed Action, with additional measures to enhance conservation of key aquatic and terrestrial habitats. Under Alternative A, no-harvest zones would apply to Class I and II watercourses in the primary assessment area. This could result in the loss of some additional timber harvest volume relative to the No Action alternative. This loss in harvest volume is reflected in a lower level of harvest as a percentage of growth (Table 3.9-3). Net growth as a percentage of inventory is also higher than under the No Action alternative or the Proposed Action. These harvest levels would be sustainable and are less than the estimated long-term sustained yield, contributing to achievement of maximum sustained production. Therefore, there would be **no effect** on timber resources under Alternative A.

Table 3.9-3. Conifer harvest, inventory, and growth projections within the primary assessment area under Alternative A.

Decade	Inventory (board feet per acre)	Growth (board feet per acre per year)	Harvest (board feet per acre per year)	Net growth[a] (% of inventory)	Harvest (% of growth)	Harvest (% of long-term sustained yield[b])
1	14,260	478	221	18	46	26
2	16,658	544	278	16	51	32
3	19,588	613	297	16	48	35
4	22,863	678	375	13	55	44
5	25,587	703	442	10	63	52
6	28,131	717	455	9	63	53

Decade	Inventory (board feet per acre)	Growth (board feet per acre per year)	Harvest (board feet per acre per year)	Net growth[a] (% of inventory)	Harvest (% of growth)	Harvest (% of long-term sustained yield[b])
7	30,650	743	503	8	68	59
8	33,267	777	493	9	63	57
9	36,208	812	497	9	61	58
10	39,726	858	472	10	55	55

[a] Net growth = growth minus harvest; expressed here as a percentage of inventory.
[b] Long-term sustained yield: estimated at 858 board feet per acre per year.

3.9.2.5 Alternative B

Under Alternative B, MRC would establish no-harvest terrestrial habitat reserves totaling 48,800 ac (19,748 ha). This could result in the loss of some additional timber harvest volume relative to the No Action alternative. The loss in harvest volume is reflected in a greater conifer inventory in later decades and a lower level of harvest as a percentage of growth within the primary assessment area, compared with the No Action alternative and the other action alternatives (Table 3.9-4). Net growth as a percentage of inventory is also higher than under the No Action alternative and the other action alternatives. These harvest levels would be sustainable and are less than the estimated long-term sustained yield, contributing to the achievement of maximum sustained production within the primary assessment area. Therefore, there would be **no effect** on timber resources under Alternative B.

Table 3.9-4. Conifer harvest, inventory, and growth projections within the primary assessment area under Alternative B.

Decade	Inventory (board feet per acre)	Growth (board feet per acre per year)	Harvest (board feet per acre per year)	Net growth[a] (% of inventory)	Harvest (% of growth)	Harvest (% of long-term sustained yield[b])
1	13,984	479	152	23	32	14
2	17,789	552	225	18	41	21
3	20,458	597	381	11	64	35
4	23,458	669	314	15	47	29
5	27,234	752	415	12	55	38
6	31,295	834	286	18	34	26
7	35,580	887	447	12	50	41
8	41,154	964	409	13	42	38
9	46,028	1,000	564	9	56	52
10	52,133	1,086	320	15	29	29

[a] Net growth = growth minus harvest; expressed here as a percentage of inventory.
[b] Long-term sustained yield: estimated at 1,086 board feet per acre per year.

3.9.2.6 Alternative C

Effects on timber resources under Alternative C would be the same as those of the Proposed Action. The only difference between Alternative C and the Proposed Action affecting timber resources is that the proposed conservation measures would apply for a shorter term of 40 years.

Therefore, the potential for effects on timber resources under Alternative C is expected to be comparable to that described above under the Proposed Action (i.e., **no effect**).

3.9.2.7 Comparison of alternatives

Table 3.9-5 summarizes the effects of the alternatives on timber resources. The summary is based on the three criteria relevant to demonstrating that maximum sustained production would be achieved. Under all of the alternatives (including the Proposed Action), growth and harvest are balanced, sufficient inventory is maintained to support the long-term sustained yield, and the projected annual harvest levels do not exceed the long-term sustained yield. Therefore, there would be no effect on timber resources under any of the alternatives.

Table 3.9-5. Comparison of alternatives for timber resources.

Criteria	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Balancing growth and harvest	Harvest would not exceed growth in any decade. **No effect.**	Same as the No Action alternative.	Same as the No Action alternative.	Same as the No Action alternative.	Same as Proposed Action for a period of 40 years.
Maintenance of inventory	Inventory is capable of supporting long-term sustained yield. **No effect.**	Same as the No Action alternative.	Same as the No Action alternative.	Same as the No Action alternative.	Same as Proposed Action for a period of 40 years.
Harvest relative to long-term sustained yield	Harvest level does not exceed long-term sustained yield in any decade. **No effect.**	Same as the No Action alternative.	Same as the No Action alternative.	Same as the No Action alternative.	Same as Proposed Action for a period of 40 years.

3.9.3 PTEIR alternate standard analysis for the Proposed Action, Alternative A, and Alternative C

In its TMP (Appendix A) and HCP/NCCP, MRC has proposed alternate standards to the current (2012) CFPRs, which would be implemented and included in PTHPs prepared under the Proposed Action, Alternative A, or Alternative C. Alternate standards are not proposed for the No Action alternative because no TMP, HCP, or NCCP would be implemented. Likewise, alternate standards are not proposed for Alternative B because no TMP or NCCP would be implemented. The 2012 CFPRs (14 CCR §1092[b]) authorize CAL FIRE to accept alternate standards in a PTHP where it has been demonstrated in a PTEIR that the alternate standard provides resource protections that are equal to or better than the standard operational rule and its implementation would have a less than significant impact on the environment. Also, where future changes in the CFPRs occur, the current operational standards (2012 CFPRs) may be accepted by CAL FIRE as alternate standards where the PTEIR has similarly demonstrated a less than significant impact.

The proposed alternate standards were reviewed by the lead agencies to determine the resource area(s) to which they apply (see Attachment D to Appendix A). For each alternate standard that applies to Timber Resources, the analysis in Sections 3.9.2.3, 3.9.2.4, and 3.9.2.6 and the cumulative effects analysis in Sections 4.9.2, 4.9.3, and 4.9.5 demonstrates that its implementation as part of the Proposed Action, Alternative A, or Alternative C would provide equal or better protection to Timber Resources than the 2012 CFPR standard and its implementation would either (1) not result in adverse environmental impacts or (2) result in impacts that are below the level of significant effect on the environment. This analysis considered the effects of implementing the proposed alternate standards as part of a suite of management and conservation measures contained in the HCP, NCCP, and TMP.

The following are the CFPRs for which alternate standards (or current operational standards, which due to a rule change could become an alternate standard) have been proposed by MRC in its TMP (Appendix A) and/or its HCP/NCCP and are applicable to Timber Resources:

913.1, 913.1(a), 913.1(a)(1-2), 913.1(a)(2)(B-E), 913.1(a)(3-4), 913.1(a)(4)(A), 913.1(a)(5), 913.1(c), 913.1(c)(2), 913.2(a), 913.2(a)(1-2), 913.2(a)(2)(A), 913.2(a)(2)(A)(1-4), 913.2(a)(2)(B)(1-4), 913.2(a)(3-5), 913.2(b), 913.2(b)(1-8), 913.3(b), 913.3(b)(1-3), 913.4(b), 913.4(b)(1-2), 913.4(d)(1-16), 913.6, and 915.

The EIS/PTEIR analysis demonstrates that these alternate standards would provide equal or better protection to Timber Resources than the 2012 CFPR standard. Implementation of these alternate standards would have a less than significant impact and would not contribute to cumulative effects on Timber Resources, and may be proposed in PTHPs by MRC and approved by CAL FIRE (14 CCR §1092[c]).

A complete list of MRC's proposed alternate standards is included in the TMP (Appendix A) as Attachment D. Attachment D of the TMP also includes a reference to the location of each alternate standard in the TMP and/or HCP/NCCP, and the CFPR standard (rule) it would replace.

3.10 Hazards and Hazardous Substances

This section describes the hazards and hazardous substances within the assessment area, as well as the effects of implementing the alternatives on hazards and hazardous substances. The assessment area for hazards and hazardous substances is the primary assessment area (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1).

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is similar to the primary assessment area and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects are assumed to therefore be similar to those in the primary assessment area.

3.10.1 Affected environment/Environmental setting

Hazards in the primary assessment area include the use or storage of hazardous substances, release of hazardous substances into the environment through operation of equipment, and wildfire. A substance is defined as hazardous if it appears on a list of hazardous materials prepared by a federal, state, or local regulatory agency, or if the material has characteristics defined as hazardous by such an agency. MRC stores and uses a variety of hazardous substances including herbicides, adjuvants, and petroleum products used by heavy equipment). Other than herbicides, MRC does not use pesticides or fertilizers in its forest management.

3.10.1.1 Hazardous Materials

Regulatory context

Numerous local, state, and federal laws and regulations regulate the use, storage, and disposal of hazardous materials, including management of contaminated soils and groundwater. The following discussion contains a summary review of regulatory controls pertaining to hazardous substances, including federal, state, and local laws and regulations.

Federal

Federal agencies that regulate hazardous materials include the Environmental Protection Agency, the Occupational Safety and Health Administration, the Department of Transportation, and the National Institute of Health. The following federal laws and guidelines govern hazardous materials:

- Federal Water Pollution Control
- Clean Air Act
- Occupational Safety and Health Act
- Federal Insecticide, Fungicide, and Rodenticide Act
- Comprehensive Environmental Response, Compensation, and Liability Act
- Guidelines for Carcinogens and Biohazards
- Superfund Amendments and Reauthorization Act Title III
- Resource Conservation and Recovery Act
- Safe Drinking Water Act
- Toxic Substances Control Act

The Environmental Protection Agency is the primary federal agency responsible for enforcing and implementing federal laws and regulations pertaining to hazardous materials. The California Department of Toxic Substance Control is authorized to implement the state's hazardous waste management program for the Environmental Protection Agency. The federal Environmental Protection Agency continues to regulate hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act.

State

The California Environmental Protection Agency and the State Water Resources Control Board establish rules governing the use of hazardous materials and the management of hazardous waste. Applicable state and local laws include the following:

- Public Safety/Fire Regulations/Building Codes
- Hazardous Waste Control Law
- Hazardous Substances Information and Training Act
- Air Toxics Hot Spots and Emissions Inventory Law
- Underground Storage of Hazardous Substances Act
- Porter-Cologne Water Quality Control Act

The California Department of Pesticide Regulation regulates many chemicals (including herbicides and other pesticides) under a comprehensive program that encompasses enforcement of pesticide use in agricultural and urban environments. California Department of Pesticide Regulation oversees a multi-tiered enforcement infrastructure and is vested by the Environmental Protection Agency with primary responsibility to enforce federal pesticide laws in California. California Department of Pesticide Regulation directs and oversees the County Agricultural Commissioners who carry out and enforce federal and state pesticide and environmental laws and regulations at the local level.

Businesses that handle hazardous materials in California are required to file a Hazardous Materials Business Plan. A Hazardous Materials Business Plan consists of general business information; basic information on the location, type, quantity and health risks of hazardous materials; and emergency response and training plans. In general, a Hazardous Materials Business Plan is required if a facility handles a hazardous material, or a mixture containing a hazardous material, in a quantity equal to or greater than 55 gallons[45], 500 pounds, or 200 cubic feet at any one time during the year. MRC maintains Hazardous Materials Business Plans for three areas where hazardous materials are stored: the Navarro shop, the MRC-Fort Bragg site, and the MRC-Ukiah site.

California Department of Toxic Substances Control. Within the California Environmental Protection Agency, the California Department of Toxic Substances Control has primary regulatory responsibility, with delegation of enforcement to local jurisdictions that enter into agreements with the state agency, for the management of hazardous materials and the generation, transport and disposal of hazardous waste under the authority of the Hazardous Waste Control Law Most state hazardous waste regulations are contained in Title 22 of the California Code of Regulations. Department of Toxic Substances Control generally acts as the lead agency for soil and groundwater clean-up projects, and establishes clean up and action levels for subsurface contamination that are equal to, or more restrictive than, federal levels.

Regional Water Quality Control Boards. Regional Water Quality Control Boards are authorized by the California Porter-Cologne Water Quality Act of 1969 to implement water quality protection laws. Regional Water Quality Control Boards provide oversight for sites where the quality of groundwater or surface waters is threatened, and has the authority to require investigations and remedial actions. The assessment area is within the jurisdiction of the North Coast Regional Water Quality Control Board.

Local

Mendocino County Health and Human Services Agency (Environmental Health Division). The agency responsible for local enforcement of state and federal laws controlling hazardous materials management in the assessment area is the Mendocino County Health and Human Services Agency (Environmental Health Division). This agency is the Certified Unified Program Agency for Mendocino County. The Certified Unified Program Agency program regulates underground tanks, hazardous materials (including, but not limited to, hazardous substances, hazardous waste, and any material which a handler or the Certified Unified Program Agency has reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment), and any

[45] Crankcase, hydraulic, transmission, gearbox, and differential oils may each be present or "handled" in quantities up to 55 gallons without requiring an inventory.

unauthorized release of hazardous material. In addition, the Certified Unified Program Agency program regulates medical waste and final disposal/transfer activities of solid waste.

Agricultural Commissioners. The County Agricultural Commissioner is the primary enforcer of pesticide regulations within Mendocino County for agricultural users. The Commissioner's Office oversees, monitors, and evaluates the use, records, storage and sales of pesticides in their respective county as required in the California Food and Agricultural Code, the California Code of Regulations and the Business and Professions Code. Project applicants must obtain the proper permit or other document from the Agricultural Commissioner in the event that pesticides are applied for commercial or agricultural use. One function of the pesticide permitting program is recording data on agricultural pesticide use. The pesticide use information is obtained from the *Pesticide Use Reports*, submitted monthly by growers and/or other applicators. Other functions of this program include incident and illness investigations, as well as field and headquarter inspections. Staff also provides education to the community and growers in safe pesticide application practices, including classes for continuing education hours needed by pesticide applicators to keep their applicators license valid.

Hazardous substances used in the assessment area

The types of hazardous substances used by MRC include herbicides (and adjuvants), petroleum products (e.g., gasoline, diesel fuel, motor oil) used by heavy equipment used to harvest and transport forest products, and tree-marking paint. The application of herbicides would not be covered by the incidental take authorizations or under the HCP/NCCP. MRC does not use insecticides, fungicides, rodenticides, or fertilizers during forest management activities.

Herbicides

Within the primary assessment area, herbicides are used by MRC to control competing and undesirable plant species and to maximize growth of commercially valuable tree species. Herbicides used by MRC include broad-spectrum products that do not target specific vegetation species but rather control broad-leaved and woody plants that can encroach on conifer forests. Herbicides are applied to multiple species including ceanothus (*Ceanothus* spp.), live oak (*Quercus chrysolepis*), madrone (*Arbutus menziesii*), manzanita (*Arctostaphylos* spp.), and tanoak (*Lithocarpus densiflorus*). Tanoak is the primary target of herbicide use on MRC forestlands. Once disturbed by harvest or burning, tanoak trees "stump sprout" and overtake young conifer seedlings, suppressing regeneration of the redwood and Douglas-fir forest.

Two types of herbicides are normally used: pre-emergent and post-emergent. Pre-emergent herbicides prevent or inhibit seed germination or reduce seedling survival of competing vegetation, and when applied diffuse into the soil and remain active in the immediate area of the shallow root zone. Post-emergent weed control agents kill established plants after being directly absorbed by the targeted weed and translocated to active growing sites within the plant body. These herbicides are usually applied by hand to the leaves, basal stems, injected into the cambial tissue of larger hardwoods (i.e., "hack and squirt"), or painted onto tree stumps to kill the roots and prevent resprouting. Both soil-active pre-emergent as well as foliar post-emergent chemicals may be mixed and applied together.

A list of all herbicides, active ingredients, and adjuvants used on MRC forestlands and method of application is provided in Table 3.10-1. All herbicides proposed for use are registered in the U.S. and California and have a label certifying that the Environmental Protection Agency and the California Department of Pesticide Regulation have approved the herbicide for use in forestry and/or on the targeted weed species. Product labels are legal documents whose language is determined and approved by the Environmental Protection Agency during the pesticide registration process. The Environmental Protection Agency is responsible for regulating the sale, distribution and use of herbicides under the Federal Insecticide, Fungicide, and Rodenticide Act.

Table 3.10-1. Forest chemicals and methods of application currently used by MRC as part of its forest management activities.

Chemical trade name	Application type and purpose	Active ingredient
Accord	Post-emergent; applied by hand. Used to control undesirable grasses and broadleaf species.	Glyphosate[a]
Arsenal	Post-emergent; applied by hand. Used to prepare clearcut sites for reforestation, to release conifers from competing vegetation, and to provide control of many annual and perennial weeds.	Imazapyr[a]
Chopper	Post-emergent; applied by hand. Used to control perennial broadleaf weeds.	Imazapyr[a]
Colorfast Purple (dye)	Foliar[b]; applied with Garlon 4. Used to mark pesticide applications on leaves and avoid spray overlapping.	None (dye)
Element 4	Foliar. Used to control broadleaf weeds and brush.	Triclopyr BEE
Garlon, Garlon 3A, Garlon 4	Post-emergent; applied by hand, and roadside sprayer. Used to control broadleaf weeds and brush.	Triclopyr BEE
Oust	Pre-emergent; applied to soils by hand. Used for nonselective weed control.	Sulfometuron-methyl
Polaris AC	Frill[c]. Used to control perennial broadleaf weeds.	Imazapyr[a]
Polaris SP	Foliar. Used to control perennial broadleaf weeds.	Imazapyr[a]
Razor	Foliar. Used to control undesirable grasses and broadleaf species.	Glyphosate[a]
Tahoe 4E	Foliar. Used to control broadleaf weeds and brush.	Triclopyr BEE
Methylated Oil Concentrate (adjuvant)	Foliar. Used to facilitate mixing, application, and/or effectiveness of an herbicide.	Methylated seed oil

[a] Labeled for aquatic use.
[b] Foliar refers to application of chemicals through spray equipment to plant foliage.
[c] Frill refers to applying herbicide into the cambial layer of fresh cuts on the tree trunk (hack and squirt).

MRC's use of herbicides is regulated by the Mendocino County Agricultural Commissioner and the Environmental Protection Agency. The Basin Plan water quality objective for pesticides, which include herbicides, states that "no individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. There shall be no bioaccumulation of pesticide concentrations found in bottom sediments or aquatic life. Waters designated for use as domestic or municipal supply shall not contain concentrations of pesticides in excess of the limiting concentrations set forth in California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64444.5 (Table 5), and listed in Table 3-2 of the Basin Plan" (NCRWQCB 2011).

MRC currently follows the guidelines for herbicide use in The Nature Conservancy's Weed Control Handbook (Tu et al. 2001). MRC also has its own Herbicide Spill Contingency Plan providing internal guidelines on the transport, mixing and loading, containerization and containment, security, and spill response procedures for all herbicides used on company lands. MRC's policy governing the use of herbicides is as follows (MRC 2000a):
Herbicides are only applied by ground-based equipment, either as backpack foliar applications or direct stem injection frill treatments.

- Only herbicides that are labeled for aquatic use may be applied in the following riparian buffer areas: (1) within 150 ft (46 m) of Class I streams; (2) within 100 ft (30 m) of Class II streams; (3) within 25 ft (8 m) of Class III streams (if there is any moisture present).
- Although water quality monitoring is not required by the labels or conducted by the County Agricultural Commissioner, MRC works in partnership with the North Coast Regional Water Quality Control Board to test stream water downstream from herbicide applications to determine if herbicides are present. In order to measure the anticipated worst-case (i.e., greatest) herbicide concentrations, MRC conducts annual monitoring in ephemeral streams that are discharged directly from an application unit after the first major storm event causing flow in the adjacent stream. Grab samples are collected and analyzed by a commercial laboratory using standard methods, where available.
- Neighboring landowners are notified in writing when herbicide application occurs within 300 ft (91 m) of their property line.

From 1999 through 2010 (i.e., 12-year period), herbicides have been applied to a varying number of acres per year in the primary assessment area, ranging from approximately 1,700 to 7,000 ac (688–2,833 ha) per year (Table 3.10-2). The total amount of herbicide applied during the 12-year period was 11,800 gallons, with an average annual value of 986 gallons per year. The majority of herbicide application has occurred in upland areas.

Table 3.10-2. Total annual herbicide application in the primary assessment area for the period of record (1999-2010).

Year	Acres of application	Total gallons herbicide
1999	3,368	1,317
2000	5,203	889
2001	6,779	1,036
2002	6,979	876
2003	6,621	962
2004	6,106	804
2005	6,512	1,175
2006	5,615	1,065
2007	4,811	750
2008	6,352	1,103
2009	1,721	644
2010	6,680	1,216
Total	**66,747**	**11,838**
Average annual amounts (1999–2010)	**5,562**	**986**

* Pounds of active ingredient.

Imazapyr has been the most prevalently used active ingredient over the period of record (1999–2008), constituting 74% of total herbicide application, followed by glyphosate (14%), triclopyr butoxyethyl ester (BEE) (10%), and sulfometuron-methyl (2%) (Figure 3.10-1). During 2008 (representing existing conditions), imazapyr also constituted 74% of total herbicide application, followed by triclopyr BEE (13%), sulfometuron-methyl (7%), and glyphosate (5%).

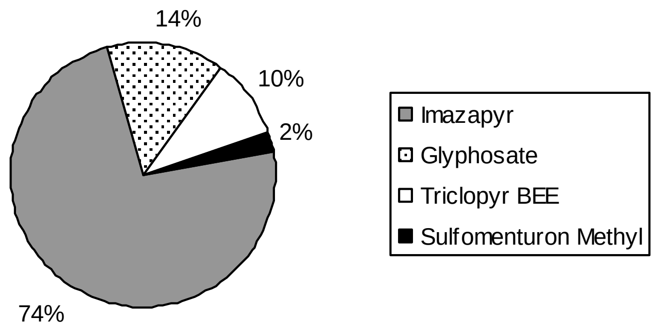


Figure 3.10-1. Percentage of total herbicide application in the primary assessment area (1999–2008) for each herbicide type. Data based on annual totals provided by MRC (2011, unpublished data).

Data collected annually from 2001 to 2011 at multiple streams in the primary assessment indicated low to non-detectable concentrations of three of the four active ingredients applied by MRC; approximately 90% of 44 stream samples had less than 0.005 mg per liter imazapyr, with 10% of stream samples ranging from 0.011–0.023 mg per liter. Of 22 triclopyr samples, 100% were less than 0.001 mg per liter, and of 8 glyphosate samples, 100% were less than 0.005 mg per liter.

3.10.1.2 Wildland fire

Introduction

Another hazard that places people and structures at risk—as well as affecting fish, wildlife, and their habitat—is wildland fire. A wildland fire is a type of wildfire that spreads through consumption of vegetation. Wildland fires often begin unnoticed, but can spread quickly, and are usually evidenced by dense smoke that may be visible from several miles. Wildfires can be caused by natural events, such as lightning. However, most wildland fires are caused by humans. Campfires, careless smokers, electrical sparks, and arson cause most wildland and wildland/urban interface fires. An emerging cause for concern is fires started by mowing and use of power equipment around very dry vegetation. Wildfire behavior is based on three primary factors: topography, fuel, and weather.

Topographic slope and aspect can affect the incidence, intensity, and spread of wildland fires. South-facing slopes are generally drier due to increased solar radiation, making them more susceptible to fire and subject to more intense wildfire behavior. In general, the rate of wildfire spread increases with slope. However, ridgetops may limit the spread of wildfire as the fire may spread slower or be unable to spread downhill.

The type and condition of vegetation plays a significant role in the occurrence and spread of wildland fires. Some plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the “fuel load”). The ratio of living to dead plant matter is also an important factor as is the fuel’s continuity, both vertically and horizontally.

Slash fuels, especially those created by timber harvest operations, may be arranged in various spatial configurations, resulting in increased levels of fire risk. Dry, compacted logging slash, created by tractor logging and separated by relatively clean skid trails, can be expected to burn intensely once ignited, but the fires may spread slowly and somewhat sporadically from slash pile to slash pile. Timber harvest activity can also contribute to creation of fuel "ladders" to the forest canopy, which could result in forest crown fires.

Weather is the most variable factor affecting wildland fire behavior. Temperature, humidity, wind, and lightning all affect chances for ignition and spread of fire. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildland fire activity. The risk of fire is increased substantially during periods of prolonged drought as the moisture content of both living and dead plant matter decreases. The frequency and severity of wildland fires is also dependent on other hazards, such as lightning, drought, and disease or pest infestations.

Wildland fire season in Mendocino County spans the months from when the last spring rains have fallen until the first fall or winter rains occur, although extended dry periods during other parts of the year may enable wildland fires. While the 2008 fires on the covered lands occurred in late June, typically the months of August, September, and October have the greatest potential for wildland fires as vegetation dries out, humidity levels fall, and offshore winds blow. The western portion of the county is heavily influenced by the Pacific Ocean, and the summer fire hazard is mitigated by the summer fog. However, during the periods of dry offshore winds that occur each fall, the coastal areas can become an extreme fire hazard.

Local fire history

In Mendocino County, CAL FIRE and the U.S. Department of Agriculture Forest Service responded to over 263 wildland fires in the county between 1922 and 2008. CAL FIRE maps areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. These zones, referred to as Fire Hazard Severity Zones, define the application of various mitigation strategies to reduce risk associated with the ignition and control of wildland fires. Based on previous wildland fire occurrences, Mendocino County can expect a wildland fire of over 500 ac (202 ha) to occur about every 2.5 years (URS Corporation 2007).

3.10.2 Environmental effects and mitigation

Hazards and hazardous material effects are considered significant if the alternatives would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment.
- Be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, where the project would result in a safety hazard for people residing or working in the project area.

- Be located within the vicinity of a private airstrip, where the project would result in a safety hazard for people residing or working in the project area.
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
- Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.
- Result in detrimental effects on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern due to application of herbicides.

There are airstrips located within the primary assessment area in the Garcia Tract (Lofty Redwoods Airport), within 1 mi (1.6 km) of the ownership in the Albion Tract (Mendocino County Airport or Little River Airport), and near Marsh Gulch in the Lower Navarro Tract. Only the Lofty Redwoods and Mendocino County airports are in active use. In addition, the Comptche Elementary School is in the vicinity of the primary assessment area. MRC's forest management activities would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school or result in a safety hazard for people residing or working in the project area around the active airports. Therefore, it is anticipated that no effects on these receptors would occur under the No Action alternative or the action alternatives due to storage and use of hazardous substances by MRC. MRC's timber management and harvesting activities would not occur on a hazardous materials site. Implementing the alternatives would not impair or interfere with an emergency response or evacuation plan. These issues, therefore, are not analyzed in detail in this EIS/PTEIR.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.10.2.7.

3.10.2.1 Analysis approach and methodology

The types of hazardous substances used by MRC include herbicides (and associated surfactants/adjuvants/breakdown products), petroleum products (e.g., gasoline, diesel fuel, motor oil, hydraulic fluids) used by heavy equipment that harvest and transport forest products, and tree paint used for marking trees.

Herbicides

The use of herbicides is not an activity covered by the USFWS, NMFS, or CDFG under the requested incidental take authorizations or any of the alternatives analyzed in this EIS/PTEIR. However, herbicide use is a reasonably foreseeable forest management activity that may take place in association with timber operations approved by CAL FIRE under MRC's future PTHPs. Herbicides are used by MRC both to restore the conifer balance to hardwoods and control invasive plants. In addition, herbicide use is described in MRC's TMP (Appendix A), which serves as the project description for purposes of the PTEIR. Thus, to meet CEQA requirements, the effects of herbicide application on the environment are analyzed in this PTEIR. This analysis assesses the environmental effects of herbicides and associated surfactants and adjuvants (and their breakdown products) that MRC may use in the management of its timberlands on water quality and species that could be negatively affected by these products.

The effects of herbicides and/or adjuvants in the primary assessment area under each of the alternatives are assessed by considering application method, frequency, type of herbicide or adjuvant, amount applied, buffer widths and location of application (i.e., uplands, riparian buffers, roadsides), toxicity and bioaccumulation potential, and consideration of MRC's approach to herbicide transport (i.e., pursuant to label specifications and agency guidelines). Because no additional information is available regarding future herbicide application method, frequency, and type of herbicide, existing conditions are assumed to apply throughout the 80-year period of analysis and within the secondary assessment area. This is a conservative estimate (i.e., an overestimate) as MRC strives to reduce and ultimately eliminate the use of herbicides over time (MRC 2012). The amount of herbicide applied is estimated by decade using silviculture method, acres harvested, and herbicide application rates (gallons per acre) for triclopyr and imazypyr in upland stands (see Appendix T for additional detail). MRC does not currently use herbicides in riparian buffer zones. Buffer widths and location of herbicide application (i.e., uplands, riparian buffers, roadsides) are considered qualitatively in a manner similar to that used in Section 3.3 (Hydrology, Beneficial Uses of Water, and Water Quality) for the peak flows analysis.

Toxicity and bioaccumulation potential of herbicides and/or adjuvants on multiple species in the assessment area are determined using the results of the Environmental Protection Agency's risk assessment process for each of the herbicides used by MRC. The Environmental Protection Agency, as part of the Endangered Species Protection Program and in compliance with the Federal Insecticide, Fungicide, and Rodenticide Act and the ESA, determines whether pesticide use in a certain geographic area may affect listed species. In this capacity, the Environmental Protection Agency reviews information and data to determine whether a pesticide product may be registered for a particular use and assesses whether listed endangered or threatened species or their designated critical habitat may be affected by use of the product. Effects determinations are based in part on the results of a suite of standardized acute and chronic toxicity tests typically performed on broad taxonomic groups of organisms (i.e., birds, mammals, freshwater fish, freshwater invertebrates, estuarine/marine fish, estuarine/marine invertebrates, terrestrial plants, and algae and aquatic plants). Acute and chronic endpoints for the toxicity tests are generally selected based on the most sensitive species tested within the organism group and provide a concentration or dose at which the laboratory test organisms are significantly affected. A common toxicity test metric is the "LC_{50}", or lethal concentration at which half of the test organisms are killed; LC_{50} values are reported for a particular exposure time (e.g., 96 hours). Toxicity categories, which are qualitative descriptors of acute toxicity to test organisms, have been adopted by the Environmental Protection Agency for fish and aquatic invertebrates based on Zucker (1985) (Table 3.10-3), and for birds, mammals, and terrestrial invertebrates based on EPA (2004a) (Table 3.10-4). Toxicity categories for terrestrial plants and algae have not been defined.

For purposes of this analysis it is assumed that the application of an herbicide directly to a terrestrial plant would cause mortality or substantial impairment of essential life functions (e.g., reproduction). Although MRC does not and would not under any alternative knowingly apply herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, or plant species of concern, unintentional application of herbicides could occur in areas where these resources are undetected (i.e., surveys have not been performed).

Table 3.10-3. Toxicity categories for fish and aquatic invertebrates. Source: Zucker (1985).

LC_{50}[a] or EC_{50}[b]	Toxicity category
< 0.1 ppm	Very highly toxic
0.1–1 ppm	Highly toxic
> 1 < 10 ppm	Moderately toxic
> 10 < 100 ppm	Slightly toxic
> 100 ppm	Practically non-toxic

[a] LC_{50} is defined as the lethal concentration at which half of the test organisms are killed.
[b] EC_{50} is defined as the concentration of a chemical where 50% of its maximal effect is observed.
ppm = parts per million

Table 3.10-4. Toxicity categories for birds, mammals, and terrestrial invertebrates. Source: EPA (2004a).

Oral LD_{50}[a] (mg/kg)	Dietary LC_{50}[b] (ppm)	Toxicity category
< 10	< 50	Very highly toxic
10–50	50–500	Highly toxic
51–500	501–1,000	Moderately toxic
501–2,000	1,001–5,000	Slightly toxic
> 2,000	> 5,000	Practically non-toxic

[a] LD_{50} is defined as the lethal dose at which half of the test organisms are killed. LD_{50} measurement is usually expressed as the mass of toxin per kilogram or pound of body weight.
[b] LC_{50} is defined as the lethal concentration at which half of the test organisms are killed.
ppm = parts per million

Sub-lethal effects (e.g., reproductive activities, feeding behavior, metabolism, etc.) can also be reported for chronic test conditions, where exposure times are longer and the concentrations of chemicals used in the tests are typically lower.

For each of the herbicides used by MRC, a summary of available toxicity and bioaccumulation potential is provided below. This information is referenced in the effects analyses.

Imazapyr

Imazapyr is the active ingredient in Arsenal, Chopper, Polaris AC, and Polaris SP (Table 3.10-1). Imazapyr is relatively mobile in the environment since it is readily transported through soil leaching and surface runoff (EPA 2007). Primary degradation products of imazapyr are pyridine hydroxy-dicarboxylic acid and pyridine dicarboxylic acid.

A substantial amount of testing of imazapyr products has been conducted by the Environmental Protection Agency to evaluate its potential toxicity to non-target organisms. Based on the results from a variety of standardized toxicity and bioaccumulation tests, imazapyr is practically non-toxic to fish, including listed salmonids, and aquatic invertebrates. Standard 96-hour exposure studies indicated low toxicity to rainbow trout, bluegill sunfish, channel catfish, and water flea (*Daphnia magna*) (EPA 2003, WSDA 2003). Tests for sub-lethal effects revealed no effects on hatching or survival in rainbow trout with concentrations up to 92 and 118 mg per liter (WSDA 2003). Bioaccumulation of imazapyr in aquatic invertebrates is also low; therefore the potential for exposure through ingestion of exposed organisms is expected to be low (WSDA 2003). Direct acute and chronic risks to birds and mammals consuming food types containing imazapyr residues are not expected from the labeled uses of the herbicide (EPA 2007). Imazapyr was found to be practically non-toxic to Northern bobwhite quail (*Colinus virginianus*), mallard duck (*Anas platyrhynchos*), rabbit (New Zealand white), and rat (Sprague-Dawley) for both acute and chronic tests (EPA 2007). No direct acute or chronic toxicity data is available for amphibians; the Environmental Protection Agency used fish toxicity data as a surrogate for aquatic stage California red-legged frog (*Rana draytonii*) and bird data as a surrogate for terrestrial stage California red-legged frog. Based on their analysis, the Environmental Protection Agency determined that the only potential effect on California red-legged frog through the use of imazypyr is an indirect effect upon critical habitat via reduction of food (aquatic plants), habitat, and/or primary productivity (EPA 2007).

Glyphosate

Glyphosate is the active ingredient in Accord and Razor (Table 3.10-1). Glyphosate is immobile in the soil and is rendered inactive over a period of several weeks through microbial degradation (Norris et al. 1991). Its primary degradation product is aminomethylphosphonic acid.

Based on standard 96-hour exposure studies, technical grade glyphosate and its salts are practically non-toxic or slightly toxic to fish and aquatic invertebrates. Exposure tests indicated low toxicity to rainbow trout, bluegill sunfish, fathead minnow, channel catfish, midge (*Chironomus plumosus*), and water flea (EPA 2004a, 2008a; WSDA 2003). Technical grade glyphosate and its salts are considered relatively non-toxic to fish and one of the forest herbicides least likely to have sublethal effects (NMFS 2003). The potential for the compound to build up (i.e., bioaccumulate) in the tissues of aquatic organisms is very low (Extoxnet 1996). Technical grade glyphosate, its salts, and multiple formulations are considered practically non-toxic or slightly toxic to amphibians, birds, and mammals. Exposure studies indicated slight to practically no toxicity to Australian tree frog (*Litoria moorei*), green frog (*Rana clamitans*), Northern bobwhite quail, mallard duck, and rat (*Rattus norvegicus*) for both acute and chronic tests (EPA 2008a). Aminomethyl phosphoric acid, the primary breakdown product, is considered practically nontoxic to birds (EPA 2008a). Glyphosate IPA (Roundup) and other formulations with the surfactant polyoxy ethylene fatty amine are moderately to highly toxic to fish and moderately toxic to numerous amphibian species (EPA 2004a, 2008a). The Enviromental Protection Agency has determined that glyphosate use may affect and is likely to directly adversely affect California red-legged frog (based on effects on terrestrial phase California red-legged frog) and indirectly affect its habitat and prey items due to the compounds' effects on vascular plants and small, terrestrial organisms (EPA 2008a).

Triclopyr BEE

Triclopyr BEE is the active ingredient in Element 4, Garlon, Garlon 3A, Garlon 4, and Tahoe 4E (Table 3.10-1). Triclopyr BEE rapidly degrades to triclopyr acid; in natural waters (pH 6.7) the triclopyr BEE half-life has been reported as 0.5 days, and when applied to silty clay loam, silt loam, and sandy loam soils the half-life has been reported as 3 hours (EPA 2009). In aquatic environments, photodegradation products of the triclopyr acid include 5-chloro-3,6 dihydroxy-2-pyridinoloxyacetic acid (TCP) and oxamic acid. In soils, breakdown products include TCP and 3,5,6 trichloro-2-methoxypyridine, which are formed through microbial metabolism (EPA 2009).

Triclopyr BEE is highly toxic to rainbow trout, with median lethal concentrations (LC_{50}) occurring at 0.74 mg per liter (EPA 2003, 2004b, 2008b, Ganapathy 1997, Norris et al. 1991). Triclopyr BEE dissipates relatively rapidly in the soil through microbial activity and photo decomposition (see above half-life for soils). In soils with high organic matter, such as would be found on MRC's timberlands, this dissipation appears to occur much more rapidly (Norris et al.

1991). McKellar et al. (1982) and Norris et al. (1991) found that water concentrations of triclopyr following heavy treatment in small, forested watersheds (11.2 kg/ha) ranged from non-detectable to 0.02 mg per liter. Lee et al. (1986) and Norris et al. (1991) concluded that there is little likelihood that triclopyr would leach from adjacent forest applications into water. Both triclopyr acid and TCP breakdown products are more persistent and mobile in the environment than triclopyr BEE; the Environmental Protection Agency has determined that these degradates are likely to be transported to surface waters (EPA 2009). However, in a recent preliminary analysis NMFS found that the use of triclopyr BEE (and its breakdown products): (1) poses only a low potential to reduce reproduction, numbers, or distribution of Chinook salmon in the California Coastal Evolutionarily Significant Unit, coho salmon in the California Central Coast and Southern Oregon/Northern California Coast Evolutionarily Significant Units, and steelhead in the Northern California Distinct Population Segment, and (2) would not appreciably reduce the conservation value of critical habitat for these species (NMFS 2011). NMFS also determined its use poses a medium potential[46] to reduce reproduction, numbers, or distribution of steelhead in the Central California Coast Distinct Population Segment, and would not appreciably reduce the conservation value of critical habitat for this species (NMFS 2011).

Triclopyr BEE is considered slightly toxic to practically non-toxic to birds and mammals. Exposure studies indicated slight to practically no toxicity to Northern bobwhite quail, mallard duck, and rat for both acute and chronic tests (EPA 2009). Using fish and bird data as a surrogate for amphibian effects, the Environmental Protection Agency has determined that triclopyr BEE may affect and is likely to directly adversely affect the terrestrial phase of California red-legged frog and indirectly affect its terrestrial habitat and prey items due to the compound's effects on vascular plants and small, terrestrial organisms (EPA 2009). Limited data on the toxicity of TCP are available, but values presented in the California red-legged frog assessment show TCP to be less toxic than the triclopyr BEE on an acute basis (EPA 2009).

Sulfometuron-methyl

Sulfometuron-methyl is the active ingredient in "Oust." The following information is summarized from the California Department of Pesticide Regulation's document (CDPR n.d.) summarizing the environmental fate of sulfometuron-methyl. Sulfometuron-methyl hydrolyzes quickly in water and forms a variety of degradation products, including saccharine and 2-(aminosulfonyl) benzoic acid (EPA 2003).

Sulfometuron-methyl is slightly toxic to fish and aquatic invertebrates (EPA 2003). Its LC_{50} in adult rainbow trout is greater than 12.5 mg per liter. Sulfometuron-methyl exhibits low acute and chronic toxicity to aquatic animals, including rainbow trout, bluegill sunfish, channel catfish, and waterflea (EPA 2003). Little specific information is available on the potential sublethal effects of the compound (NMFS 2003), although the water flea mentioned above is often regarded as a sensitive indicator to toxic substances (Odell 1999).

Adjuvants

Methylated seed oil is an adjuvant used by MRC to improve the emulsifying, dispersing, spreading, wetting, or other surface modifying properties of liquid herbicides. For methylated seed oils, a LC_{50} value of 53.1 mg per liter was reported (NMFS 2003). This LC_{50} is 1,000 to

[46] Medium potential means that use of this chemical as registered: (1) might kill fish, but not very often, (2) would not disrupt fish life cycle functions, and (3) would only result in minor reductions in reproduction, prey availability, primary production, or cover (NMFS 2011).

10,000 times greater than concentrations that are likely to occur in streams in the assessment area due to herbicide application, indicating that toxicity effects from adjuvants would not occur under any of the alternatives.

Petroleum products

MRC would also continue to use petroleum products in equipment used to harvest and transport forest products, and tree paint used for marking trees. These products are used primarily in upland areas and because timber operations are relatively constrained in streamside areas (e.g., Watercourse and Lake Protection Zones) under the CFPRs (14 CCR §916.9), there is little chance of these chemicals reaching streams in amounts deleterious to aquatic organisms. The exception could be the use of heavy equipment at stream crossings. Most stream crossing work requires that CDFG be notified under Section 1600 of the California Fish and Game code. For stream crossing work that requires a streambed alteration agreement, the Master Agreement for Timber Operations would include measures to avoid contamination of streams during these activities. It is assumed that these protective measures would avoid any adverse effects associated with the use of petroleum products in equipment used during MRC's forest management activities.

Wildland fire

MRC forestlands are located entirely within CAL FIRE's State Responsibility Area. CAL FIRE maintains responsibility for emergency services in this area. MRC policy is to provide support and coordination with CAL FIRE during emergency operations on its forestlands. The analysis assumes that CAL FIRE would continue to maintain responsibility for emergency services in the event of wildfire and that MRC would serve in a reporting and support role. The results of management activities that substantially alter the risk of wildfire or could affect the incidence and/or severity of wildfire under the various alternatives are described below where applicable

3.10.2.2 No Action alternative

Hazardous substances

Under the No Action alternative, a number of herbicides and adjuvants would continue to be used by MRC, under regulation by the California Department of Agriculture and by the Environmental Protection Agency. MRC would continue to follow all California Department of Agriculture and Environmental Protection Agency regulations for use of forest chemicals. MRC would also continue to maintain and update its Herbicide Spill Contingency Plan. The application of forest chemicals by MRC or its representatives is regulated by the California Department of Agriculture and by the Environmental Protection Agency and is subject to the requirements of all applicable federal and state laws, as well as the prohibitions against take of listed species pursuant to Section 9 of the ESA (Section 1.6, Regulatory contect). Protective measures for the use of heavy equipment and tree paint in forest management activities would avoid any adverse effects associated with the use of petroleum products in equipment used during MRC's forest management activities (Section 3.10.2.1).

Under the No Action alternative, there would be little to no change in the application method, frequency, and type of herbicide and adjuvant for control of vegetation compared with existing conditions. Compared with herbicide use under existing conditions (i.e., annual average of 986 gallons per year [see Table 3.10-2] or 9,860 gallons per decade), the amount of herbicide use under the No Action alternative would be less in the first decade but would increase to levels greater than existing conditions use for decades 2 through 8. Decade 3 would experience a relative decrease in herbicide use following larger increases in decades 2 and 4 through 8 (Figure 3.10-2). For the period of analysis, the total amount of herbicide applied would be the greatest under the No Action alternative, at approximately 101,900 gallons (Table 3.10-5). Under the No

Action alternative, it is assumed that herbicide application would continue to occur in upland areas only; MRC does not currently use herbicides in riparian buffer zones. As discussed in Section 3.3.2 (Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation), the variability in implemented buffer widths between the No Action alternative and existing conditions means that large differences in potential for toxic compounds to reach fish and aquatic invertebrates would not be expected to occur relative to existing conditions under the No Action alternative. The limited operational restrictions in the Watercourse and Lake Protection Zones under the No Action alternative may slightly increase the potential for toxic compounds to reach the stream channel; however, the effects would likely be small. Since the length of the road and skid trail network under the No Action alternative are not expected to change from existing conditions (Section 3.2.2; Geology, Soils, and Geomorphology; Environmental effects and mitigation), roadside application of triclopyr BEE (as Garlon formulations) would not change.

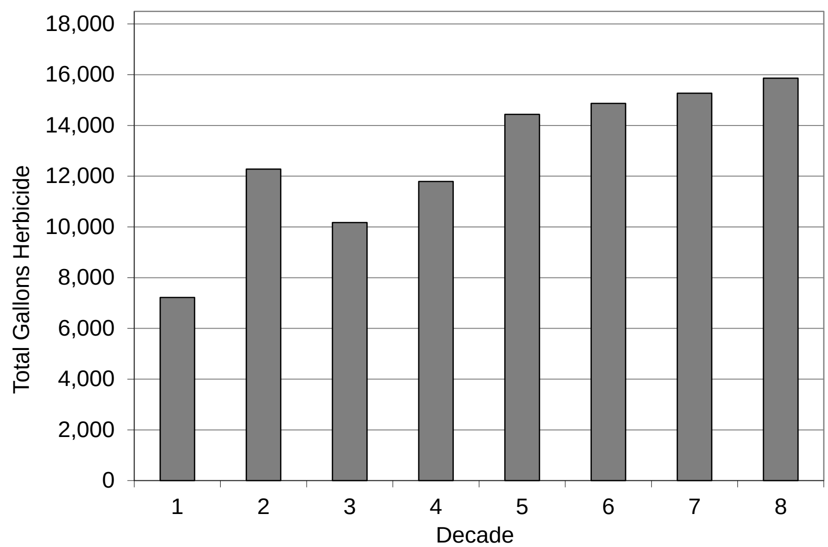


Figure 3.10-2. Total gallons of herbicide applied to the assessment area for the No Action alternative. Data based on gallons per acre of triclopyr and amazapyr applied for each decade, provided by MRC (2011, unpublished data).

Table 3.10-5. Total gallons of herbicide applied to assessment area for the alternatives. Data based on gallons per acre of triclopyr and amazapyr applied for each decade, provided by MRC (2011, unpublished data).

Decade	No Action alternative	Proposed Action	Alternative A	Alternative B	Alternative C
1	7,221	12,634	12,594	9,336	12,594
2	12,280	10,872	10,491	7,608	10,491
3	10,171	7,759	7,516	18,349	7,516
4	11,791	7,864	7,465	11,521	7,465
5	14,436	8,215	7,981	15,604	–
6	14,869	8,122	7,694	8,594	–
7	15,270	8,596	8,246	16,257	–
8	15,865	8,234	7,851	14,032	–
Total	**101,902**	**72,297**	**69,840**	**101,301**	**38,067**

Based on fish, aquatic invertebrate, amphibian, bird, and mammal toxicity information for imazapyr, glyphosate, triclopyr BEE, and sulfometuron-methyl, mortality (acute) or changes in reproductive success (chronic) are not expected from MRC's use of these herbicides for fish, aquatic invertebrates, and amphibian species of concern or avian and mammal species of concern in the primary assessment area. There is insufficient information to determine potential effects on reptile species of concern (i.e., Pacific pond turtle) and insect species of concern (i.e, Behren's silverspot butterfly, lotis blue butterfly). While toxicity data for fish and numerous amphibian species indicate moderate to high toxicity of glyphosate IPA (Roundup) and other formulations with the surfactant polyoxy ethylene fatty amine, these formulations are not allowed for aquatic use in California and are not used by MRC. Further, while triclopyr BEE can be acutely toxic to rainbow trout (Section 3.10.1), the low soil mobility of this herbicide and the lack of use of herbicides in riparian buffers means that salmonids in the primary assessment area are unlikely to be exposed to toxic concentrations. Although the potential for direct and/or indirect effects on California red-legged frog have been identified for imazapyr, glyphosate, and triclopyr BEE, they are not expected under the No Action alternative due to the lack of use in riparian buffers, and the use of solely ground-based application methods (i.e., no aerial spraying) for all of these active ingredients (Table 3.10-1). Based on available information, imazapyr, glyphosate and sulfometuron-methyl show little tendency to bioaccumulate and do not have long-term persistence in food chains.

Although the amount of herbicide use would increase under the No Action alternative, review of herbicide and/or adjuvant application method, frequency, toxicity, and bioaccumulation potential, and consideration of MRC's approach to herbicide transport (i.e., pursuant to label specifications and agency guidelines) indicates that there is a low likelihood of toxicity or bioaccumulation in fish, aquatic invertebrates, amphibians, or birds and mammals in the primary assessment area. Under the No Action alternative, herbicide application would continue to be regulated by the State Department of Agriculture and by the Environmental Protection Agency. Therefore, effects on these species due to application of forest chemicals under the No Action alternative would be **less than significant**.

Impact 3.10-1. Effects on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern due to application of herbicides. Because total herbicide use under the No Action alternative would increase as compared with existing conditions, there is an increased likelihood of direct application of herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern in areas where these resources are undetected (i.e., surveys have not been performed). This is especially likely during activities such as application of herbicides along roadsides in order to control invasive plant species, since these activities are not subject to survey requirements under CEQA. Direct application of herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern could result in death of individuals and/or degradation of a population or community. Therefore, effects on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern due to application of forest chemicals under the No Action alternative would be **potentially significant.**

Wildland fire

MRC's response to wildfire would follow its current (2011) Fire Suppression Plan or updates to this plan in the future. MRC is committed to fire prevention, fire planning, and fire suppression across its forestlands. MRC would actively work to suppress any uncontrolled fire on its forestlands using appropriate resources and would work with the CAL FIRE in all suppression efforts.

The Fire Suppression Plan contains fire prevention procedures that specify the general requirements for both contractors and employees. These fire prevention procedures, in total, provide the best likelihood of preventing fires and also preparedness for containing the spread of uncontrolled fire. Therefore, effects due to wildfire under the No Action alternative would be **less than significant**.

3.10.2.3 Proposed Action

The application of herbicides would not be a covered activity under the federal or state incidental take authorizations. Under the Proposed Action, a number of herbicides and adjuvants would continue to be used by MRC, under regulation by the California Department of Agriculture and by the Environmental Protection Agency. MRC would continue to follow all California Department of Agriculture and Environmental Protection Agency regulations for use of forest chemicals. MRC would also continue to maintain and update its Herbicide Spill Contingency Plan.

Hazardous substances

Under the Proposed Action, there would be little to no change in the application method, frequency, and type of herbicide and adjuvant for control of vegetation as compared with existing conditions and the No Action alternative. Compared with herbicide use under existing conditions (i.e., annual average of 986 gallons per year [see Table 3.10-2] or 9,860 gallons per decade), the amount of herbicide use under the Proposed Action would be greater in the first two decades but would decrease and remain relatively steady at lower levels for decades 3–8 (Figure 3.10-3). For the period of analysis, the total amount of herbicide applied would be considerably less under the Proposed Action (approximately 72,300 gallons) than the No Action alternative (approximately 101,900 gallons) (Table 3.10-5) and slightly less compared with existing conditions (78,900 gallons extrapolated across 80 years). For all alternatives, it is assumed that herbicide application would continue to occur in upland areas only; MRC does not currently use herbicides in riparian buffer zones. As discussed in Section 3.3.2 (Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation), overall there would be small differences in typical Aquatic Management Zone widths between the Proposed Action and existing conditions. While this may reduce hydrologic connectivity between upland areas and streams in the primary assessment area and decrease the potential for toxic compounds to reach fish and aquatic invertebrates relative to existing conditions, the effect would likely be small. Additional operational restrictions in the Aquatic Management Zone under the Proposed Action may also result in small reductions in the potential for toxic compounds to reach the stream channel.

In the first decade after implementing the Proposed Action, approximately 45 mi (72 km) of roads would be decommissioned and 65 mi (105 km) of new roads would be constructed (Section 3.2 [Geology, Soils, and Geomorphology], Table 3.2-15), which may result in higher total rates of roadside triclopyr BEE (as Garlon formulations) application. However, since few roads (3 mi [5 km]) would be constructed and many more roads (32 mi [51 km]) would be decommissioned within Class I or large Class II Aquatic Management Zones (an additional 5 mi [8 km] would be decommissioned within Small Class II and Class III streams), transport of high concentrations of triclopyr BEE to streams within the primary assessment area is unlikely. MRC anticipates completing most of the changes to its road network (including decommissioning and new road construction) within the first 20–40 years and does not specify in the HCP/NCCP how the road network would change after the first decade (Section 3.2; Geology, Soils, and Geomorphology).

For purposes of analysis in this EIS/PTEIR, it is assumed that changes to the road network in the primary assessment area in subsequent decades, after the aforementioned changes in the first decade are complete, would be relatively minor and would not affect the analysis presented here.

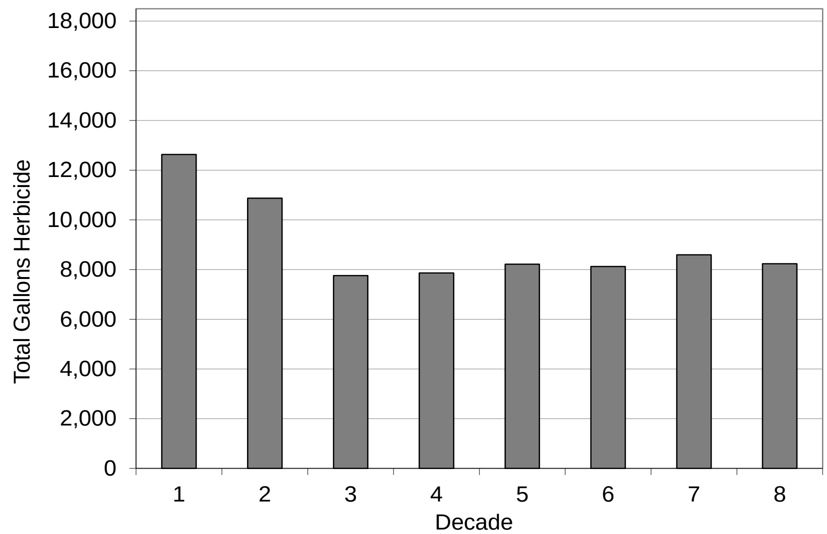


Figure 3.10-3. Total gallons of herbicide applied to the assessment area for the Proposed Action. Data based on gallons per acre of triclopyr and amazapyr applied by silviculture type and summed for each decade, provided by MRC (2011, unpublished data).

Based on overall herbicide use, toxicity and bioaccumulation potential for species of concern (Section 3.4, Aquatic and Riparian Habitats and Species of Concern) under the Proposed Action would be greater in the first two decades but would decrease and remain lower for decades 3–8 compared with existing conditions and the No Action alternative, and would be slightly less compared with existing conditions levels for the entire analysis period (approximately 72,300 gallons under the Proposed Action versus 78,900 gallons under existing conditions). In addition, as discussed under the No Action alternative, the type of herbicides used and the lack of application in riparian buffer zones indicate that the potential for toxicity and bioaccumulation for species of concern is low.

Overall, effects on species of concern due to application of forest chemicals under the Proposed Action would be **less than significant**. There is insufficient information to determine potential effects on reptile species of concern (i.e., Pacific pond turtle) and insect species of concern (i.e., Behren's silverspot butterfly, lotis blue butterfly).

Total herbicide use under the Proposed Action would decrease in decades 3–8 of the analysis period as compared with existing conditions, and overall use would be slightly less compared with existing levels. Where herbicides are applied in areas that have not been surveyed, there may be mortality of individuals that are part of a California Natural Diversity Database Special Community Type or Habitat Element, or an individual that is a plant species of concern. However, because (1) the amount of herbicide use over the 80-year analysis period would be less than under existing conditions and the No Action alternative, (2) covered plants have a greater likelihood of being detected given the survey protocols defined in the HCP/NCCP, and (3) there are potential beneficial effects on covered plants where herbicides are utilized to manage species competing directly with covered plants, effects on covered plant species of concern due to application of forest chemicals under the Proposed Action would be **less than significant**.

Impact 3.10-2. Effects on California Natural Diversity Database Special Community Types, Habitat Elements and non-covered plant species of concern due to application of herbicides. Despite the fact that total herbicide use under the Proposed Action would decrease as compared with existing conditions, relative to covered plant species of concern there is an increased likelihood of direct application of herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern in areas where these resources are undetected (i.e., surveys have not been performed). Direct application of herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern could result in death of individuals and/or degradation of a population or community. Therefore, effects on California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern due to application of forest chemicals under the Proposed Action would be **potentially significant.**

Mitigation Measure 3.10-1. Perform surveys, according to CDFG's guidelines (CDFG 2005b) and protocols (CDFG 2009c), for all California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern in the management area prior to herbicide application. If California Natural Diversity Database Special Community Types, Habitat Elements, or a non-covered plant species of concern is detected, MRC would consult with CDFG to develop feasible site-specific mitigation measures to assure that potentially significant project impacts (14 CCR §15382) would be avoided for all California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern. With implementation of this mitigation measure there would be **less than significant effects** on all California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern under the Proposed Action.

Wildland fire

Under the Proposed Action, wildland fire suppression would not be a covered activity. As is the case under the No Action alternative, MRC would follow its Fire Suppression Plan as described under the No Action alternative. Therefore, effects due to wildfire under the Proposed Action would be **less than signficant**.

3.10.2.4 Alternative A

The application of herbicides would not be a covered activity under the incidental take authorizations or the HCP/NCCP. Under Alternative A, a number of herbicides and adjuvants would continue to be used by MRC, under regulation by the California Department of Agriculture and by the Environmental Protection Agency. MRC would continue to follow all California Department of Agriculture and Environmental Protection Agency regulations for use of forest chemicals. MRC would also continue to maintain and update its Herbicide Spill Contingency Plan.

Hazardous substances

Under Alternative A, there would be little to no change in the application method, frequency, and type of herbicides and adjuvants used for control of vegetation as compared with existing conditions and the No Action alternative. Compared with herbicide use under existing conditions (i.e., annual average of 986 gallons per year [see Table 3.10-2] or 9,860 gallons per decade), the amount of herbicide use under Alternative A would be greater during decades 1 and 2 but would decrease and remain relatively steady at lower levels for decades 3–8 (Figure 3.10-4). Herbicide use under Alternative A is slightly less than that under the Proposed Action for each decade, such that the total amount of herbicide applied for the analysis period as a whole would be slightly less under Alternative A (approximately 69,800 gallons) than under the Proposed Action (approximately 72,300 gallons) (Table 3.10-5). For all alternatives, it is assumed that herbicide application would continue to occur in upland areas only; MRC does not currently use herbicides in riparian buffer zones. As discussed in Section 3.3.2 (Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation), overall there would be small differences in typical Aquatic Management Zone widths between Alternative A and existing conditions. While this may reduce hydrologic connectivity between upland areas and streams in the primary assessment area and decrease the potential for toxic compounds to reach fish and aquatic invertebrates relative to existing conditions, the effect would likely be small. Additional operational restrictions in the Aquatic Management Zone under Alternative A may also result in small reductions in the potential for toxic compounds to reach the stream channel. The effects of road building and removal on application of triclopyr BEE (or another roadside herbicide) cannot be determined because the location, type, and length of roads to be removed and the timing of road building and removal under Alternative A have not been defined (Section 3.2.2, Geology, Soils, and Geomorphology; Environmental effects and mitigation).

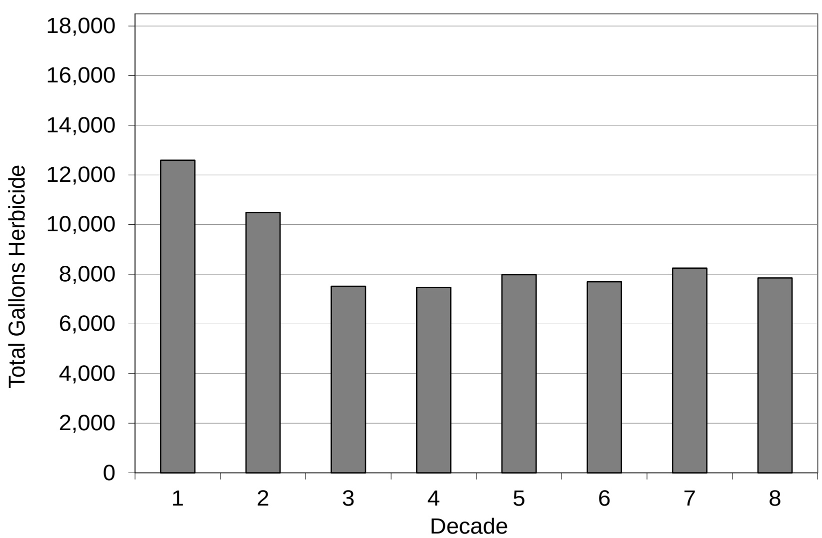


Figure 3.10-4. Total gallons of herbicide applied to the assessment area for Alternative A. Data based on gallons per acre of triclopyr and amazapyr applied by silviculture type and summed for each decade, provided by MRC (2011, unpublished data).

Based on overall herbicide use, toxicity and bioaccumulation potential for species of concern under Alternative A would be greater in the first two decades but would decrease and remain lower for decades 3–8 compared with existing conditions and the No Action alternative, and would be slightly less compared with existing conditions levels for the entire analysis period (approximately 69,800 gallons under Alternative A versus 78,900 gallons under existing conditions). In addition, as discussed under the No Action alternative, the type of herbicides used and the lack of application in riparian buffer zones means that the potential for toxicity and bioaccumulation potential for species of concern is low.

Overall, effects on these species due to application of forest chemicals under Alternative A would be **less than significant**. There is insufficient information to determine potential effects on reptile species of concern (i.e., Pacific pond turtle) and insect species of concern (i.e., Behren's silverspot butterfly, lotis blue butterfly).

Where herbicides are applied in areas that have not been surveyed for plants, there may be mortality of individuals that are part of a California Natural Diversity Database Special Community Type or Habitat Element, or an individual that is a plant species of concern. However, because (1) the amount of herbicide use over the 80-year analysis period would be less than under existing conditions and the No Action alternative, (2) covered plants have a greater likelihood of being detected given the survey protocols defined in the HCP/NCCP, and (3) there are potential beneficial effects on covered plants where herbicides are utilized to manage species competing directly with covered plants, effects on covered plant species of concern due to application of forest chemicals under the No Action alternative would be **less than significant**.

Impact 3.10-3. Effects on California Natural Diversity Database Special Community Types, Habitat Elements and non-covered plant species of concern due to application of herbicides. Despite the fact that total herbicide use under Alternative A would decrease as compared with existing conditions, relative to covered plant species of concern there is an increased likelihood of direct application of herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern in areas where these resources are undetected (i.e., surveys have not been performed). Direct application of herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern could result in death of individuals and/or degradation of a population or community. Therefore, effects on California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern due to application of forest chemicals under Alternative A would be **potentially significant.**

Mitigation Measure 3.10-1. Perform surveys, according to CDFG's guidelines (CDFG 2005b) and protocols (CDFG 2009c), for all California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern in the management area prior to herbicide application. If California Natural Diversity Database Special Community Types, Habitat Elements, or a non-covered plant species of concern is detected, MRC would consult with CDFG to develop feasible site-specific mitigation measures to assure that potentially significant project impacts (14 CCR §15382) would be avoided for all California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern. With implementation of this mitigation measure there would be **less than significant** effects on all California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern under Alternative A.

Wildland fire

Under Alternative A, harvesting and management activities would be the same as the Proposed Action, with additional measures to enhance conservation of key aquatic and terrestrial habitats. The risk of wildfire under Alternative A would be similar to existing conditions and MRC's response to wildfire would follow its Fire Suppression Plan as under the No Action alternative. Therefore, effects due to wildfire under Alternative A would be **less than significant**.

3.10.2.5 Alternative B

The application of herbicides would not be a covered activity under the incidental take authorizations. Under Alternative B, a number of herbicides and adjuvants would continue to be used by MRC, under regulation by the California Department of Agriculture and by the Environmental Protection Agency. MRC would continue to follow all California Department of Agriculture and Environmental Protection Agency regulations for use of forest chemicals. MRC would also continue to maintain and update its Herbicide Spill Contingency Plan.

Hazardous substances

Under Alternative B outside of the reserves, there would be little to no change in the application method, frequency, and type of herbicide and adjuvant used for control of vegetation as compared with existing conditions and the No Action alternative. Compared with herbicide use under existing conditions (i.e., annual average of 986 gallons per year [see Table 3.10-2] or 9,860 gallons per decade), the amount of herbicide use under Alternative B in decades 1, 2 and 6 would be roughly the same, but would increase to greater levels for decades 3, 4, 5, 7 and 8. Decade 3 would experience the highest herbicide application amount of any of the alternatives, exceeding 18,000 gallons applied in the assessment area (Figure 3.10-5). For the period of analysis, the total amount of herbicide applied under Alternative B (approximately 101,300 gallons) would be slightly less than that under the No Action alternative (approximately 101,900 gallons) (Table 3.10-5). For all alternatives it is assumed that herbicide application would continue to occur in upland areas only; MRC does not currently use herbicides in riparian buffer zones. The Watercourse and Lake Protection Zone widths and limited operational restrictions under Alternative B (outside reserves) are the same as under the No Action alternative (Section 3.3; Hydrology, Beneficial Uses of Water, and Water Quality; Table 3.3-15), meaning the potential for toxic compounds to reach fish and aquatic invertebrates is the same as existing conditions and the No Action alternative. Under Alternative B, road inventory, construction, and maintenance outside of the reserves would occur in accordance with the CFPRs (similar to the No Action alternative). Thus, outside of the reserves application of triclopyr BEE (or other roadside herbicides) would be the same as under existing conditions and the No Action alternative. Inside the reserves there would be no herbicide application.

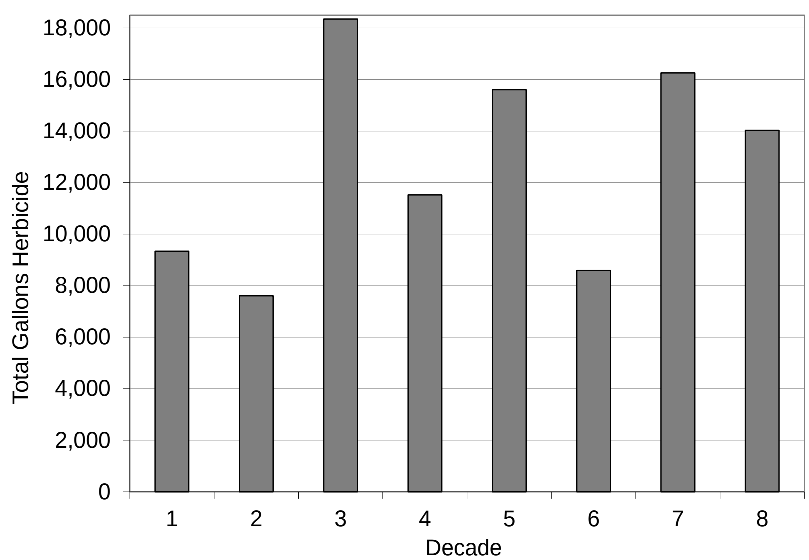


Figure 3.10-5. Total gallons of herbicide applied to the assessment area for Alternative B. Data based on gallons per acre of triclopyr and amazapyr applied by silviculture type and summed for each decade, provided by MRC (2011, unpublished data).

Based on overall herbicide use, toxicity and bioaccumulation potential for species of concern under Alternative B would be the same or less in decades 1, 2, and 6 compared with existing conditions, but would be greater in decades 3,4,5,7 and 8 (potential during decade 6 would be lower than the No Action alternative). However, as discussed under the No Action alternative, the type of herbicides used and the lack of application in riparian buffer zones means that the potential for toxicity and bioaccumulation potential for species of concern outside the reserves is low.

Overall, effects on species of concern due to application of forest chemicals under Alternative B would be **less than significant**. There is insufficient information to determine potential effects on reptile species of concern (i.e., Pacific pond turtle) and insect species of concern (i.e., Behren's silverspot butterfly, lotis blue butterfly).

Impact 3.10-4: Effects on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern due to application of herbicides. Because total herbicide use under Alternative B outside the reserves would be the same or greater than existing conditions, there is an increased likelihood of direct application of herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern in areas where these resources are undetected (i.e., surveys have not been performed). This is especially likely during activities such as application of herbicides along roadsides in order to control invasive plant species, since these activities are not subject to survey requirements under CEQA. Direct application of herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern could result in death of individuals and/or degradation of a population or community. Therefore, effects on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern due to application of forest chemicals under Alternative B would be **potentially significant**.

Mitigation Measure 3.10-2. Perform surveys, according to CDFG's guidelines (CDFG 2005b) and protocols (CDFG 2009c), for all California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern in the management area prior to herbicide application. If California Natural Diversity Database Special Community Types, Habitat Elements, or a plant species of concern is detected, MRC would consult with CDFG to develop feasible site-specific mitigation measures to assure that potentially significant project impacts (14 CCR §15382) would be avoided for all California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern. With implementation of this mitigation measure there would be **less than significant effects** on all California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern under Alternative B.

Wildland fire

Under Alternative B, wildland fire suppression would not be a covered activity. It should be noted, however, that the establishment of no-harvest reserves under Alternative B may affect access to these reserves during a wildfire for suppression activities. However, over time the reserves would take on an older structure, and be less prone to intensive fires. The risk of wildfire under Alternative B would be similar to existing conditions and MRC's response to wildfire would follow its Fire Suppression Plan as under the No Action alternative. Therefore, effects due to wildfire under Alternative B would be **less than significant**.

3.10.2.6 Alternative C

The application of herbicides would not be a covered activity under the incidental take authorizations. Under Alternative C, a number of herbicides and adjuvants would continue to be used by MRC, under regulation by the California Department of Agriculture and by the Environmental Protection Agency. MRC would continue to follow all California Department of Agriculture and Environmental Protection Agency regulations for use of forest chemicals. MRC would also continue to maintain and update its Herbicide Spill Contingency Plan.

Hazardous substances

Under Alternative C, as with the Proposed Action, the amount of herbicide use would be greater in the first two decades compared with existing conditions and the No Action alternative but would decrease and remain relatively steady at lower levels for decades 3 and 4 (Figure 3.10-6). For the period of analysis, the total amount of herbicide applied would be the lowest under Alternative C (38,000 gallons) because the term of the proposed HCP and incidental take authorizations under this alternative would end after decade 4 (Table 3.10-5). Effects on fish, aquatic invertebrates, and amphibian species of concern and bird and mammal species of concern due to application of forest chemicals under Alternative C would be the same as under the Proposed Action for the first 40 years (i.e., **less than significant**). There is insufficient information to determine potential effects on reptile species of concern (i.e., Pacific pond turtle) and insect species of concern (i.e., Behren's silverspot butterfly, lotis blue butterfly).

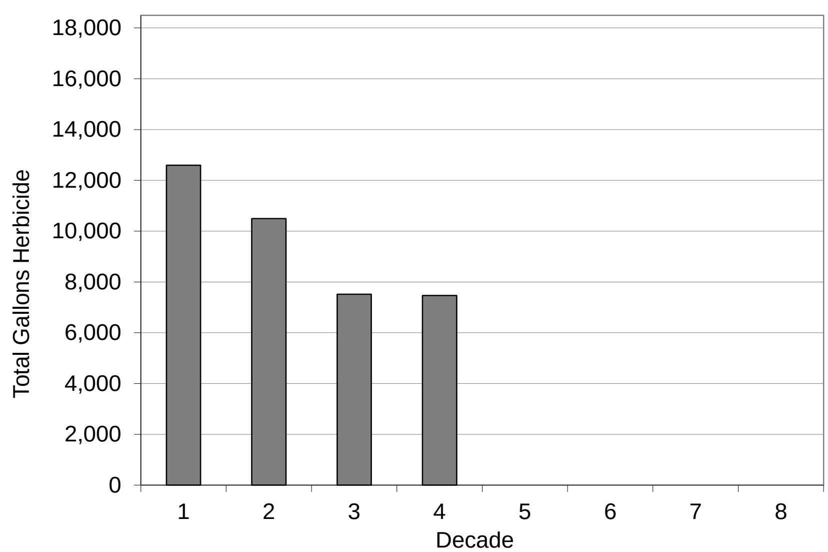


Figure 3.10-6. Total gallons of herbicide applied to the assessment area for Alternative C. Data based on gallons per acre of triclopyr and amazapyr applied by silviculture type and summed for each decade, provided by MRC (2011, unpublished data).

Total herbicide use under Alternative C would decrease in decades 3 and 4 of the analysis period as compared with existing conditions, Where herbicides are applied in areas that have not been surveyed, there may be mortality of individuals that are part of a California Natural Diversity Database Special Community Type or Habitat Element, or an individual that is a plant species of concern. However, because (1) the amount of herbicide use over the 40-year analysis period would be less than under existing conditions and the No Action alternative, (2) covered plants have a greater likelihood of being detected given the survey protocols defined in the HCP, and (3) there are potential beneficial effects on covered plants where herbicides are utilitized to manage species competing directly with covered plants, effects on covered plant species of concern due to application of forest chemicals under Alternative C would be **less than significant**.

Impact 3.10-5. Effects on California Natural Diversity Database Special Community Types, Habitat Elements and non-covered plant species of concern due to application of herbicides. Despite the fact that total herbicide use under Alternative C would decrease as compared with existing conditions, relative to covered plant species of concern there is an increased likelihood of direct application of herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern in areas where these resources are undetected (i.e., surveys have not been performed). Direct application of herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern could result in death of individuals and/or degradation of a population or community. Therefore, effects on California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern due to application of forest chemicals under Alternative C would be **potentially significant.**

Mitigation Measure 3.10-1. Perform surveys, according to CDFG's guidelines (CDFG 2005b) and protocols (CDFG 2009c), for all California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern in the management area prior to herbicide application. If California Natural Diversity Database Special Community Types, Habitat Elements, or a non-covered plant species of concern is detected, MRC would consult with CDFG to develop feasible site-specific mitigation measures to assure that potentially significant project impacts (14 CCR §15382) would be avoided for all California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern. With implementation of this mitigation measure there would be **less than significant** effects on all California Natural Diversity Database Special Community Types, Habitat Elements, and non-covered plant species of concern under Alternative C.

Wildland fire

Under Alternative C, wildland fire suppression would not be a covered activity. Effects on wildfire under Alternative C would be the same as under the Proposed Action (i.e., **less than significant**) for the first 40 years.

3.10.2.7 Comparison of alternatives

Table 3.10-6 summarizes the effects of the alternatives on hazards and hazardous substances. All of the action alternatives (including the Proposed Action) would have effects similar to those under the No Action alternative.

Table 3.10-6. Comparison of alternatives for hazards and hazardous substances.

Subcategory	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Herbicides and Adjuvants	**Less than significant effects** on animal species of concern[a]. **Potentially significant effects** on California Natural Diverity Database Special Community Types, Habitat Elements, and plant species of concern.	Same as the No Action alternative for animal species of concern[1]. **Less than significant effects** on covered plant species of concern. **Potentially significant effects** on California Natural Diverity Database Special Community Types, Habitat Elements, and non-covered plant species of concern.	Same as the Proposed Action.	Same as the No Action alternative outside of the reserves.	Same as the Proposed Action for a period of 40 years.
Wildfire	No change from existing conditions; continued support of CAL FIRE during suppression activities. Effects **less than significant.**	Same as the No Action alternative.	Same as the No Action alternative.	Same as the No Action alternative.	Same as Proposed Action for a period of 40 years.

[1] There is insufficient information to determine potential effects on reptile species of concern (i.e., Pacific pond turtle) and insect species of concern (i.e., Behren's silverspot butterfly, lotis blue butterfly).

3.10.3 PTEIR alternate standard analysis for the Proposed Action, Alternative A, and Alternative C

In its TMP (Appendix A) and HCP/NCCP, MRC has proposed alternate standards to the current (2012) CFPRs, which would be implemented and included in PTHPs prepared under the Proposed Action, Alternative A, or Alternative C. Alternate standards are not proposed for the No Action alternative because no TMP, HCP, or NCCP would be implemented. Likewise, alternate standards are not proposed for Alternative B because no TMP or NCCP would be implemented. The 2012 CFPRs (14 CCR §1092[b]) authorize CAL FIRE to accept alternate standards in a PTHP where it has been demonstrated in a PTEIR that the alternate standard provides resource protections that are equal to or better than the standard operational rule and its implementation would have a less than significant impact on the environment. Also, where future changes in the CFPRs occur, the current operational standards (2012 CFPRs) may be accepted by CAL FIRE as alternate standards where the PTEIR has similarly demonstrated a less than significant impact.

The proposed alternate standards were reviewed by the lead agencies to determine the resource area(s) to which they apply (see Attachment D to Appendix A). For each alternate standard that applies to Hazards and Hazardous Substances, the analysis in Sections 3.10.2.3, 3.10.2.4, and 3.10.2.6 and the cumulative effects analysis in Sections 4.10.2, 4.10.3, and 4.10.5 demonstrates that its implementation as part of the Proposed Action, Alternative A, or Alternative C would provide equal or better protection to resources affected by Hazards and Hazardous Substances than the 2012 CFPR standard and its implementation would either (1) not result in adverse environmental impacts or (2) result in impacts that are below the level of significant effect on the environment. This analysis considered the effects of implementing the proposed alternate standards as part of a suite of management and conservation measures contained in the HCP, NCCP, and TMP.

The following are the CFPRs for which alternate standards (or current operational standards, which due to a rule change could become an alternate standard) have been proposed by MRC in its TMP (Appendix A) and/or its HCP/NCCP and are applicable to Hazards and Hazardous Substances:

915, 915.2(a), 916.3, 917.2, and 917.2(a-d).

The EIS/PTEIR analysis demonstrates that these alternate standards would provide equal or better protection to resources affected by Hazards and Hazardous Substances than the 2012 CFPR standard. Implementation of these alternate standards, with implementation of associated mitigation measures for potentially significant impacts, would have a less than significant impact and would not contribute to cumulative effects related to Hazards and Hazardous Substances, and may be proposed in PTHPs by MRC and approved by CAL FIRE (14 CCR §1092[c]).

A complete list of MRC's proposed alternate standards is included in the TMP (Appendix A) as Attachment D. Attachment D of the TMP also includes a reference to the location of each alternate standard in the TMP and/or HCP/NCCP, and the CFPR standard (rule) it would replace.

3.11 Land Use

This section describes the land uses within the assessment area, as well as the effects of implementing the alternatives on land uses. The land use resources assessment area is the primary assessment area (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1).

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is similar to the primary assessment area and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects are assumed to therefore be similar to those in the primary assessment area.

3.11.1 Affected environment/Environmental setting

3.11.1.1 Land use setting

The assessment area is located within Mendocino County, which contains substantial amounts of land (both federal and private) in timber production. Mendocino County contains about 1,300,000 ac (526,315 ha) of commercial forest land, or 58% of the total county area, including MRC-owned lands. Land that is devoted to and used for growing and harvesting timber can be placed for a minimum 10-year period in a Timberland Preserve Zone which may be used only for production of forest products and compatible uses. A total of 854,383 ac (345,904 ha) are zoned as Timberland Preserve lands (Mendocino County 2009a).

The primary assessment area borders a mix of other land uses, primarily other timber production areas. MRC lands border other industrial and non-industrial forestlands on the north and south throughout northern Mendocino County. The primary assessment area also borders the Jackson Demonstration State Forest which is managed by CAL FIRE. Commercial timber harvesting also takes place on the Jackson Demonstration State Forest, where "management" and "demonstration" are the primary land uses in the Forest. Other portions of the ownership in Mendocino County are generally surrounded by other industrial and non-industrial forestlands. Developed population centers adjacent to the primary assessment area are generally not present. Towns near the primary assessment area include Elk, Albion, Westport, Leggett, Willits, Comptche, Ukiah, and Boonville.

Land use regulations

Local land use regulations that apply to the assessment area include the Mendocino County general plan and zoning ordinances. MRC-owned lands are designated as "Forestry" in the Mendocino County General Plan. This designation is applied to areas that have essential characteristics for timber production, and are intended to conserve forest resource values of the designated area. Most of the primary assessment area is zoned as Timberland Production Zone under the California's Timberland Productivity Act of 1982. The Timberland Production Zone classification is intended to promote continued timberland management. Land use in a Timberland Production Zone classification is restricted to growing and harvesting timber, in addition to other compatible uses.

Within the primary assessment area, there are several designated Special Treatment Areas. Special Treatment Areas are defined under the CFPRs (14 CCR §895.1) as specific locations which contain one or more of the following significant resource features that may be at risk during timber operations:

- Within 200 ft (61 m) of the watercourse transition line of federal or state designated wild and scenic rivers.
- Within 200 ft (61 m) of national, state, regional, county or municipal park boundaries.
- Key habitat areas of federal or state designated threatened, rare or endangered species (e.g., northern spotted owl).
- Coastal Commission Special Treatment Areas.
- Within 200 ft (61 m) of state designated scenic highways or within scenic corridors established pursuant to Article 2.5 (commencing with Section 260) of Chapter 2 of Division 1 and Section 154 of Chapter 1 of Division 1 of the Streets and Highways Code.

The California Coastal Commission has established separate Special Treatment Areas, which are identifiable and geographically bounded forest areas within the Coastal Zone that constitute a significant wildlife and/or plant habitat area, area of special scenic significance, and any land where timber operations could adversely affect public recreation areas or the biological productivity of any wetland, estuary, or stream especially valuable because of its role in a coastal ecosystem. All Coastal Commission Special Treatment Areas were adopted by the Coastal Commission on 5 July 1977, and they include several specially identified areas, buffer zones adjacent to designated highways within Coastal Scenic View Corridors, and buffer zone adjacent to publicly owned preserves and recreation areas. Coastal Commission Special Treatment Areas have been designated according to the following criteria:

- Scenic view corridors.
- Sites of significant scenic value.
- Wetlands, lagoons, streams, estuaries, and marine environments.
- Significant animal and plant habitat areas.
- Recreation areas.

The Coastal Commission has also set forth in its designations special management objectives considered essential by the Coastal Commission for the protection of public values within the Coastal Zone. Table 3.11-1 provides the type and acres of the primary assessment area contained in Special Treatment Areas (including those identified by the Coastal Commission) in Mendocino County.

Table 3.11-1. Special Treatment Areas in the primary assessment area.

Special Treatment Area designation	Acres
Coastal Zone Special Treatment Area—Silviculture (Selection-Upland/High Retention Selection-Riparian)	637
"Other Special Treatment Area"—Silviculture (Selection-Upland/High Retention Selection-Riparian)	3,547
Northern Spotted Owl Core Areas—No Harvest	6,667
Northern Spotted Owl Buffer Areas—Silviculture (Selection-Upland/High Retention Selection-Riparian)	924
Marbled Murrelet Core Areas—No Harvest	136
Marbled Murrelet Buffer Areas—Silviculture (Medium Retention Selection-Upland/High Retention Selection-Riparian)	1,143
Point Arena Mountain Beaver—No Harvest	51
Total	**13,105**

3.11.2 Environmental effects and mitigation

Land use effects are considered significant if the alternatives would:

- Physically divide an established community.
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.
- Conflict with any applicable HCP or NCCP.

There would likely be little or no direct or indirect effects on land use because the alternatives would not divide established communities and would not conflict with other HCPs or NCCPs in the region. Therefore, land use effects would be limited to conflicts with applicable land use plans and policies adopted to avoid or mitigate other environmental effects.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.11.2.7.

3.11.2.1 Analysis approach and methodology

Land use effects are typically described as inconsistencies with applicable land use plans and policies. In accordance with California law, local governments directly control land use through the adoption of general plans and zoning ordinances. As described in Section 3.11.1, private forestlands in the assessment area are included within the General Plan and Zoning Ordinances of Mendocino County. Potential effects on land use are evaluated by determining if proposed activities would conflict with existing land use plans, policies, or regulations.

3.11.2.2 No Action alternative

The Mendocino County General Plan designates the MRC forestlands and other private forestlands in the assessment area as suitable for timber production. This designation is consistent with past and intended future use of land in the assessment area. The No Action alternative would continue the same type of land use as is currently practiced (i.e., timber production), and is consistent with the Mendocino County General Plan. With regard to zoning, most of the MRC forestlands and other private forestlands in the assessment area are designated as Timberland Production Zone under California's Timberland Productivity Act of 1982. As described above, land use in a Timberland Production Zone district is restricted to growing and harvesting timber and compatible uses and establishes a presumption that timber harvesting is expected to and would occur on such lands. Because the No Action alternative involves the continued production of timber on MRC forestlands, it is consistent with the intent of the Timberland Production Zone classification. Further, minimizing alternate land uses provides additional value for biological resources because it minimizes fragmentation of lands. MRC's timber harvest and management activities would not conflict with applicable land use plans, policies, or regulations. As described in Section 3.4.2 (Aquatic and Riparian Habitats and Species of Concern, Environmental effects and mitigation), there are currently two HCPs in effect in Mendocino County. MRC's timber management activities under the No Action alternative would not conflict with the other habitat conservation plans in the region. Therefore, the No Action alternative would have **no effect** on land use.

3.11.2.3 Proposed Action

Under the Proposed Action, MRC would continue to conduct timber harvesting in the primary assessment area in accordance with the CFPRs and MRC's TMP (Appendix A) and as a designated Timberland Production Zone. As under the No Action alternative, MRC forestlands would be used for timber production, thus minimizing fragmentation of lands and providing value for biological resources. The Proposed Action would not conflict with existing land use plans, policies, and regulations and would not conflict with other HCPs or NCCPs in the region. Therefore, the Proposed Action would have **no effect** on land use.

3.11.2.4 Alternative A

Under Alternative A, harvesting and management activities would be the same as the Proposed Action, with additional measures to enhance conservation of key aquatic and terrestrial habitats.

The enhanced conservation of key aquatic and terrestrial habitats would not conflict with existing land use plans or policies and would not conflict with other HCPs or NCCPs in the region. Therefore, Alternative A would have **no effect** on land use.

3.11.2.5 Alternative B

Under Alternative B, MRC would establish no-harvest terrestrial habitat reserves. The establishment of no-harvest reserves under Alternative B would not conflict with existing land use plans or policies and would not conflict with other HCPs or NCCPs in the region. Therefore, Alternative B would have **no effect** on land use. However, establishment of no-harvest reserves would result in a loss of revenue to Mendocino County as these areas would not generate timber harvest yield tax revenue. The potential for loss of revenue is discussed as an economic effect in Section 3.17 (Social and Economic Conditions).

3.11.2.6 Alternative C

Land use effects under Alternative C would be the same as under the Proposed Action. The only difference between Alternative C and the Proposed Action for land use is that the proposed conservation measures would apply for a shorter term of 40 years. This would not result in conflicts with existing land use plans or policies. Therefore, Alternative C would have **no effect** on land use.

3.11.2.7 Comparison of alternatives

Table 3.11-2 summarizes the effects of the alternatives on land use. All of the action alternatives (including the Proposed Action) would have effects similar to those under the No Action alternative.

Table 3.11-2. Comparison of alternatives for land use.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Land use	No change from existing conditions. **No effect.**	Similar to the No Action alternative.	Similar to the No Action alternative.	Similar to the No Action alternative.	Similar to the No Action alternative.

3.11.3 PTEIR alternate standard analysis for the Proposed Action, Alternative A, and Alternative C

In its TMP (Appendix A) and HCP/NCCP, MRC has proposed alternate standards to the current (2012) CFPRs, which would be implemented and included in PTHPs prepared under the Proposed Action, Alternative A, or Alternative C. Alternate standards are not proposed for the No Action alternative because no TMP, HCP, or NCCP would be implemented. Likewise, alternate standards are not proposed for Alternative B because no TMP or NCCP would be implemented. The 2012 CFPRs (14 CCR §1092[b]) authorize CAL FIRE to accept alternate standards in a PTHP where it has been demonstrated in a PTEIR that the alternate standard provides resource protections that are equal to or better than the standard operational rule and its implementation would have a less than significant impact on the environment. Also, where future changes in the CFPRs occur, the current operational standards (2012 CFPRs) may be accepted by CAL FIRE as alternate standards where the PTEIR has similarly demonstrated a less than significant impact.

The proposed alternate standards were reviewed by the lead agencies to determine the resource area(s) to which they apply (see Attachment D to Appendix A). For each alternate standard that applies to Land Use, the analysis in Sections 3.11.2.3, 3.11.2.4, and 3.11.2.6 and the cumulative effects analysis in Sections 4.11.2, 4.11.3, and 4.11.5 demonstrates that its implementation as part of the Proposed Action, Alternative A, or Alternative C would provide equal or better protection to Land Use than the 2012 CFPR standard and its implementation would either (1) not result in adverse environmental impacts or (2) result in impacts that are below the level of significant effect on the environment. This analysis considered the effects of implementing the proposed alternate standards as part of a suite of management and conservation measures contained in the HCP, NCCP, and TMP.

The following are the CFPRs for which alternate standards (or current operational standards, which due to a rule change could become an alternate standard) have been proposed by MRC in its TMP (Appendix A) and/or its HCP/NCCP and are applicable to Land Use:

913.6(e)(2) and 913.6(e)(4).

The EIS/PTEIR analysis demonstrates that these alternate standards would provide equal or better protection to Land Use than the 2012 CFPR standard. Implementation of these alternate standards would have a less than significant impact and would not contribute to cumulative effects on Land Use, and may be proposed in PTHPs by MRC and approved by CAL FIRE (14 CCR §1092[c]).

A complete list of MRC's proposed alternate standards is included in the TMP (Appendix A) as Attachment D. Attachment D of the TMP also includes a reference to the location of each alternate standard in the TMP and/or HCP/NCCP, and the CFPR standard (rule) it would replace.

3.12 Traffic

This section describes traffic volumes within the assessment area, as well as the effects of implementing the alternatives on traffic. The traffic resources assessment area includes state highways in Mendocino County and the primary assessment area (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1).

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is similar to the primary assessment area and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects are assumed to therefore be similar to those in the primary assessment area.

3.12.1 Affected environment/Environmental setting

Table 3.12-1 describes existing (2008) traffic volumes at selected points along the major state highways that cross the assessment area (1, 20, and 128). Average annual daily traffic is the total volume for the year divided by 365 days and is used for evaluating traffic trends, computing accident rates, planning and designing highways, and other purposes. The peak month average daily traffic is the average daily traffic for the month of heaviest traffic flow and may be more representative of traffic conditions than the average annual daily traffic. The peak hour traffic is useful to traffic engineers in estimating the amount of congestion experienced, and shows how near to capacity the highway is operating. "Back" represents traffic south or west of the count location while "ahead" represents traffic north or east of the count location. Currently, logging trucks make up a small percentage of this daily traffic.

Table 3.12-1. Traffic volumes "back" and "ahead" of selected locations along state highways in the assessment area (2008).

State Route	Location	Back			Ahead		
		Peak hour	Peak month	Avg. annual daily traffic	Peak hour	Peak month	Avg. annual daily traffic
1	Sonoma-Mendocino County Line	510	5,100	4,200	510	5,100	4,200
1	Gualala	570	5,200	4,300	350	3,350	2,500
1	Point Arena, South City Limit	230	2,400	1,900	230	2,400	1,900
1	Elk, North City Limit	150	1,300	1,100	150	1,400	1,100
1	Junction Route 128 East	150	1,400	1,100	430	3,900	3,100
1	Comptche/Ukiah Road	710	7,400	6,000	810	8,400	6,600
1	Mendocino, Jackson Street	810	8,400	6,600	720	7,600	5,900
1	Caspar, North City Limit	1,250	12,700	10,000	1,300	13,600	10,700
1	Junction Route 20 East	1,950	22,800	19,400	1,900	23,800	20,900
1	Fort Bragg, Redwood Avenue	1,450	16,200	14,000	1,800	21,100	17,800
1	Mac Kerricher State Park	900	6,200	4,600	290	2,150	1,500
1	Leggett, Junction Route 271 South	130	1,200	720	120	1,100	670
20	Fort Bragg, Junction Route 1 South				990	9,100	8,400
20	Willits, West City Limits	280	3,700	2,700	790	5,800	4,800
20	North Junction Rout 101	610	6,800	6,100			
20	Mendocino/Lake County Line	1,100	11,400	10,400	860	9,200	8,300
128	Albion, Junction Route 1				190	2,000	1,600
128	Philo, West City Limit	540	5,600	4,500	500	5,000	4,000
128	Boonville State Highway Maintenance Station	570	5,000	3,900	800	6,600	5,000
128	Junction Route 253 East (Ukiah-Boonville Road)	700	5,200	3,800	260	2,550	2,100

The amount of traffic generated by MRC's timber management and harvest activities can be estimated based on harvest levels. Average annual harvest (board feet) is divided by 4,200 (average log truck load size in board feet) to determine the amount of log truck traffic (vehicle trips) that would be generated on an annual basis. Timber harvest activities (falling/bucking, yarding) generate additional truck and automobile traffic as workers commute to and from timber harvest sites. Based on estimates from MRC, each million board feet of timber harvested entails approximately 33 days with approximately 9.5 vehicles per day to accommodate the contract crew. In addition, MRC staff and consultants contribute to regional traffic.

Table 3.12-2 provides the current estimate of annual traffic generated by MRC activities and the average annual daily traffic based on average annual harvest levels for the decade 1999–2008. The total amount of vehicle traffic generated by MRC's timber management and harvesting activities for this decade is estimated to be 24,875 vehicles-days for an average of 68.1 vehicles per day on average. This vehicle traffic would not occur year-round as harvest activities are generally limited from 1 April to 15 November with limited winter operations after 15 November. Since harvest occurs throughout the primary assessment area, vehicle traffic is dispersed and not concentrated along one highway, road, or road segment. The estimated traffic generated by MRC employees and contractors is a small fraction of the average annual daily traffic along area highways (Table 3.12-1).

Table 3.12-2. Annual and average daily traffic (vehicle-days) generated by MRC timber management and harvesting activities based on annual average harvest of 31,500,000 board feet.

Traffic type	Annual level	Average daily[a]
Logging trucks (4200 board feet per truck)	7,500	20.5
Contract vehicles	9,875	27.1
MRC vehicles	7,500	20.5
Total	**24,875**	**68.1**

[a] Based on annual level divided by 365 days.

3.12.2 Environmental effects and mitigation

Transportation/traffic effects are considered significant if the alternatives would:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.
- Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).
- Result in inadequate emergency access.
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

There would likely be little or no direct or indirect effects on several potential traffic issues related to changes in air traffic, design features, emergency access, or adopted plans regarding public transit, bicycle, or pedestrian facilities as a result of implementing the Proposed Action or alternatives in the primary assessment area. These issues are briefly discussed below but are not analyzed in detail in this EIS/PTEIR.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.12.2.7.

3.12.2.1 Analysis approach and methodology

The assessment of traffic effects is based on the level of timber harvesting by MRC in the primary assessment area expected under each of the alternatives. Harvest volume is used as an indicator of potential traffic levels under each alternative because log truck and contractor vehicle traffic levels are directly related to the volume of timber harvest. The lead agencies used data from timber harvest modeling, provided by MRC, to predict harvest volume under each alternative. Details of the modeling are provided in Appendix E and results of the modeling are used in the analysis of traffic effects that follows. Log truck traffic generated by MRC's harvesting activities is estimated by dividing the average annual harvest (board feet) by 4200 board feet (the average size of a log truck load). Based on information provided by MRC, contractor vehicles are estimated at 313.5 vehicle days per million board feet while MRC employees generate approximately 7,500 vehicle days on an annual basis and this number does not vary substantially with harvest. If additional lands in the secondary assessment area are added to the area covered by the HCP/NCCP, it is assumed that the same level of vehicle traffic (per million board feet) would be generated when harvested.

3.12.2.2 No Action alternative

Based on timber modeling (Appendix E), timber harvest (volume) is anticipated to increase from existing conditions during the first decade and continue to increase over the next 40 years, with harvest volume stabilizing after that time. This increase in harvest would result in a corresponding increase in the use of log trucks and vehicles by MRC contractors. Table 3.12-3 provides the estimated annual and average daily traffic generated by MRC timber management and harvesting activities under the No Action alternative.

Table 3.12-3. Annual and average daily traffic (vehicle-days) generated by MRC timber management and harvesting activities under the No Action alternative.

Decade	Annual traffic			Average annual daily traffic[a]			
	Log trucks	Contractor vehicles	MRC vehicles	Log trucks	Contractor vehicles	MRC vehicles	Total
1	8,770	11,548	7,500	24.0	31.6	20.5	76.1
2	16,875	22,219	7,500	46.2	60.9	20.5	127.6
3	16,476	21,694	7,500	45.1	59.4	20.5	126.5
4	18,835	24,800	7,500	51.6	67.9	20.5	140.0
5	28,923	38,083	7,500	79.2	104.3	20.5	204.0
6	26,644	35,082	7,500	73.0	96.1	20.5	189.6
7	25,811	33,986	7,500	70.7	93.1	20.5	184.3
8	26,182	34,474	7,500	71.7	94.4	20.5	186.6

[a] Based on annual level divided by 365 days.

Traffic associated with MRC's timber harvesting and management activities currently does not contribute greatly to local traffic volumes. Under the No Action alternative, the increase in traffic volume associated with MRC's activities within the assessment area is not anticipated to conflict with applicable plans, ordinances, policies, or programs, and would not substantially increase hazards due to design features or incompatible uses. Therefore, traffic effects under the No Action alternative would be **less than significant**.

3.12.2.3 Proposed Action

The volume of timber harvested from the primary assessment area would increase over the 80-year term of the HCP/NCCP compared with existing conditions (similar to the No Action alternative), stabilizing at approximately the same level of harvest volume as under the No Action alternative. This increase in harvest would result in a corresponding increase in the use of log trucks and vehicles by MRC contractors. Table 3.12-4 provides the estimated annual and average daily traffic generated by MRC timber management and harvesting activities under the Proposed Action.

Table 3.12-4. Annual and average daily traffic (vehicle-days) generated by MRC timber management and harvesting activities predicted under the Proposed Action.

Decade	Annual traffic			Average annual daily traffic[a]			
	Log trucks	Contractor vehicles	MRC vehicles	Log trucks	Contractor vehicles	MRC vehicles	Total
1	11,633	15,317	7,500	31.9	42.0	20.5	94.4
2	15,125	19,915	7,500	41.4	54.6	20.5	116.5
3	14,879	19,591	7,500	40.8	53.7	20.5	115.0
4	19,115	25,168	7,500	52.4	69.0	20.5	141.9
5	21,521	28,336	7,500	59.0	77.6	20.5	157.1
6	22,284	29,342	7,500	61.1	80.4	20.5	162.0
7	25,467	33,532	7,500	69.8	91.9	20.5	182.2
8	25,666	33,794	7,500	70.3	92.6	20.5	183.4

[a] Based on annual level divided by 365 days.

The effects on traffic volumes due to changes in timber harvesting levels are not expected to be significant. Management activities under the Proposed Action would be similar to and generate traffic volumes comparable to what would occur under the No Action alternative. Any change in traffic volume would not be substantial, and traffic conditions in the region are not considered impaired. Accordingly, traffic effects under the Proposed Action would be **less than significant**.

3.12.2.4 Alternative A

The volume of timber harvested from the primary assessment area would increase over the 80-year term of the HCP/NCCP compared with existing conditions (similar to the No Action alternative), stabilizing at a harvest volume slightly less than under the No Action alternative. Traffic volumes would be comparable to or less than under the No Action alternative (Table 3.12-5).

Table 3.12-5. Annual and average daily traffic (vehicle-days) generated by MRC timber management and harvesting activities under Alternative A.

Decade	Annual traffic			Average annual daily traffic[a]			
	Log trucks	Contractor vehicles	MRC vehicles	Log trucks	Contractor vehicles	MRC vehicles	Total
1	10,660	14,036	7,500	29.2	38.5	20.5	88.2
2	13,411	17,658	7,500	36.7	48.4	20.5	193.8
3	14,343	18,885	7,500	39.3	51.7	20.5	132.0
4	18,129	23,871	7,500	49.7	65.4	20.5	135.6
5	21,353	28,116	7,500	58.5	77.0	20.5	156.0
6	21,979	28,940	7,500	60.2	79.3	20.5	160.0

Decade	Annual traffic			Average annual daily traffic[a]			
	Log trucks	Contractor vehicles	MRC vehicles	Log trucks	Contractor vehicles	MRC vehicles	Total
7	24,316	32,017	7,500	66.6	87.7	20.5	174.8
8	23,797	31,334	7,500	65.2	85.8	20.5	171.5

[a] Based on annual level divided by 365 days.

The effects on traffic volumes due to changes in timber harvesting levels are not expected to be significant. Management activities under Alternative A would be similar to and generate traffic volumes comparable to those anticipated under the No Action alternative. Any change in traffic volume would not be substantial, and traffic conditions in the region are not considered impaired. Accordingly, traffic effects under Alternative A would be **less than significant**.

3.12.2.5 Alternative B

Harvest levels under Alternative B would be somewhat higher than under existing conditions in every decade but generally less than under the No Action alternative. Therefore, traffic volume associated with MRC's activities is expected to be less than under the No Action alternative (Table 3.12-6) and traffic effects under Alternative B are expected to be comparable to or less than that described above under the No Action alternative. Accordingly, traffic effects under Alternative B would be **less than significant**.

Table 3.12-6. Annual and average daily traffic (vehicle-days) generated by MRC timber management and harvesting activities under Alternative B.

Decade	Annual traffic			Average annual daily traffic[a]			
	Log trucks	Contractor vehicles	MRC vehicles	Log trucks	Contractor vehicles	MRC vehicles	Total
1	7,355	9,684	7,500	20.2	26.5	20.5	67.2
2	10,847	14,282	7,500	29.7	39.1	20.5	89.3
3	18,388	24,211	7,500	50.4	66.3	20.5	137.2
4	15,160	19,961	7,500	41.5	54.7	20.5	116.7
5	20,028	26,371	7,500	54.9	72.3	20.5	147.7
6	13,808	18,181	7,500	37.8	49.8	20.5	108.1
7	21,595	28,434	7,500	59.2	77.9	20.5	157.6
8	19,753	26,009	7,500	54.1	71.3	20.5	145.9

[a] Based on annual level divided by 365 days.

3.12.2.6 Alternative C

Traffic effects under Alternative C would be the same as those of the Proposed Action. The only difference between Alternative C and the Proposed Action affecting traffic is that the proposed conservation measures would apply for a shorter term of 40 years. Traffic effects under Alternative C would be **less than significant**.

3.12.2.7 Comparison of alternatives

Table 3.23-7 summarizes the effects of the alternatives on traffic. Overall, the Proposed Action would result in traffic levels similar to what are expected under the No Action alternative. Alternatives A and B would provide for a reduction in traffic levels compared with the No Action alternative, but the effects on regional traffic would be **less than significant**. Effects on traffic under Alternative C would be similar to the Proposed Action.

Table 3.12-7. Comparison of alternatives for traffic.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Traffic	Traffic volumes would increase over time to around 186 average annual daily traffic due to increased harvest levels. Effects **less than significant**.	Traffic volumes are expected to increase over time to levels similar to under the No Action alternative (183 average annual daily traffic). Effects **less than significant**.	Traffic volumes are expected to increase over time to levels somewhat less than under the No Action alternative (172 average annual daily traffic). Effects **less than significant**.	Traffic levels are expected to increase over time to levels less than under the No Action alternative (146 average annual daily traffic). Effects **less than significant**.	Same as Proposed Action for a period of 40 years. Effects **less than significant**.

3.13 Noise

This section describes the existing noise levels and contributing factors to noise levels in the assessment area, as well as the effects of implementing the alternatives on noise levels. The noise resources assessment area includes the primary assessment area (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1).

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is similar to the primary assessment area and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects are assumed to therefore be similar to those in the primary assessment area.

3.13.1 Affected environment/Environmental setting

In general, the steep forested character of the land in the assessment area creates an environment in which noise is trapped between the surrounding ridge tops. Existing ambient noise levels are generally a function of the distance from roads, including State Highways 1, 20, and 128. The Mendocino County General Plan identifies Route 101 as the noisiest highway in Mendocino County. Other contributors to the noise environment in the county include lighter traffic on county roads, railroads, airports, lumber mills and other commercial and industrial sources of noise. Activities such as target shooting, hunting-related gunfire, wind noise, noise from bordering residences, and noise generated from recreational use also contribute to the ambient noise environment. These sources are typically minimal, seasonal, and temporary in nature.

Timber harvest operations conducted in the assessment area are a source of potentially significant noise. Individual timber harvest operations, and the noise associated with them, are seasonal (generally late-spring to early fall) and temporary in nature. Timber falling and associated tasks are generally conducted during daylight hours and require the use of chainsaws, trucks, and all-terrain vehicles. Noise levels during yarding vary widely depending on the yarding method. Tractor yarding produces noise levels associated with diesel-powered, tracked or wheeled equipment. Cable yarding usually takes place on or near roads due to the size and limited mobility of the yarder and currently accounts for approximately 49% of all conifer yarding. Cable yarding generally requires the use of noisy whistle signals for communication. Tractor yarding currently accounts for about 49% of all conifer yarding conducted by MRC. Helicopter yarding likely has the greatest potential for noise effects, but currently accounts for only about 2% of all yarding activities. Noise effects are likely to be confined to the primary assessment area and areas immediately adjacent to the primary assessment area.

3.13.2 Environmental effects and mitigation

Noise effects are considered significant if the alternatives would:

- Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Expose persons to or generate excessive groundborne vibration or groundborne noise levels.
- Result in a substantial permanent increase in ambient noise levels in the project vicinity (i.e., in and adjacent to the primary assessment area) above levels existing without the project.
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity (i.e., in and adjacent to the primary assessment area) above levels existing without the project.
- Be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, where the project would expose people residing or working in the project area to excessive noise levels.
- Be located within the vicinity of a private airstrip, where the project would expose people residing or working in the project area to excessive noise levels.

There would likely be little or no direct or indirect effects on several potential noise issues related to proximity to airports or airstrips as a result of implementing the Proposed Action or alternatives in the primary assessment area. Implementing the alternatives would not expose persons to or generate excessive groundborne vibration or noise. These issues are briefly discussed below but are not analyzed in detail in this EIS/PTEIR.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.13.2.7.

3.13.2.1 Analysis approach and methodology

The assessment of noise effects is based on the types of yarding expected to be used under each of the alternatives. As described in Section 3.9 (Timber Resources), timber harvest modeling was used to predict harvested acres under each alternative. Details of the timber model are provided in Appendix E. Although changes in harvest levels (acres) may indicate changes in the spatial extent of noise generation, actual noise levels generated by harvest are more dependent on the type of yarding being used in individual harvest units. Therefore anticipated yarding methods are used in the analysis of noise effects that follows.

3.13.2.2 No Action alternative

Noise associated with MRC's timber harvesting and management activities currently contributes to local ambient noise levels, but is remote (isolated to areas of substantial activity, such as yarding), seasonal, and temporary in nature. There would be a temporary increase in ambient noise levels in areas subject to harvest, but these areas would likely have been subject to harvest at some time in the past and the temporary noise levels would not be in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. Substantial changes in the types of yarding or the relative amount of each yarding type relative to existing operations are not anticipated under the No Action alternative. Because there are no changes in the amounts of each type of yarding that would occur, and noise generation due to harvest activities is seasonal and temporary in nature, no permanent increases in ambient noise levels in the primary assessment area above existing levels are anticipated. Under the No Action alternative, noise generated by these activities would remain about the same as existing conditions and noise effects are anticipated to be **less than significant**.

3.13.2.3 Proposed Action

Under the Proposed Action, the effects on ambient noise levels due to changes in timber harvesting levels are not expected to be significant. Management activities under the Proposed Action would be similar to existing conditions and generate noise levels similar to the No Action alternative. However, there likely would be a slight decrease in the percentage of cable yarding relative to existing conditions and the No Action alternative (5%), with a corresponding increase in the percentage of tractor yarding. This could result in a slight decrease in ambient noise levels during yarding activities in areas where tractor yarding predominates. Helicopter yarding would remain a minor component of noise generated by yarding activities.

Any change in ambient noise levels would not be substantial, and would be remote, seasonal, and temporary in nature. Noise effects under the Proposed Action would be **less than significant**.

3.13.2.4 Alternative A

Impact 3.13-1: Noise-related disturbance associated with increased helicopter yarding. Management activities under Alternative A would be similar to existing conditions and generate noise levels similar to the No Action alternative. However, because of measures that would be implemented under Alternative A requiring the use of helicopter yarding when more than one mile of new road would otherwise need to be built, there would be an increase in the amount of helicopter use under this alternative. This could increase ambient noise levels during yarding activities in areas where helicopter yarding predominates. Under Alternative A, it is anticipated that helicopter logging would be used in approximately twenty (20) additional areas totaling approximately 12,800 ac (5,180 ha), relative to the No Action alternative and Proposed Action. Eleven of these areas (5,000 ac [2,023 ha]) are located where humans are anticipated to be within hearing distance of the helicopter noise (J. Ramaley, Mendocino Redwood Company, pers. comm.). Ambient noise levels would be substantially increased in these areas not currently subject to helicopter logging, such that noise effects under Alternative A would be **potentially significant** and would require mitigation.

Mitigation Measure 3.13-1: Minimize noise-related disturbance from helicopter operations. Measures to limit helicopter flights to between 9:00 AM and 4:00 PM with no helicopter operations on weekends would minimize noise effects under Alternative A to **less than significant**.

3.13.2.5 Alternative B

Impact 3.13-2: Noise-related disturbance associated with increased helicopter yarding. Management activities under Alternative B would be similar to existing conditions and generate noise levels similar to the No Action alternative. However, because of the restrictions on yarding, loading, road building, and road use with the reserves, additional helicopter yarding would be required, particularly in the areas adjacent to the reserves. Under Alternative B, it is anticipated that helicopter logging would be used in approximately 59 additional areas totaling approximately 7,900 ac (3,197 ha), relative to the No Action alternative and Proposed Action. Twenty-eight of these areas (3,900 ac [1,578 ha]) are located where humans are anticipated to be within hearing distance of the helicopter noise (J. Ramaley, Mendocino Redwood Company, pers. comm.). Ambient noise levels would be substantially increased in these areas not currently subject to helicopter logging, such that noise effects under Alternative B would be **potentially significant** and would require mitigation.

Incorporating **Mitigation Measure 3.13-1** (minimize noise-related disturbance from helicopter operations) would reduce noise effects under Alternative B to **less than significant**.

3.13.2.6 Alternative C

Noise effects under Alternative C would be the same as those under the Proposed Action. The only difference between Alternative C and the Proposed Action affecting ambient noise is that the proposed conservation measures would apply for a shorter term of 40 years. Therefore, the potential for noise effects under Alternative C is expected to be comparable to that described above under the Proposed Action (i.e., **less than significant**).

3.13.2.7 Comparison of alternatives

Table 3.13-1 summarizes the effects of the alternatives on noise.

Table 3.13-1. Comparison of alternatives for noise.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Noise	Noise levels similar to existing conditions due to a comparable mix of yarding types. **Less than significant effect**.	Similar to No Action alternative, with a slight reduction in noise levels due to increased tractor yarding. **Less than significant effect**.	Similar to No Action alternative, with an increase in noise levels due to increased helicopter yarding. **Less than significant effect** after mitigation.	Increased noise levels due to increased helicopter yarding outside of reserves. **Less than significant effect** after mitigation.	Same as Proposed Action for a period of 40 years. **Less than significant effect**.

3.14 Visual Resources

This section describes the visual resources within the assessment area, as well as the effects of implementing the alternatives on visual resources. The visual resources assessment area includes portions of the primary assessment area that may be visible to the general public, and focuses on adjacent public lands and nearby roadways.

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is similar to the primary assessment area and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects are assumed to therefore be similar to those in the primary assessment area.

3.14.1 Affected environment/Environmental setting

The primary assessment area is interspersed among several public recreation areas, including Jackson Demonstration State Forest, and several smaller State Parks. Adjacent lands are described in detail in Section 3.11 (Land Use), and recreation use on these adjacent lands is described in Section 3.15 (Recreation).

There are limited viewing areas in the assessment areas. The primary public recreation area with views into the primary assessment area is Jackson Demonstration State Forest. The ownership borders portions of both the northern and the southern extent of Jackson Demonstration State Forest. Limited viewing may also be possible from portions of Van Damme and Hendy Woods State Parks in central Mendocino County. State Highways 1, 20, and 128 are the primary roadways with views into the primary assessment area. Portions of these highways are considered eligible for scenic highway designation. Primary areas along state highways with views into the primary assessment area are as follows.

North of the town of Gualala, in Mendocino County, the majority of the primary assessment area lies several miles east of Highway 1 and is unlikely to be visible from the highway except from a relatively large distance. North of the town of Westport in northern Mendocino County, Highway 1 travels through and along the western edge of the primary assessment area for several miles, offering views into the ownership from both travel directions.

State Highway 20 from Willits to Fort Bragg travels through the southern portion of Jackson Demonstration State Forest, which lies directly adjacent to a large tract of the primary assessment area. Views into the primary and secondary assessment areas are possible from Highway 20, depending on the local topography. This stretch of highway is eligible for scenic highway designation.

State Highway 128 travels in a northwesterly direction through Boonville for several miles and then parallels the eastern edge of a large tract of the primary assessment area north of Hendy Woods State Park. Views into the primary assessment area are likely limited in this area due to local topography and the urban landscape along the highway. To the north, Highway 128 turns more to the west and passes through a large tract of the primary assessment area that extends nearly to Highway 1 south of the town of Albion. Views into the primary assessment area are possible from Highway 128 in this area, depending on the local topography. This area includes Dimmick Memorial Grove State Park and the Navarro Strip, which are located along Highway 128 and adjacent to the primary assessment area. Views into the primary assessment area are possible from these attractions.

Several other major roads traverse large portions of the primary assessment area. Included among these roads are the road from Ukiah to Comptche and Albion, and the Greenwood Ridge road from Albion to Highway 128 near Hendy Woods State Park. In addition, the California Western Railway (Skunk Train), a tourist railway between Fort Bragg and Willits, travels along the Noyo River and provides passengers with views into the primary and secondary assessment areas.

For stands identified as requiring special management for aesthetic purposes (e.g., stands adjacent to public roads), MRC employs a unique harvest prescription designed specifically to create visual buffer stands that minimize the visual impact of harvest immediately adjacent to some public roads and other viewpoints or travel corridors. As described in the imber model description (Appendix E), these stands are managed with the goal of creating and maintaining a continuous cover of multistoried, uneven-aged stands with a variety of diameter classes to buffer views into adjacent harvest units.

Using a geographic information system and stand data derived from inventories, the acreage in each structure class and canopy closure class can be calculated for stands (polygons) where the unique harvest prescription to minimize visual effects is employed. Canopy closure was derived from the structure classes. Table 3.14-1 presents the MRC structure and canopy closure classes and acreage in each class visible to the public based on the 2009 inventory.

Table 3.14-1. Acres in each vegetation structure and canopy closure class used to indicate visual quality in polygons subject to harvest prescriptions that minimize visual effects.

MRC structure class[a]	General description	Successional stage	Dominant diameter (in)	Canopy closure (%)	Acres visible
5	Hardwoods, poles, high density	Mid successional	< 16	> 60	73
9	Mixed conifers and hardwoods, saplings, medium density	Mid successional	< 16	40–60	127
10	Mixed conifers and hardwoods, saplings and small sawtimber, high density	Mid successional	> 16	40–60	222
12	Mixed conifers and hardwoods, small sawtimber, high density	Mid successional	16–24	> 60	147
13	Conifers, saplings, all densities	Early successional	< 8	> 20	39
14	Conifers, small sawtimber, open density	Mid successional	16–24	< 20	28
18	Conifers, small sawtimber, medium density	Mid successional	16–24	40–60	213
19	Conifers, medium sawtimber, medium density	Mid successional	24–32	40–60	84
21	Conifers, poles, high density	Mid successional	8–16	> 60	417
22	Conifers, small sawtimber, high density	Mid successional	16–24	> 60	1,411
23	Conifers, medium sawtimber, high density	Advanced successional	24–32	> 60	693
24	Conifers, large sawtimber, high density	Advanced successional	> 32	> 60	40

[a] Structure classes not listed are not within the area visible to the public or do not exist in the primary assessment area.

3.14.2 Environmental effects and mitigation

Visual effects are considered significant if the alternatives would:

- Have a substantial adverse effect on a scenic vista.
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.
- Substantially degrade the existing visual character or quality of the site and its surroundings.
- Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

There would likely be little or no direct or indirect effects on visual resources through damage to scenic trees, rock outcroppings, or historic buildings, and activities under the Proposed Action or other alternatives would not create a new source of light or glare. These issues are not analyzed in detail in this EIS/PTEIR.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.14.2.7.

3.14.2.1 Analysis approach and methodology

As discussed in Section 3.14.1, there are limited viewing opportunities in the primary assessment area. The analysis in this section focuses on whether the Proposed Action or the other alternatives would result in degradation of existing visual quality. The timber model (Appendix E) was used to predict the vegetative characteristics (structure class) and canopy closure in stands identified as requiring special management for aesthetic purposes (i.e., stands adjacent to public roads), where MRC employs a unique harvest prescription designed specifically to minimize visual effects through development of visual buffer stands. Vegetative characteristics and canopy closure in these stands was estimated for each decade under each of the alternatives. The vegetative characteristics and canopy closure in these visual buffer stands are used as surrogates for visual quality. A geographic information system analysis was also used to estimate the minimum width of each buffer stand (polygon) where the unique harvest prescription would be employed. The majority of stands had a minimum width of at least 100 ft (30 m). However, the minimum width of buffer stands is only one measure of buffer quality and does not fully describe their ability to minimize visual effects. In many cases, the buffers are irregular in shape and are designed so that visual impacts are further minimized, taking into account such factors as local topography.

3.14.2.2 No Action alternative

Under the No Action alternative, MRC's activities have the potential to affect visual resources by introducing elements that interrupt the visual continuity of the landscape, such as through even-aged management (e.g., seed tree removal). Timber harvesting within the primary assessment area would be conducted within sight of highways eligible for scenic highway designation (e.g., State Highways 1, 20, and 128) and recreation areas on adjacent public lands (e.g., Jackson Demonstration State Forest). These operations can diminish visual resources enjoyed by the public. However, in stands identified as requiring special management for aesthetic purposes (i.e., visual buffers), MRC would employ a unique harvest prescription designed specifically to minimize visual effects. The majority of these buffer stands would be at least 100 ft (30 m) wide (minimum distance from the adjacent viewpoint). In many cases the buffers would be irregular in shape and designed so that visual impacts are minimized, taking into account other factors, such as local topography, that can contribute to minimization of visual effects.

Existing visual conditions experienced by highway travelers and recreation area users would not change substantially from existing conditions under the No Action alternative. Adverse visual effects of timber harvesting could be reduced to some extent relative to existing conditions because MRC has discontinued the use of traditional clearcutting and is transitioning towards uneven-aged silviculture. Even-aged management would still be used in some situations, such as restoration of stands from hardwood to conifer dominance.

Canopy coverage in the visual buffer stands would not change substantially as nearly the entire visible landscape in these areas would have greater than 40% canopy coverage. The percentage of the visible landscape in the visual buffers with high (> 60%) canopy coverage would fluctuate over time, but generally would be in the range of 60–70% of the buffer area (Figure 3.14-1, Appendix U).

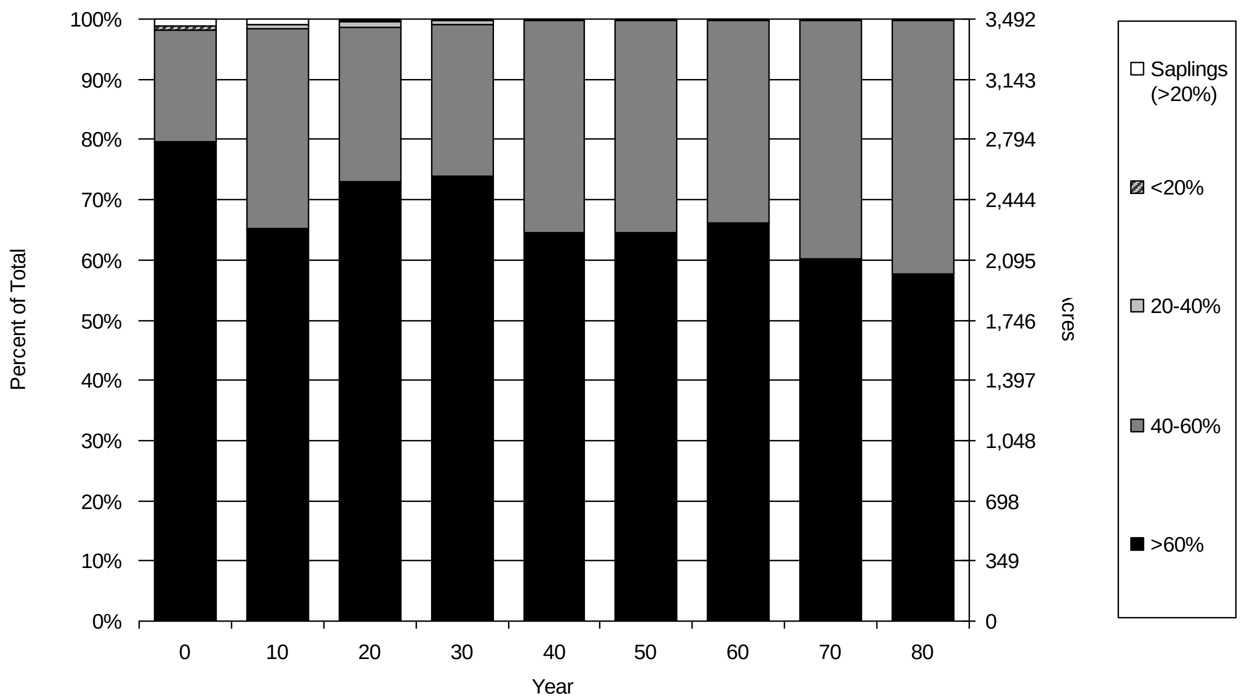


Figure 3.14-1. Acres in visual buffer polygons by canopy closure predicted under the No Action alternative.

Visual quality under the No Action alternative is expected to remain about the same as existing conditions. There would be no substantial change in existing scenic vistas and MRC's management activities would not substantially damage scenic resources or substantially degrade the existing visual character or quality of visible sites. For stands identified as requiring special management for aesthetic purposes (e.g., stands adjacent to public roads), MRC would employ a unique harvest prescription designed specifically to create visual buffer stands that minimize the visual impact of adjacent harvest. Therefore, effects on visual resources under the No Action alternative would be **less than significant**.

3.14.2.3 Proposed Action

Under the Proposed Action, MRC would continue to conduct timber harvesting in the primary assessment area within sight of highways eligible for scenic highway designation (e.g., State Highways 1, 20, and 128) and recreation areas on adjacent public lands (e.g., Jackson Demonstration State Forest). As described under the No Action alternative, in stands identified as requiring special management for aesthetic purposes (i.e., visual buffers), MRC would employ a unique harvest prescription designed specifically to create visual buffer stands that minimize visual effects. The majority of these buffer stands would be at least 100 ft (30 m) wide (minimum distance from the adjacent viewpoint). In many cases the buffers would be irregular in shape and designed so that visual impacts are minimized, taking into account other factors, such as local topography, that can contribute to minimization of visual effects.

As under the No Action alternative, conifer-dominated stands within the visible landscape would increase over time as hardwood and mixed-conifer stands are restored to conifer dominance. Adverse visual effects of timber harvesting could be reduced to some extent relative to existing conditions because MRC has discontinued the use of traditional clearcutting and is transitioning towards uneven-aged silviculture. Even-aged management would still be used in some situations, such as restoration of stands from hardwood to conifer dominance.

Canopy coverage in the visual buffer stands would not change substantially as nearly the entire visible landscape in these areas would have greater than 40% canopy coverage. Compared with the No Action alternative, the percentage of the visible landscape within the visual buffers with high (> 60%) canopy coverage would decrease slightly over time, but generally would be in the range of 50–60% of the buffer area for most of the 80-year term of the HCP/NCCP (Figure 3.14-2, Appendix U).

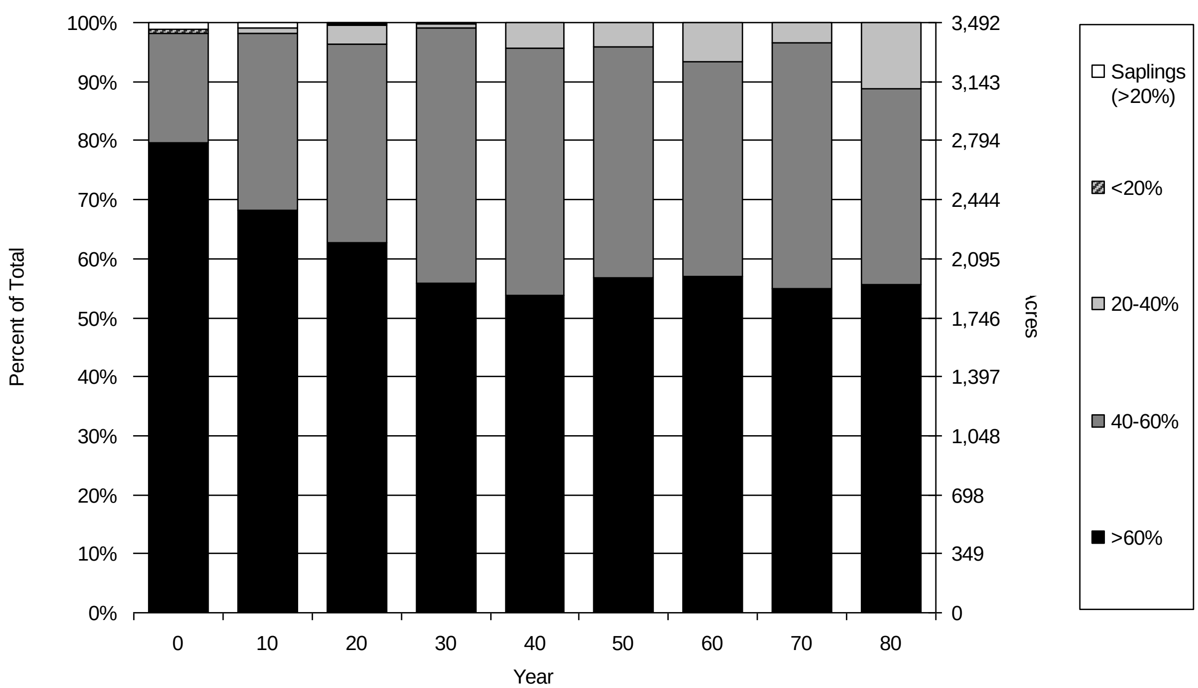


Figure 3.14-2. Acres in visual buffer polygons by canopy closure predicted under the Proposed Action.

Visual resource quality under the Proposed Action is expected to remain similar to existing conditions. There would be no substantial change in existing scenic vistas and MRC's management activities would not substantially damage scenic resources or substantially degrade the existing visual character or quality of visible sites. For stands identified as requiring special management for aesthetic purposes (e.g., stands adjacent to public roads), MRC would employ a unique harvest prescription designed specifically to create visual buffer stands that minimize the visual impact of adjacent harvest. Therefore, effects on visual resources under the Proposed Action would be **less than significant**.

3.14.2.4 Alternative A

Under Alternative A, harvesting and management activities would be the same as the Proposed Action, with additional measures to enhance conservation of key aquatic and terrestrial habitats. Therefore, additional stands, some of which would be visible from highways and recreation areas, would be subject to harvest restrictions that could enhance their visual character. In addition, as described under the No Action alternative, MRC would employ a unique harvest prescription designed specifically to create visual buffers in stands identified as requiring special management for aesthetic purposes. As under the No Action alternative, conifer-dominated stands within the visible landscape would increase over time as hardwood and mixed-conifer stands are restored to conifer dominance.

Canopy coverage in the visual buffer stands would not change substantially, but the percentage of the visible landscape within the buffer areas with high (> 60%) canopy coverage would increase compared with the No Action alternative, generally to around 80% of the buffer area (Figure 3.14-3, Appendix U).

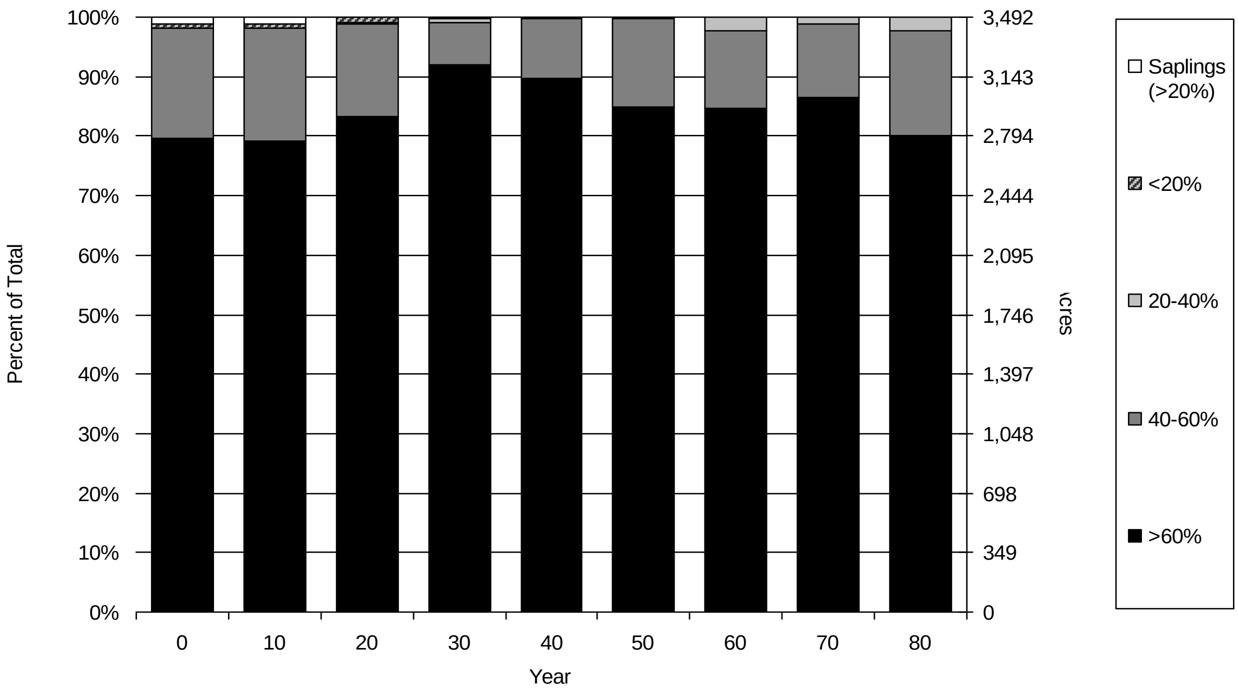


Figure 3.14-3. Acres in visual buffer polygons by canopy closure predicted under Alternative A.

As described under the No Action alternative, in stands identified as requiring special management for aesthetic purposes (i.e., visual buffers), MRC would employ a unique harvest prescription designed specifically to create visual buffer stands that would minimize visual effects. The majority of these buffer stands would be at least 100 ft (30 m) wide (minimum distance from the adjacent viewpoint). In many cases, the buffers would be irregular in shape and designed so that visual impacts are minimized, taking into account other factors, such as local topography. Visual quality under Alternative A is expected to increase relative to existing conditions and to what would occur under the No Action alternative because: (1) the visible landscape within the buffer areas with high (> 60%) canopy coverage would increase when compared with the No Action alternative and (2) canopy coverage would increase in many adjacent or other nearby stands where measures to enhance conservation of key aquatic and terrestrial habitats are employed. Therefore, effects on visual resources under Alternative A would be **beneficial**.

3.14.2.5 Alternative B

As described under the No Action alternative, MRC would employ a unique harvest prescription designed specifically to create visual buffers in stands identified as requiring special management for aesthetic purposes. Canopy coverage in the visual buffer stands would not change substantially, but the percentage of the visible landscape in these areas with high (> 60%) canopy coverage would increase compared with the No Action alternative, generally to around 80% of the buffer area (Figure 3.14-4, Appendix U). In addition, establishment of no-harvest reserves under Alternative B would result in reduced timber harvesting within these areas and, therefore, potential visual benefits would occur where the reserve areas are visible from adjacent highways or public recreation areas.

Areas outside of the no-harvest reserves would be subject to intensive harvesting using clearcutting. This would result in open areas with little canopy coverage for many years following harvest, creating additional viewshed issues (long-distance views into these open areas).

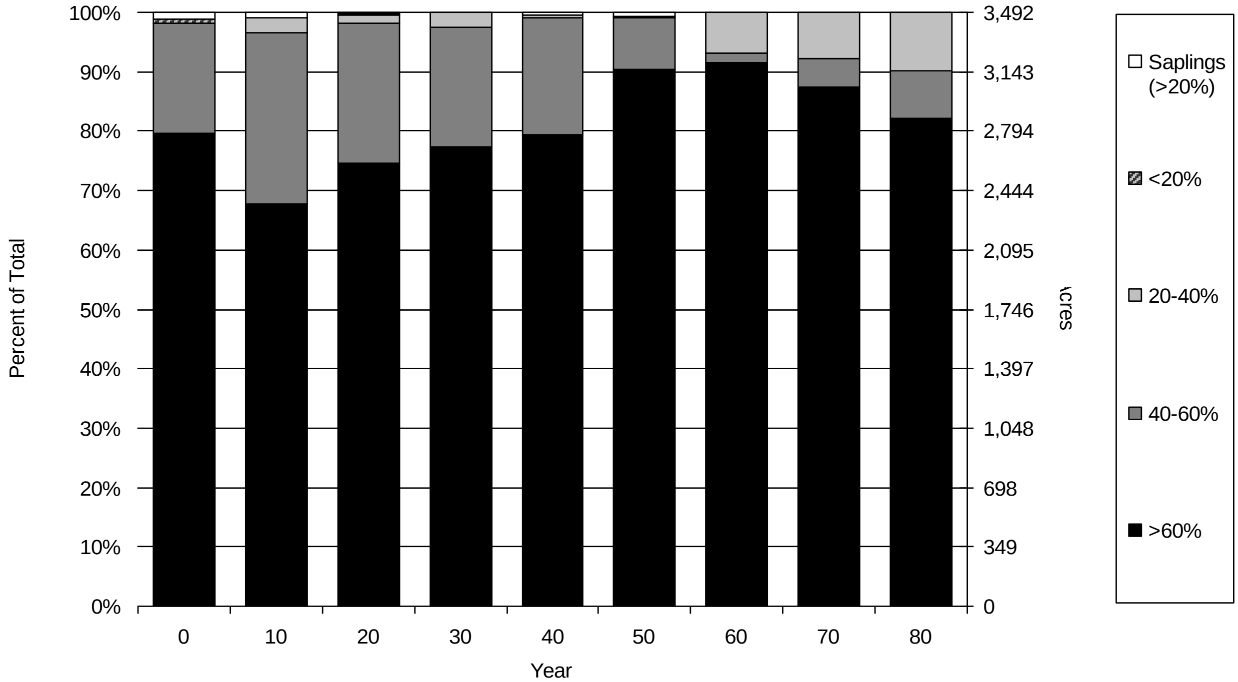


Figure 3.14-4. Acres in visual buffer polygons by canopy closure predicted under Alternative B.

Visual quality under Alternative B is expected to decrease relative to existing conditions and what would occur under the No Action alternative because areas outside of the reserves would be intensively harvested using clearcutting and the resulting open areas may be visible. However, restrictions on clearcut unit size and adjacency under the CFPRs would help to minimize these impacts on the viewshed. In addition, MRC would develop visual buffers (as needed) as part of each THP that would avoid visual impacts. Therefore, effects on visual resources under Alternative B would be **less than significant**.

3.14.2.6 Alternative C

Under Alternative C, the potential for effects on visual resources would be comparable to under the Proposed Action because the measures affecting visual resources would be the same under Alternative C as under the Proposed Action. The only difference between Alternative C and the Proposed Action for visual resources is that the conservation measures described under the Proposed Action would apply for a shorter term of 40 years. Therefore, visual effects under Alternative C would be **less than significant**.

3.14.2.7 Comparison of alternatives

Table 3.14-2 summarizes the effects of the alternatives on visual resources. Overall, the Proposed Action would provide a visual landscape similar to existing conditions and what is expected under the No Action alternative. Alternative A would provide for more canopy coverage in the visible stands than currently exists or would develop under the No Action alternative, resulting in beneficial effects on visual resources. Alternative B would result in more of the visual landscape outside of the reserves being subject to clearcutting, reducing the visual quality of these areas. Effects on visual resources under Alternative C would be similar to the Proposed Action.

Table 3.14-2. Comparison of alternatives for visual resources.

Resource	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Visual resources	Visual quality is expected to remain about the same as existing conditions. **Less than significant effect**.	Visual quality is expected to be similar to the No Action alternative. **Less than significant effect**.	Visual quality is expected to increase slightly relative to the No Action alternative. **Beneficial effect**.	Visual quality is expected to decrease relative to the No Action alternative. **Less than significant effect**.	Same as Proposed Action for a period of 40 years. **Less than significant effect**.

3.14.3 PTEIR alternate standard analysis for the Proposed Action, Alternative A, and Alternative C

In its TMP (Appendix A) and HCP/NCCP, MRC has proposed alternate standards to the current (2012) CFPRs, which would be implemented and included in PTHPs prepared under the Proposed Action, Alternative A, or Alternative C. Alternate standards are not proposed for the No Action alternative because no TMP, HCP, or NCCP would be implemented. Likewise, alternate standards are not proposed for Alternative B because no TMP or NCCP would be implemented. The 2012 CFPRs (14 CCR §1092[b]) authorize CAL FIRE to accept alternate standards in a PTHP where it has been demonstrated in a PTEIR that the alternate standard provides resource protections that are equal to or better than the standard operational rule and its implementation would have a less than significant impact on the environment. Also, where future changes in the CFPRs occur, the current operational standards (2012 CFPRs) may be accepted by CAL FIRE as alternate standards where the PTEIR has similarly demonstrated a less than significant impact.

The proposed alternate standards were reviewed by the lead agencies to determine the resource area(s) to which they apply (see Attachment D to Appendix A). For each alternate standard that applies to Visual Resources, the analysis in Sections 3.14.2.3, 3.14.2.4, and 3.14.2.6 and the cumulative effects analysis in Sections 4.14.2, 4.14.3, and 4.14.5 demonstrates that its implementation as part of the Proposed Action, Alternative A, or Alternative C would provide equal or better protection to Visual Resources than the 2012 CFPR standard and its implementation would either (1) not result in adverse environmental impacts or (2) result in impacts that are below the level of significant effect on the environment. This analysis considered the effects of implementing the proposed alternate standards as part of a suite of management and conservation measures contained in the HCP, NCCP, and TMP.

The following are the CFPRs for which alternate standards (or current operational standards, which due to a rule change could become an alternate standard) have been proposed by MRC in its TMP (Appendix A) and/or its HCP/NCCP and are applicable to Visual Resources:

913.1(a)(6-7), 913.4(a), 913.6(b)(4), and 913.6(e)(2).

The EIS/PTEIR analysis demonstrates that these alternate standards would provide equal or better protection to Visual Resources than the 2012 CFPR standard. Implementation of these alternate standards would have a less than significant impact and would not contribute to cumulative effects on Visual Resources, and may be proposed in PTHPs by MRC and approved by CAL FIRE (14 CCR §1092[c]).

A complete list of MRC's proposed alternate standards is included in the TMP (Appendix A) as Attachment D. Attachment D of the TMP also includes a reference to the location of each alternate standard in the TMP and/or HCP/NCCP, and the CFPR standard (rule) it would replace.

3.15 Recreation

This section describes the recreation resources within the assessment area, as well as the effects of implementing the alternatives on recreation resources. The recreation assessment area includes the primary and secondary assessment areas (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1).

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is similar to the primary assessment area and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects are assumed to therefore be similar to those in the primary assessment area.

3.15.1 Affected environment/Environmental setting

The primary assessment area contains portions of the Albion, Big, Garcia, Gualala, Navarro, Noyo, and Russian rivers and the South Fork Eel River. A portion of the South Fork Eel River is designated as a federal Wild and Scenic River. Recreational activities along these rivers include kayaking, canoeing, boating, fishing, swimming, and viewing wildlife. Mendocino County is a popular northern California destination for recreational activities and there are numerous state parks, beaches, and reserves in the region. The primary assessment area is also adjacent to Jackson Demonstration State Forest and several state parks and recreation areas.

Jackson Demonstration State Forest is managed by CAL FIRE and covers approximately 50,000 ac (20,200 ha) in west-central Mendocino County. Jackson Demonstration State Forest is located in the secondary assessment area, and a small portion of the eastern edge of Jackson Demonstration State Forest is adjacent to the primary assessment area on both the northern and southern borders. Recreation is a secondary land use objective on Jackson Demonstration State Forest, but is generally compatible with the primary land uses of "management" and "demonstration." Jackson Demonstration State Forest has become a popular destination for residents of the Mendocino coast, and supports additional recreational use from outside the local area. Recreational use of Jackson Demonstration State Forest is over 60,000 visitor-days annually, and CAL FIRE estimates that most of the use comes from residents of Mendocino County (CAL FIRE 2005). Important recreation activities occurring on Jackson Demonstration State Forest include camping, picnicking, hiking, biking, horseback riding, hunting, and shooting.

Van Damme State Park and Hendy Woods State Park are also nearby in the secondary assessment area. Hendy Woods State Park is adjacent to portions of the primary assessment area in the Navarro River drainage. Van Damme State Park is located west of the primary assessment area in the Little River drainage. These park facilities host recreational uses similar to those described above for Jackson Demonstration State Forest. The Skunk Train, a historic rail line and popular tourist attraction, runs between Fort Bragg and Willits, passing through a portion of the primary assessment area north of Jackson Demonstration State Forest.

MRC provides recreational opportunities on its forestlands, including the primary assessment area, to groups and individuals, subject to written permit authorization. These activities are permitted on a limited basis within specified areas, and include hiking, camping, picnicking, firewood cutting, bicycling, horseback riding, running, hunting, fishing, and collection of burls, mushrooms, greens, and basket making materials.

3.15.2 Environmental effects and mitigation

Recreation effects are considered significant if the alternatives would:

- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.
- Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.
- Diminish the recreational experiences enjoyed by the public.

There would likely be little or no direct or indirect effects on existing recreational facilities as a result of implementing the Proposed Action or alternatives in the primary assessment area. These issues are briefly discussed below but are not analyzed in detail in this EIS/PTEIR.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.15.2.7.

3.15.2.1 Analysis approach and methodology

The analysis in this section focuses on whether the alternatives would result in degradation of existing recreational experiences enjoyed by the public.

3.15.2.2 No Action alternative

Under the No Action alternative, there would be no anticipated change in MRC policy towards access to recreational opportunities on its lands. There would be no substantial change in existing access to MRC lands for recreational use compared with existing conditions and MRC’s management activities would not result in increased use of existing neighborhood and regional parks or other recreational facilities or require the construction or expansion of recreational facilities. Therefore, there would be **no effect** on recreational resources under the No Action alternative.

3.15.2.3 Proposed Action

Under the Proposed Action, there would be no anticipated change in MRC policy towards access to recreational opportunities on its lands. Under the Proposed Action, conservation measures for protection of aquatic and terrestrial habitats would generally result in improvements over time, relative to existing conditions (Section 3.4, Aquatic and Riparian Habitats and Species of Concern; and 3.6, Terrestrial Habitats and Wildlife Species of Concern), such that recreational experiences such as hiking, camping, picnicking, hunting, and fishing would be enhanced. Therefore, effects on recreational resources under the Proposed Action would be **beneficial**.

3.15.2.4 Alternative A

Under Alternative A, there would be no anticipated change in MRC policy towards access to recreational opportunities on its lands. Harvesting and management activities would be the same as the Proposed Action, with additional measures to enhance conservation of key aquatic and terrestrial habitats. These enhanced conservation measures would result in improvements in forest conditions and aquatic and terrestrial habitats over time, relative to existing conditions (Section 3.4, Aquatic and Riparian Habitats and Species of Concern; and 3.6, Terrestrial Habitats and Wildlife Species of Concern). Therefore, recreational experiences such as hiking, camping, picnicking, hunting, and fishing would be enhanced. Effects on recreational resources under Alternative A would therefore be **beneficial**.

3.15.2.5 Alternative B

Under Alternative B, there would be no anticipated change in MRC policy towards access to recreational opportunities on its lands. MRC would establish no-harvest terrestrial habitat reserves. Only limited management to meet ecological objectives would be allowed within these reserves. Establishment of reserves under Alternative B would result in reduced timber harvesting within these areas and, therefore, provide some potential for associated recreational benefits. It is not known whether these reserve areas would be the sites on which recreational activities would be allowed or could occur. Outside of the reserves, clearcutting could result in a decrease in the quality of visual resources (Section 3.14, Visual Resources) which could affect the recreational experience in these areas. Effects on recreational resources under Alternative B would be **less than significant**.

3.15.2.6 Alternative C

The only difference between Alternative C and the Proposed Action for recreational resources is that the conservation measures described under the Proposed Action would apply for a shorter term of 40 years. There would be no change in MRC's policy towards access to recreational opportunities on its lands is anticipated under Alternative C. Conservation measures for protection of aquatic and terrestrial habitats would generally result in improvements over time, relative to existing conditions (Section 3.4, Aquatic and Riparian Habitats and Species of Concern; and 3.6, Terrestrial Habitats and Wildlife Species of Concern) such that recreational experiences such as hiking, camping, picnicking, hunting, and fishing would be enhanced. Therefore, effects on recreational resources under the Proposed Action would be **beneficial** under Alternative C.

3.15.2.7 Comparison of alternatives

Table 3.15-1 summarizes the effects of the alternatives on recreational resources. None of the alternatives, including the Proposed Action, would result increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated. None of the alternatives would include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment. In addition, there would be no change in MRC's policy towards recreational access. The level of enjoyment would potentially increase under the Proposed Action, Alternative A, and Alternative C, as forest conditions and aquatic and terrestrial habitats are enhanced over time. Establishment of reserves under Alternative B would result in reduced timber harvesting within these areas and, therefore, provide some potential for associated recreational benefits. Outside of the reserves, clearcutting could result in a decrease in the quality of visual resources (Section 3.14, Visual Resources) which could affect the recreational experience in these areas.

Table 3.15-1. Comparison of alternatives for recreation.

Criteria	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Use of existing recreational facilities	Use of existing recreational facilities is expected to remain about the same as existing conditions. **No effect.**	Same as the No Action alternative. **No effect.**	Same as the No Action alternative. **No effect.**	Same as the No Action alternative. **No effect.**	Same as Proposed Action for a period of 40 years. **No effect.**
Construction or expansion of facilities	No construction or expansion of facilities is anticipated. **No effect.**	Same as the No Action alternative. **No effect.**	Same as the No Action alternative. **No effect.**	Same as the No Action alternative. **No effect.**	Same as Proposed Action for a period of 40 years. **No effect.**
Access to recreation on MRC lands	No change in MRC's policy towards recreational access. **No effect.**	Same as the No Action alternative. **No effect.**	Same as the No Action alternative. **No effect.**	Same as the No Action alternative. **No effect.**	Same as Proposed Action for a period of 40 years. **No effect.**
Level of Enjoyment by the Public	Recreational experiences such as hiking, camping, picnicking, hunting, and fishing could be enhanced through forest and habitat improvements relative to existing conditions. **No effect**.	Recreational experiences such as hiking, camping, picnicking, hunting, and fishing could be enhanced through forest and habitat improvements relative to the No Action. **Beneficial effect**.	Recreational experiences such as hiking, camping, picnicking, hunting, and fishing could be enhanced through forest and habitat improvements relative to the No Action. **Beneficial effect**.	Recreational experiences such as hiking, camping, picnicking, hunting, and fishing could be decreased through greater use of clearcutting outside of the reserves. **Less than significant effect**.	Same as Proposed Action for a period of 40 years. **Beneficial effect**.

3.15.3 PTEIR alternate standard analysis for the Proposed Action, Alternative A, and Alternative C

In its TMP (Appendix A) and HCP/NCCP, MRC has proposed alternate standards to the current (2012) CFPRs, which would be implemented and included in PTHPs prepared under the Proposed Action, Alternative A, or Alternative C. Alternate standards are not proposed for the No Action alternative because no TMP, HCP, or NCCP would be implemented. Likewise, alternate standards are not proposed for Alternative B because no TMP or NCCP would be implemented. The 2012 CFPRs (14 CCR §1092[b]) authorize CAL FIRE to accept alternate standards in a

PTHP where it has been demonstrated in a PTEIR that the alternate standard provides resource protections that are equal to or better than the standard operational rule and its implementation would have a less than significant impact on the environment. Also, where future changes in the CFPRs occur, the current operational standards (2012 CFPRs) may be accepted by CAL FIRE as alternate standards where the PTEIR has similarly demonstrated a less than significant impact.

The proposed alternate standards were reviewed by the lead agencies to determine the resource area(s) to which they apply (see Attachment D to Appendix A). For each alternate standard that applies to Recreation, the analysis in Sections 3.15.2.3, 3.15.2.4, and 3.15.2.6 and the cumulative effects analysis in Sections 4.15.2, 4.15.3, and 4.15.5 demonstrates that its implementation as part of the Proposed Action, Alternative A, or Alternative C would provide equal or better protection to Recreation than the 2012 CFPR standard and its implementation would either (1) not result in adverse environmental impacts or (2) result in impacts that are below the level of significant effect on the environment. This analysis considered the effects of implementing the proposed alternate standards as part of a suite of management and conservation measures contained in the HCP, NCCP, and TMP.

The following are the CFPRs for which alternate standards (or current operational standards, which due to a rule change could become an alternate standard) have been proposed by MRC in its TMP (Appendix A) and/or its HCP/NCCP and are applicable to Recreation:

913.6(e)(2).

The EIS/PTEIR analysis demonstrates that these alternate standards would provide equal or better protection to Recreation than the 2012 CFPR standard. Implementation of these alternate standards would have a less than significant impact and would not contribute to cumulative effects on Recreation], and may be proposed in PTHPs by MRC and approved by CAL FIRE (14 CCR §1092[c]).

A complete list of MRC's proposed alternate standards is included in the TMP (Appendix A) as Attachment D. Attachment D of the TMP also includes a reference to the location of each alternate standard in the TMP and/or HCP/NCCP, and the CFPR standard (rule) it would replace.

3.16 Cultural Resources

This section describes the cultural resources within the assessment area, as well as the effects of implementing the alternatives on cultural resources. The cultural resources assessment area includes the primary and secondary assessment areas (Section 1.2 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1).

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is similar to the primary assessment area and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects are assumed to therefore be similar to those in the primary assessment area.

3.16.1 Affected environment/Environmental setting

The current ethnographic profile of the Native American cultures in the vicinity of the assessment area includes the Wailaki, Cahto, Yuki, Northern Pomo, Central Pomo, Southern Pomo, Huchnom and Coast Yuki tribes.

A number of historical and archaeological sites (both Native American and early European) have been identified and recorded within the primary assessment area. Copies of these cultural resource records are on file with the Northwest Information Center of the California Historical Resources Information System at Sonoma State University.

3.16.2 Environmental effects and mitigation

Cultural resource effects are considered significant if the alternatives would:

- Cause a substantial adverse change in the significance of a historical resource as defined in Title 14, Chapter 3, Article 5, Section 15064.5 of CEQA.
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to Title 14, Chapter 3, Article 5, Section 15064.5 of CEQA.
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.
- Disturb any human remains, including those interred outside of formal cemeteries.

A summary and comparison of the potential effects of the alternatives are presented in Section 3.16.2.7.

3.16.2.1 Analysis approach and methodology

Timber harvesting and other management operations can result in effects on cultural resources of all kinds, both individual sites and linear cultural resources such as trails, old wagon roads and railroad grades. The amount of timber harvest (acres) each decade is used to indicate the potential for disturbance or destruction of significant cultural resources in the primary assessment area because increased harvest area would entail more risk of encountering unknown cultural resources.

3.16.2.2 No Action alternative

Based on timber modeling (described in Appendix E), the number of acres subject to timber harvest activities under the No Action alternative would decline from existing conditions over the first decade, but would substantially and steadily increase over the next several decades. As a result of the larger harvest footprint, the number of cultural and historic sites potentially affected by timber harvest could increase. However, much of the increased harvest area would consist of areas harvested sometime in the past such that cultural and historic sites within the harvest footprint would largely be known and effects on these resources would be avoided.

However, under the No Action alternative, MRC would continue to comply with the CFPRs in the preparation of THPs. Pursuant to the CFPRs (14 CCR §929), the following steps must be taken in preparation of THPs to protect cultural resources.

Prior to submitting a THP, the Registered Professional Forester, or the Registered Professional Forester’s supervised designee would:

- Conduct an archaeological records check at the appropriate Information Center. A previously conducted archaeological records check for the property may be used to satisfy this requirement if it covers the entire area proposed for timber operations and if it meets the definition of "current archaeological records check." MRC's property wide sensitivity study acts as a "current arch records check," and is updated every five years.
- Provide written notification to Native Americans of the preparation of a plan. The primary purpose for this notification is to provide Native Americans an opportunity to disclose the existence of any Native American archaeological or cultural sites that are potentially within or adjacent to the site survey area, and the opportunity to comment on the plan.
- Provide a professional archaeologist or a person with archaeological training (in accordance with the CFPRs (14 CCR §929.4) to conduct a field survey for archaeological and historic sites in the area covered by the THP (previous archaeological surveys within the site survey area may also be used to partially or entirely satisfy this requirement).
- Ensure that research is conducted prior to the field survey, including review of appropriate literature and contacting knowledgeable individuals concerning potential archaeological or historic sites occurring on the property.

In addition, the Registered Professional Forester or the Registered Professional Forester's supervised designee shall:

- Provide a written notice to Native Americans informing them of the presence of Native American cultural resources within the site survey area.
- Submit a copy of all letters sent pursuant to the CFPRs (14 CCR §929.1) to the Director of CAL FIRE. The Director shall allow a minimum of 15 days from the date of the notification letter for receipt of responses to notices sent pursuant to the CFPRs (14 CCR §929.1) prior to the close of public comment.
- Prepare a confidential addendum to the THP, which includes (but is not limited to):
    - Administrative Information, which is not confidential and may be released to the public (name, affiliation, address, and phone number of the archaeological surveyor; plan name and location, etc.).
    - Archaeological Records Check Information. A copy of the records check request and written reply (including mapped information) from the Information Center shall be attached, or a justification as to why that is not possible shall be included. MRC has this justification because it has completed a property wide sensitivity study.
    - Results of notification to Native Americans pursuant to the CFPRs (14 CCR §929.1).
    - Results of notification to Native Americans of the existence of a Native American archaeological or cultural site on the plan, if required, pursuant to the CFPRs (14 CCR §929.1).
    - A list of the research done prior to a field survey. This list shall include literature reviewed and persons contacted in addition to the required archaeological records check with Information Center and Native Americans, and a summary of the results of this research.
    - Information on the current or previous archaeological surveyor(s), which is not confidential.
    - Description of archaeological survey methods and procedures including survey strategy, time spent conducting archaeological field survey, the date or dates the survey was conducted, survey coverage intensity, and ground visibility or other limitations.

- A list and description of all archaeological or historical sites identified within the site survey area including information on the site(s) size, type, and condition.
- An Archaeological Coverage Map or maps prepared in accordance with the specifications identified in the definition of an Archaeological Coverage Map in 14 CCR §895.1.
- Description of any specific enforceable protection measures to be implemented both within the site boundaries and within 100 ft (30 m) of the site boundaries.
- Other applicable information as identified in the CFPRs (14 CCR §929.1).

If damaging effects from timber operations cannot be avoided, a preliminary determination of significance of identified archaeological and historical sites must be made. This determination is to be based upon the criteria for a significant archaeological or historical site listed in the CFPRs.

If an archaeological or historical site is discovered after a plan has been accepted by CAL FIRE, the person making the discovery is to immediately notify CAL FIRE, the licensed timber operator, Registered Professional Forester or timberland owner of record. No timber operations are to occur within 100 ft (30 m) of the identified boundaries of the new site until the Registered Professional Forester of record proposes, and CAL FIRE agrees to, appropriate, specific, enforceable protection measures. Implementation of these protection measures would ensure that effects would be **less than significant**.

Pursuant to Public Resources Code, in the event of discovery or recognition of any human remains outside a dedicated cemetery, no further disturbance of the site or any nearby area would occur until the county coroner determined that no investigation of the cause of death is required. If the remains are of Native American origin, then the descendants of the deceased Native Americans must make a recommendation to the landowner or the person responsible for the excavation work for means of treating or disposing of, with appropriate dignity, the human remains of any associated grave goods as provided in Public Resources Code Section 5097.98. Further work could occur if the California Native American Heritage Commission was unable to identify a descendant or the descendant failed to make a recommendation within 24 hours after being notified by the Commission. These resource protection measures would ensure that effects under the No Action alternative would be **less than significant**.

3.16.2.3 Proposed Action

NMFS and USFWS have determined that because of the large land area involved and the duration of the permits under the Proposed Action, compliance with Section 106 of the National Historic Preservation Act (16 USC 470[f]) can be accomplished most efficiently through a Programmatic Agreement (36 CFR §800.14 [a]) that tiers to the PTHP and CAL FIRE review process for the identification and protection of cultural resources.

Under the Proposed Action, for timber harvest and related activities that fall under the state PTHP/CAL FIRE review process, MRC would continue to follow the state process described above for the No Action alternative and would update its Archeological Sensitivity Study every five years. The Services, MRC, CAL FIRE, and other signatories to the Programmatic Agreement would conduct a review of the agreement every five years to ensure that MRC is implementing effective procedures to protect cultural resources.

As described above for the No Action alternative, the state process requires a current archaeological records check; written notification to Native Americans; submission of confidential archaeological addendums; submittal of archaeological and historical information to information centers; pre-field research; field inventory; protection measures for plans and emergency notices; post-review site discovery plans; archaeological training requirements; site recordation; determination of significance; and protection of sites during timber operations. These measures would continue to be implemented under the Proposed Action.

For MRC activities that are not subject to the PTHP/CAL FIRE review process, MRC would continue to follow the state procedures for the identification of cultural resources, and would implement the following additional measures:

- A specialist in the area of archeology would provide oversight on non-PTHP covered activities. All cultural resources work would be reviewed and approved by a specialist for MRC prior to project implementation.
- The specialist for MRC would coordinate with the State Historic Preservation Officer, Tribal Historic Preservation Officers and the Services as necessary, for tribal consultation, mitigation of adverse effects, meetings, and reporting.
- The specialist for MRC would, as information is gathered, synthesize the results of the field surveys and historic properties identified and prepare written documentation following the Confidential Archaeological Addendums guidelines for all non-PTHP related activities covered under the permits. In addition, the specialist would ensure that complete, clean copies of archaeological reports are forwarded to the appropriate Information Center of the California Historical Resource Information System for permanent retention.

For all activities under the Proposed Action, MRC would immediately stop activities in the vicinity of any inadvertent discovery or effect and would make all reasonable efforts to avoid or minimize harm to the discovery of affected sites until a professional archaeologist is able to assess the site. If the site is a historic property, the CAL FIRE or MRC specialist would develop and implement measures that would protect the property. If protective measures cannot be developed, the Services would be contacted by written notification, at which time they would have 14 days to initiate consultation pursuant to 36 CFR §800.

Under the Proposed Action, there would be little change in the way in which cultural resources regulations are applied and MRC would continue to comply with the CFPR cultural resources protections discussed above under the No Action alternative and the stipulations in the Programmatic Agreement. Therefore, the potential for effects on known historic and archaeological sites or human remains are expected to be comparable to what would occur under the No Action alternative.

Under the Proposed Action, the volume extracted per acre of harvest is expected to increase such that harvest would occur on a smaller area than under the No Action alternative. As a result of the smaller harvest footprint, effects on cultural and historic properties would be less than under the No Action alternative and **less than significant**.

3.16.2.4 Alternative A

Under Alternative A, harvesting and management activities would be the same as the Proposed Action, with additional measures to enhance conservation of key aquatic and terrestrial habitats. The enhanced conservation measures would not change the way in which cultural resources regulations are applied, and MRC would continue to comply with the CFPR cultural resources protections and the Programmatic Agreement discussed above under the Proposed Action. The potential for effects on known historic and archaeological sites or human remains under

Alternative A are expected to be comparable to what would occur under the No Action alternative.

Under Alternative A, the volume extracted per acre of harvest is expected to increase such that harvest would occur on a smaller area than under the No Action alternative. As a result of the smaller harvest footprint, effects on cultural and historic properties are expected to be less than under the No Action alternative and **less than significant**.

3.16.2.5 Alternative B

Under Alternative B, MRC would establish no-harvest terrestrial habitat reserves. The establishment of no-harvest reserves under Alternative B would not substantially change the ways in which cultural resources are protected, and MRC would continue to comply with the CFPR cultural resources protections and the Programmatic Agreement discussed above under the Proposed Action. The potential for effects on known historic and archaeological sites or human remains under Alternative B are expected to be comparable to what would occur under the No Action alternative.

Under Alternative B, the volume extracted per acre of harvest is expected to increase such that harvest would occur on a smaller area than under the No Action alternative. As a result of the smaller harvest footprint, effects on cultural and historic properties are expected to be less than under the No Action alternative and **less than significant**.

3.16.2.6 Alternative C

The only difference between Alternative C and the Proposed Action for cultural resources is that the proposed conservation measures would apply for a shorter term of 40 years. This does not change the ways in which cultural resources are protected relative to the Proposed Action. Under Alternative C, the number of acres subject to timber harvest would be the same as under the Proposed Action for the first 40 years (less than under the No Action alternative). As a result of the smaller harvest footprint, potential effects on cultural and historic properties are expected to be less than under the No Action alternative and would be **less than significant**.

3.16.2.7 Comparison of alternatives

Table 3.16-1 summarizes the effects of the alternatives on cultural resources. None of the action alternatives, including the Proposed Action, would substantially change the way in which cultural resources regulations are applied. Under the Proposed Action, Alternative A, and Alternative B, the volume extracted per acre of harvest is expected to increase such that harvest would occur on a smaller area than under the No Action alternative. As a result of the smaller harvest footprint, effects on cultural and historic properties are expected to be less than under the No Action alternative. Effects on cultural resources under Alternative C would be similar to the Proposed Action.

Table 3.16-1. Comparison of alternatives for cultural resources.

Subcategory	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Overall effects on cultural resources	Increase in disturbance compared with existing conditions. **Less than significant effect**.	Reduced potential for disturbance compared with No Action alternative. **Less than significant effect**.	Reduced potential for disturbance compared with No Action alternative. **Less than significant effect**.	Reduced potential for disturbance compared with No Action alternative. **Less than significant effect**.	Same as Proposed Action for a period of 40 years. **Less than significant effect**.

3.17 Social and Economic Conditions

This section describes the social and economic (“socioeconomic”) conditions within the assessment area, as well as the effects of implementing the alternatives on socioeconomic resources. Since timber management activities in the assessment area can influence local and regional social and economic conditions, the following socioeconomic review and analysis includes the primary and secondary assessment areas in the context of Mendocino County.

The secondary assessment area includes timberlands that MRC could potentially acquire during the life of the permits as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support an analysis as detailed as the analysis conducted in the primary assessment area. However, land in the secondary assessment area that would potentially be acquired by MRC is similar to the primary assessment area and has been subject to similar management (i.e., commercial timber harvest). The affected environment and potential effects are assumed to therefore be similar to those in the primary assessment area.

3.17.1 Affected environment/Environmental setting

3.17.1.1 Population

Mendocino County has experienced relatively steady population growth over the past decade (Table 3.17-1). Since 2000, Mendocino County’s population has grown by approximately 4%. This compares with the state’s growth rate over the same period of nearly 15%.

Table 3.17-1. Population data for Mendocino County.

Year	Mendocino County
2000	86,618
2001	87,604
2002	88,283
2003	89,015
2004	89,486
2005	89,698
2006	89,441
2007	89,615

Year	Mendocino County
2008	90,001
2009	90,039

Source: Employment Development Department (2011a).

3.17.1.2 Economic factors

In Mendocino County, the Government sector generally provides the greatest percentage of employment by industry sector (Table 3.17-2). The Trade, Transportation, and Utilities sector also provide a substantial amount of employment, followed by the Manufacturing and Leisure sectors. The Mining and Logging sector, which accounted for approximately 300 jobs in Mendocino County in 2010 only includes those identified as miners or loggers and does not include workers associated with the timber harvest industry such as road builders, haulers, mill workers, lumber truck drivers, and office staff that are reflected in other categories.

The California Employment Development Department projected that employment in the Natural Resources and Mining sector would increase from 800 to 850 (6.3%) from 2006 to 2016 in the North Coast region (Del Norte, Humboldt, Lake, and Mendocino counties) (Employment Development Department 2009a).

Table 3.17-2. Employment by industry sector in Mendocino County.

Industry	2000		2010	
	Jobs	%	Jobs	%
Total Farm	2,490	6.1	1,530	4.0
Mining and Logging	650	1.6	300	0.8
Construction	1,490	3.6	950	2.5
Manufacturing	4,790	11.6	2,170	5.7
Trade, Transportation, and Utilities	5,870	14.3	5,630	14.8
Information	480	1.2	330	0.9
Financial Activities	950	2.3	1,190	3.1
Professional and Business Services	1,670	4.1	1,800	4.7
Educational and Health Services	3,450	8.4	3,720	9.8
Leisure and Hospitality	3,730	9.1	3,610	9.5
Other Services	790	1.9	730	1.9
Government	6,370	15.5	7,280	19.1
Civilian Employment	41,150	--	38,150	--

Note: Sum of jobs in each sector will not equal Civilian Employment.
Percentage (%) indicates the percentage of Civilian Employment in each sector based industry.
Source: Employment Development Department (2011b).

Average annual unemployment in Mendocino County is shown in Table 3.17-3. Mendocino County has experienced higher unemployment than the state as a whole, with an annual unemployment rate 1–3 percentage points higher than the state average.

Table 3.17-3. County and state unemployment.

Year	Mendocino County (%)
2000	5.6
2001	5.9
2002	6.7
2003	6.9
2004	6.4
2005	5.8
2006	5.2
2007	5.5
2008	6.9
2009	10.3
2010	11.4

Source: Employment Development Department (2009b, 2011c).

Forest management activities carried out by MRC influence the local economy in a number of ways. MRC currently employs about 40 full-time, part-time and seasonal workers. MRC's associated mills, and treating and distribution businesses employ an additional 300 full-time and part-time workers (J. Ramaley, MRC, pers. comm., 2011). In addition to the employment of MRC and its associated companies, MRC purchases products and engages in contracts with over 150 suppliers, most of which are located in Mendocino County. The majority of these contracts are involved in the timber harvest and hauling operations. MRC currently uses about 175 to 200 contract loggers, timber fallers, truck drivers, and road crew operators annually, with expenses of over $11 million in 2010 (J. Ramaley, MRC, pers. comm., 2011). In addition, MRC contracts for owl surveys (about 8 surveyors), plant surveys (3 surveyors), tree planting (600+ person days), and vegetation treatment (3000 person days) on an annual basis (J. Ramaley, MRC, pers. comm., 2011).

Data collected on MRC manufacturing operations indicate that the direct employment per million board feet of harvest is 12.2 jobs (MRC 2008a). The jobs considered in this "timber jobs" multiplier include foresters, biologists, watershed specialists, timber harvest contractors, managers, and mill workers. Excluded from the multiplier are contractors engaged in road construction and vegetation management. Also excluded are consultants, inspectors, and vendors associated with timber harvest. The "timber jobs" multiplier also does not include employees associated with the Calpella Distribution Center and the Ukiah wood treatment plant, which are estimated to employ 7.3 workers per million board feet. These jobs are included in the regional employment multiplier described below.

Additional contributions of MRC land management to local economic conditions include the indirect effect of employee wages on the purchase of goods and services from local businesses, and the contribution of yield taxes on timber purchases, which are distributed to Mendocino County. McKillop (1995) estimated a timber industry regional employment multiplier of 2 and an regional income multiplier of 1.6, per million board feet of timber harvested (applied to the direct employment and payroll numbers to estimate regional employment and payrolls). McKillop and Spriggs (1993) estimated that $257 per year is collected in local sales tax for each job created directly and indirectly by timber harvesting in California, Oregon, and Washington. This amounts to $6,246 in sales tax revenue per million board feet harvested. The average yield tax per million board feet of conifer harvest in Mendocino County is estimated to be $13,630 (MRC 2008a).

Table 3.17-4 shows the effect of MRC's timber harvest on the local economy per million board feet of conifers harvested and the estimated annual contribution from MRC's harvest activities from 1999 to 2008.

Table 3.17-4. Effect of MRC's timber harvest on the local economy and the estimated annual contribution from MRC's harvest activities, 1999-2008.

Timber jobs	Regional jobs	Timber payrolls	Regional payrolls	Yield tax	Sales tax
Multipliers per million board feet of timber harvested					
12.2	24.3	$274,300	$438,600	$13,630	$6,246
Estimated average annual contribution (1999–2008) from harvest (31.5 million board feet)					
384	765	$8,640,450	$13,815,900	$429,345	$196,749

3.17.2 Environmental effects and mitigation

Socioeconomic effects are considered significant if the alternatives would:

- Induce substantial population growth in an area, either directly or indirectly.
- Foster economic or population growth, or the construction of additional housing, either directly or indirectly.
- Remove obstacles to population growth.
- Encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively.

3.17.2.1 Analysis approach and methodology

Harvest projections (volume) under each alternative are scaled using the multipliers described above to estimate timber jobs and payrolls associated with MRC's timber harvest projections (Appendix E). Regional employment and payrolls indirectly associated with MRC's timber harvest are estimated using the regional multipliers described above on the average annual volume of timber harvest (by decade).

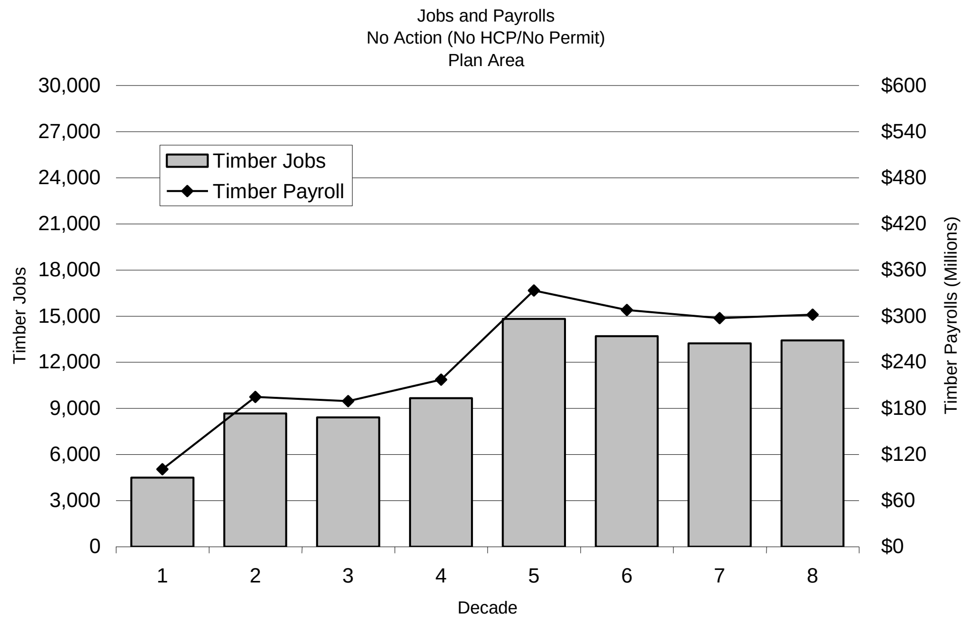
Over the term of the Proposed Action, key socioeconomic indicators (e.g., regional employment and payroll, employment and payroll in the timber industry) are likely to be affected by several internal (e.g., continued implementation of MRC's TMP [Appendix A]) and external influences (e.g., market forces in the lumber and wood products sector) that are unrelated to the proposed HCP/NCCP. The analysis assumes that MRC remains a viable timber manager under each of the alternatives and that substantial land transfers among existing residential, urban, and intensive agricultural land uses would not occur. The analysis does not evaluate what would happen in Mendocino County if there were no timber industry, or if MRC was no longer viable.

This analysis assesses the potential for changes in jobs and payrolls in the timber industry and region to occur under the alternatives, but does not determine the significance of these changes beyond their potential for growth inducing effects. The analysis comparing alternatives cannot capture the harm done to an individual by loss of a job. Similarly, the analysis cannot capture the gain in well-being to an individual who finds more secure long-term employment as a result of implementing one of the alternatives. Environmental justice effects are assessed in accordance with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (11 February 1994).

3.17.2.2 No Action alternative

As discussed above, regional employment and payroll are likely to be affected by several internal (i.e., MRC-related) and external influences that are unrelated to MRC's harvest activities under the No Action alternative. In addition, regulatory requirements would continue to affect management activities in the primary assessment area and have the potential to affect timber harvesting and socioeconomic conditions (employment and payroll in the timber industry) in the absence of an HCP/NCCP. Consequently, some changes in socioeconomic conditions relative to existing conditions could occur.

Based on timber modeling (Appendix E), timber harvest (volume) would increase from existing conditions during the first decade and continue to increase over the next 40 years, with harvest volume stabilizing after that time. This increase in harvest would result in a corresponding increase in employment and payroll in the timber industry. Figure 3.17-1 and Appendix V present results for employment and payroll in the timber industry and the region based on MRC's harvest levels under the No Action alternative for each decade. The increase in employment and payroll over time is not anticipated to result in substantial population growth, housing construction, or activities that could significantly affect the environment. Effects on socioeconomic conditions would be **less than significant** under the No Action alternative.



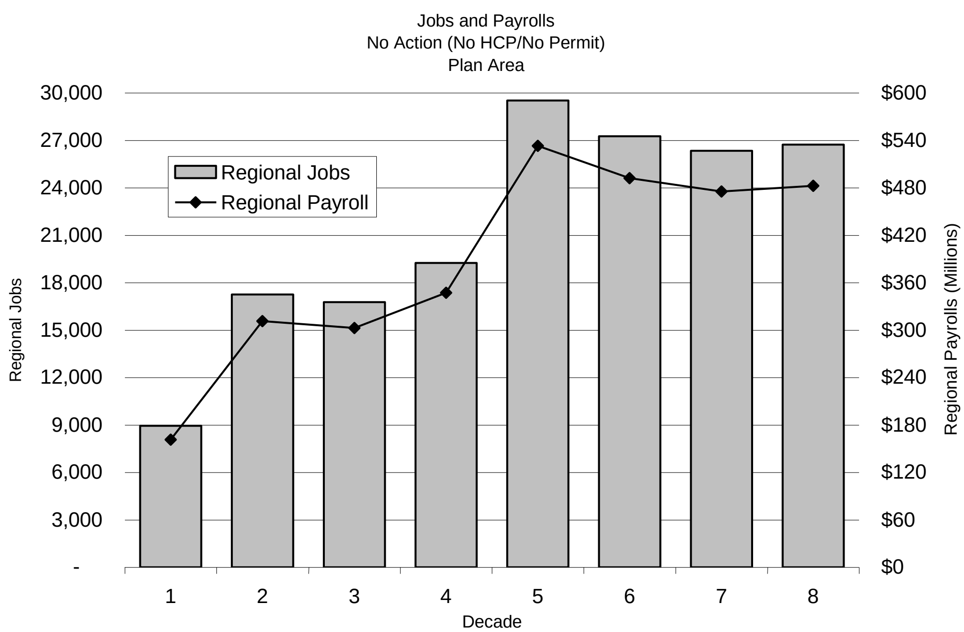


Figure 3.17-1. Jobs and payroll for timber and regional jobs predicted under the No Action alternative.

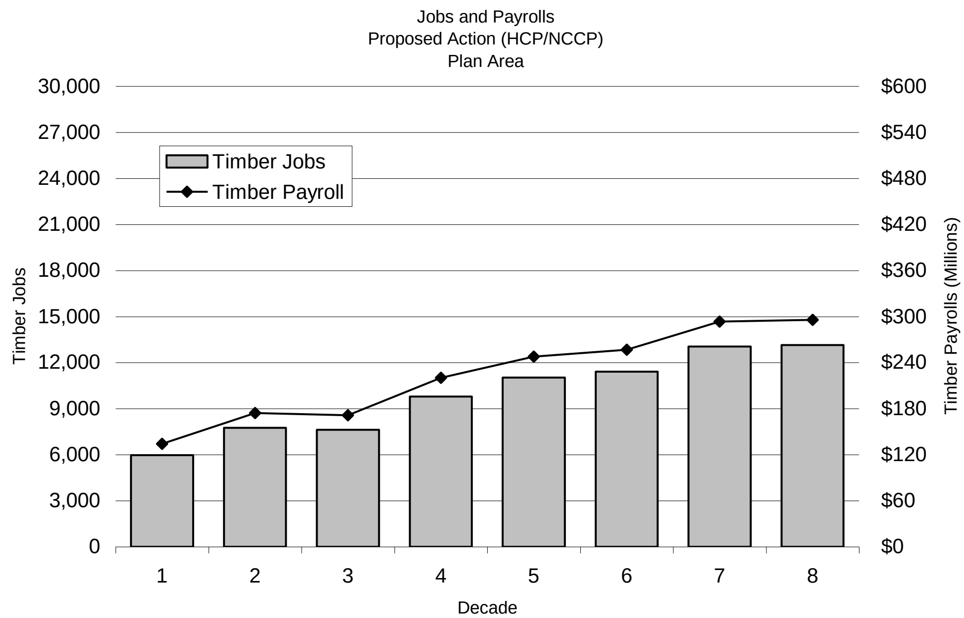
3.17.2.3 Proposed Action

As described above, MRC's future employment levels are dependent on the volume of timber harvest, such that MRC employment under the Proposed Action would be similar to employment levels under the No Action alternative. As indicated in Figure 3.17-2 and Appendix V, the trend under the Proposed Action is for a steadier, more even rise in employment and payroll in the timber industry and region compared with similar projections under the No Action alternative.

This is viewed as a potential benefit from the perspective of providing a level of predictive stability to the regional economy.

The implementation of measures contained in the proposed HCP/NCCP that augment existing practices described under the No Action alternative (e.g., road management and decommissioning actions) would generate additional employment needs for skilled equipment operators. The employment of contract employees for road upgrading and decommissioning work, and skilled workers associated with the monitoring elements of the HCP/NCCP would likely increase over time.

Overall, the changes in timber harvest levels under the Proposed Action compared with the No Action alternative and existing conditions are not anticipated to have a substantial effect on local businesses supported by the indirect effects of MRC employment or result in substantial population growth, housing construction, or activities that could significantly affect the environment. Therefore, overall effects on socioeconomic conditions would be **less than significant** under the Proposed Action.



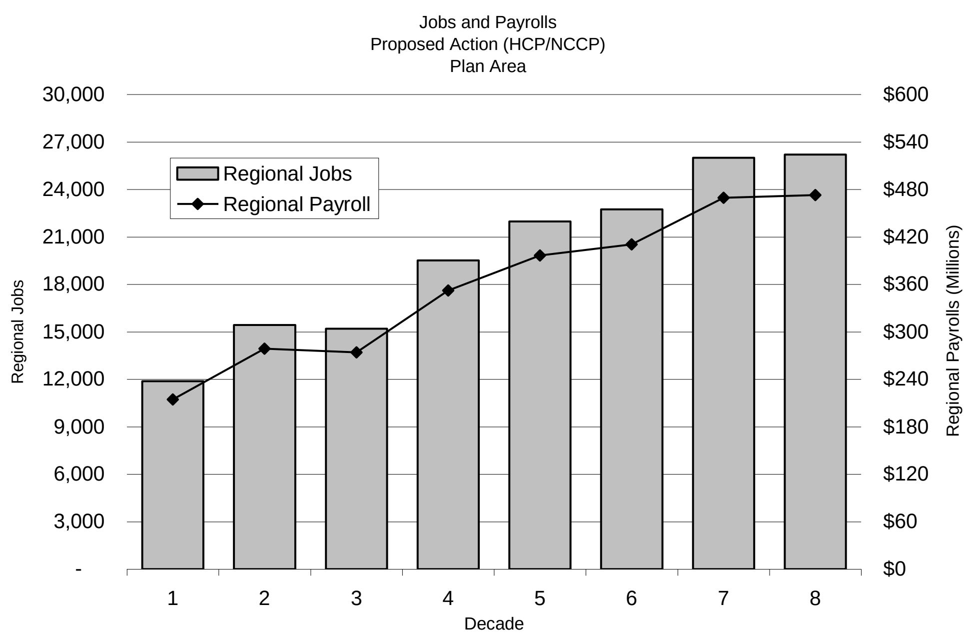


Figure 3.17-2. Jobs and payroll for timber and regional jobs predicted under the Proposed Action.

3.17.2.4 Alternative A

Under Alternative A, the volume of timber harvested from the primary assessment area would increase over the 80-year permit term compared with existing conditions, but would stabilize at a harvest volume somewhat less than anticipated under the No Action alternative. As described above, MRC's future employment levels are dependent on the volume of timber harvest, such that there would be a decrease in MRC employment relative to employment under the No Action alternative. However, as indicated in Figure 3.17-3 and Appendix V, the trend under Alternative

A is for a steadier, more even rise in employment and payroll in the timber industry and region compared with similar projections under the No Action alternative. This is viewed as a potential benefit from the perspective of providing a level of predictive stability to the regional economy.

The implementation of measures contained in the proposed HCP/NCCP that augment existing practices described under the No Action alternative (e.g., road management and decommissioning actions) would generate additional employment needs for skilled equipment operators. The employment of contract employees for road upgrading and decommissioning work, and skilled workers associated with the monitoring elements of the HCP/NCCP would likely increase over time.

Overall, it is anticipated that there would be an increase in jobs and payroll in the timber industry and region compared with existing conditions over the 80-year permit term; however this increase would be less than anticipated under the No Action alternative. The changes in regional employment and payroll anticipated under Alternative A are not anticipated to result in substantial population growth, housing construction, or activities that could significantly affect the environment. Therefore, overall effects on socioeconomic conditions would be **less than significant** under Alternative A.

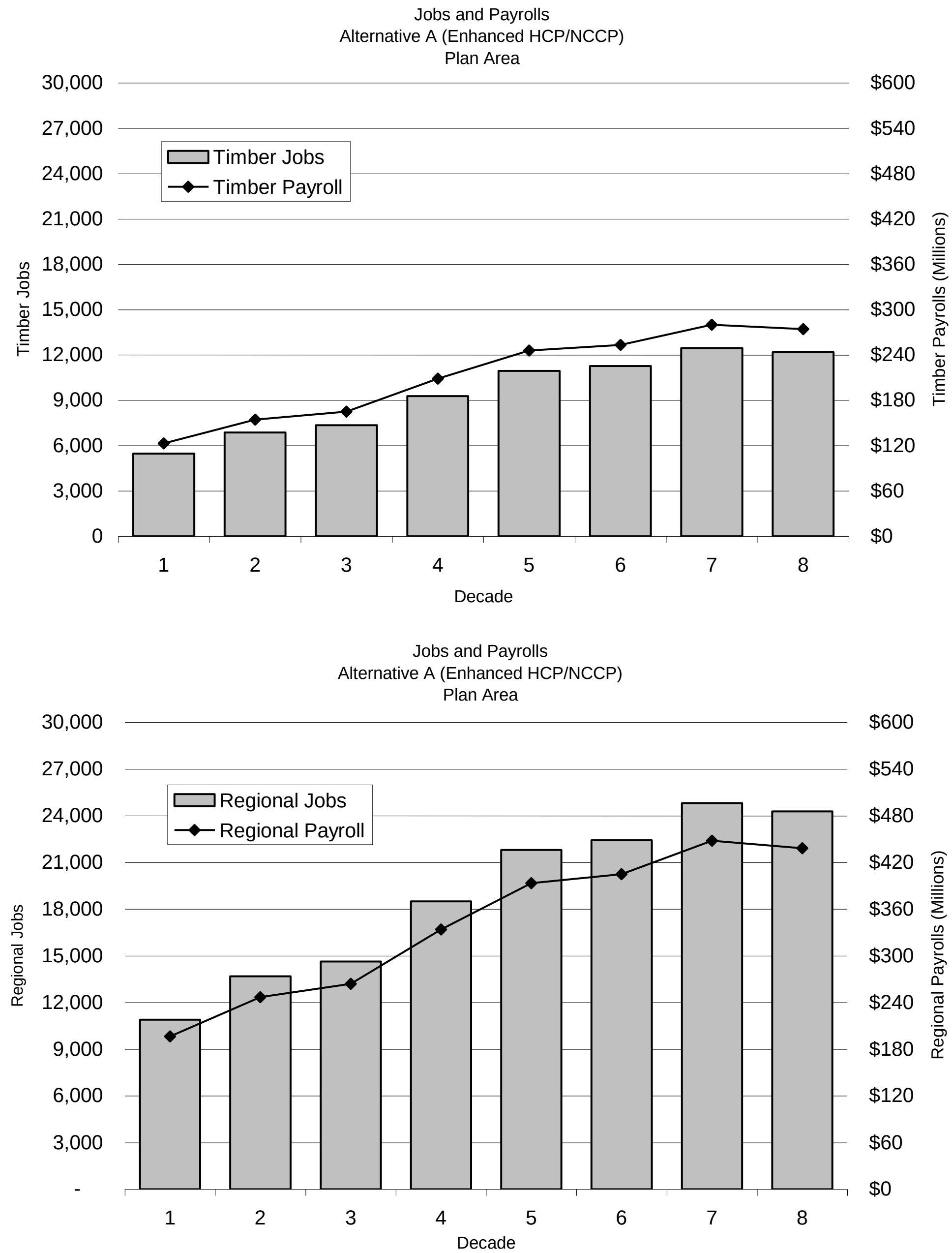
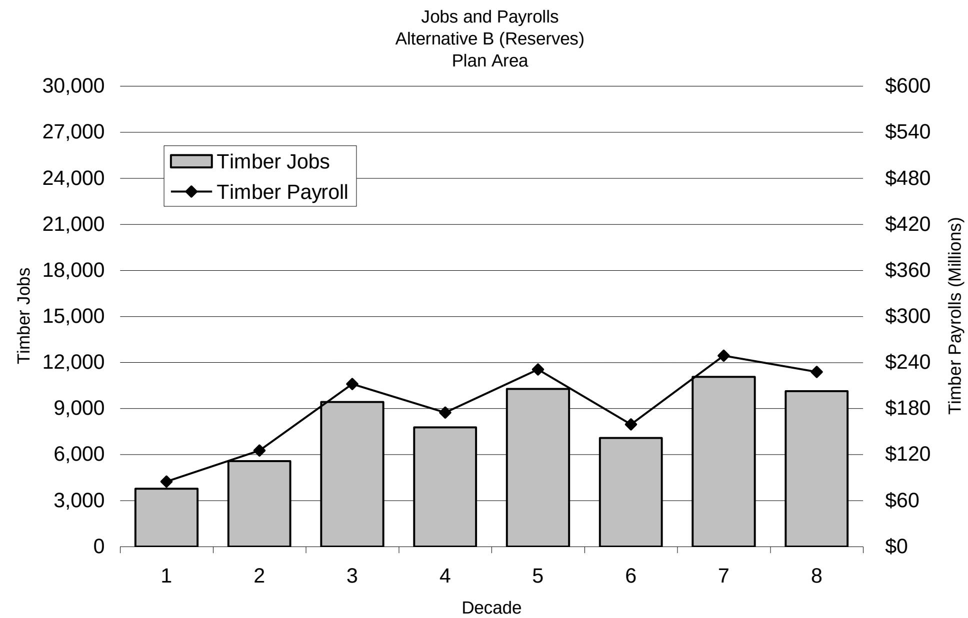


Figure 3.17-3. Jobs and payroll for timber and regional jobs predicted under Alternative A.

3.17.2.5 Alternative B

The establishment of no-harvest terrestrial habitat reserves under Alternative B could result in the loss of some additional timber volume relative to the No Action alternative. As described above, MRC's future employment levels are dependent on the volume of timber harvested, such that there would be a corresponding reduction in MRC employment relative to employment under the No Action alternative. As indicated in Figure 3.17-4 and Appendix V, the trend under Alternative B is for an increase in jobs and payroll in the timber industry and region relative to existing conditions; however, the increase would be substantially less than under the No Action alternative.

The decreases in timber harvesting could have a substantial effect on local businesses supported by the indirect effects of MRC employment. However, the changes in regional employment and payroll anticipated under Alternative B are not anticipated to result in substantial population growth, housing construction, or activities that could significantly affect the environment. Therefore, effects on socioeconomic conditions would be **less than significant** under Alternative B.



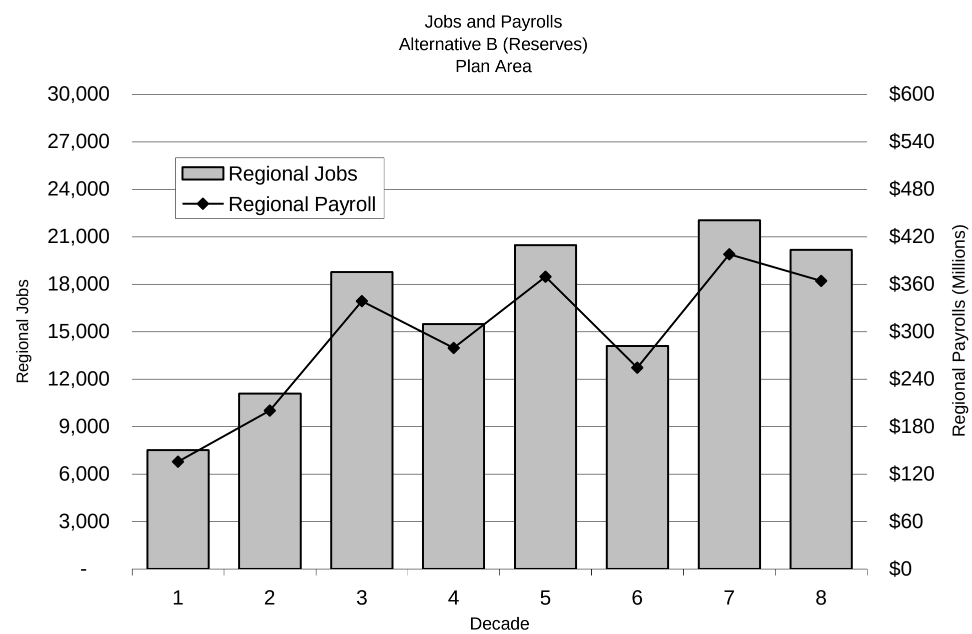


Figure 3.17-4. Jobs and payroll for timber and regional jobs predicted under Alternative B.

3.17.2.6 Alternative C

Socioeconomic effects under Alternative C would be the same as those under the Proposed Action. The only difference between Alternative C and the Proposed Action affecting socioeconomic conditions is that the proposed conservation measures would apply for a shorter term of 40 years. The effects on socioeconomic conditions would be minor and **less than significant** under Alternative C.

3.17.2.7 Comparison of alternatives

Table 3.17-5 summarizes the effects of the alternatives on social and economic resources. Under the No Action alternative, both jobs and payroll in the region are anticipated to increase from existing conditions. However, this increase is not likely to be growth inducing. Jobs and payroll under the Proposed Action and Alternative A are anticipated to increase (similar to the No Action alternative) but at a steadier, more contiguous rate. Because the timber harvest industry contributes only a small percentage of regional jobs, these increases are not anticipated to be growth inducing. Overall, effects on socioeconomic conditions would be less than significant under all of the alternatives.

Table 3.17-5. Comparison of alternatives for social and economic conditions.

Subcategory	No Action	Proposed Action	Alternative A	Alternative B	Alternative C
Employment	Increase from existing conditions.	Steadier, more contiguous increase compared with No Action alternative.	Decreased employment relative to the No Action alternative. Steadier, more contiguous increase compared with No Action alternative.	Decreased employment relative to the No Action alternative.	Same as Proposed Action for a period of 40 years.
Payroll	Increase from existing conditions.	Steadier, more contiguous increase from existing conditions compared with No Action alternative.	Decreased payroll relative to the No Action alternative. Steadier, more contiguous increase from existing conditions compared with No Action alternative.	Decreased payroll relative to the No Action alternative.	Same as Proposed Action for a period of 40 years.
Population Growth	No growth-inducing effects.	Same as the No Action alternative.	Same as the No Action alternative.	Same as the No Action alternative.	Same as Proposed Action for a period of 40 years.

3.17.2.8 Environmental justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (11 February 1994), requires federal agencies to make the achievement of environmental justice part of their mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. Executive Order 12898 further stipulates that the agencies conduct their programs and activities in a manner that does not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination because of their race, color, or national origin. The Presidential Memorandum that accompanied Executive Order 12898 states that a NEPA document should include analysis of "effects in minority communities and low-income communities."

As presented in Sections 3.17.2.2 through 3.17.2.6, the potential effects of the alternatives would be less than significant because there would be no growth inducing effects. In addition, under the action alternatives, timber harvesting levels are expected to increase over time relative to existing conditions, but the increase may be less than under the No Action alternative, particularly for Alternative B. On this basis, the MRC workforce and other local employment would increase relative to existing conditions, and would be similar to under the No Action alternative under the Proposed Action and Alternative C. Therefore, the potential for increased unemployment, including disproportionate job losses affecting minority populations, is not expected to occur as a result of implementing the Proposed Action or Alternative C. Under Alternatives A and B, however, harvest levels would likely be less than under the No Action alternative, resulting in fewer jobs and lower payrolls associated with employment and contract work by MRC.

3.17.3 PTEIR alternate standard analysis for the Proposed Action, Alternative A, and Alternative C

In its TMP (Appendix A) and HCP/NCCP, MRC has proposed alternate standards to the current (2012) CFPRs, which would be implemented and included in PTHPs prepared under the Proposed Action, Alternative A, or Alternative C. Alternate standards are not proposed for the No Action alternative because no TMP, HCP, or NCCP would be implemented. Likewise, alternate standards are not proposed for Alternative B because no TMP or NCCP would be implemented. The 2012 CFPRs (14 CCR §1092[b]) authorize CAL FIRE to accept alternate standards in a PTHP where it has been demonstrated in a PTEIR that the alternate standard provides resource protections that are equal to or better than the standard operational rule and its implementation would have a less than significant impact on the environment. Also, where future changes in the CFPRs occur, the current operational standards (2012 CFPRs) may be accepted by CAL FIRE as alternate standards where the PTEIR has similarly demonstrated a less than significant impact.

The proposed alternate standards were reviewed by the lead agencies to determine the resource area(s) to which they apply (see Attachment D to Appendix A). For each alternate standard that applies to Social and Economic Conditions, the analysis in Sections 3.17.2.3, 3.17.2.4, and 3.17.2.6 and the cumulative effects analysis in Sections 4.17.2, 4.17.3, and 4.17.5 demonstrates that its implementation as part of the Proposed Action, Alternative A, or Alternative C would provide equal or better protection to Social and Economic Conditions than the 2012 CFPR standard and its implementation would either (1) not result in adverse environmental impacts or (2) result in impacts that are below the level of significant effect on the environment. This analysis considered the effects of implementing the proposed alternate standards as part of a suite of management and conservation measures contained in the HCP, NCCP, and TMP.

The following are the CFPRs for which alternate standards (or current operational standards, which due to a rule change could become an alternate standard) have been proposed by MRC in its TMP (Appendix A) and/or its HCP/NCCP and are applicable to Social and Economic Conditions:

913.6(e)(2).

The EIS/PTEIR analysis demonstrates that these alternate standards would provide equal or better protection to Social and Economic Conditions than the 2012 CFPR standard. Implementation of these alternate standards would have a less than significant impact and would not contribute to cumulative effects on Social and Economic Conditions, and may be proposed in PTHPs by MRC and approved by CAL FIRE (14 CCR §1092[c]).

A complete list of MRC's proposed alternate standards is included in the TMP (Appendix A) as Attachment D. Attachment D of the TMP also includes a reference to the location of each alternate standard in the TMP and/or HCP/NCCP, and the CFPR standard (rule) it would replace.

4 CUMULATIVE EFFECTS

4.1 Analysis Methods

The geographic scope of the cumulative effects analysis is defined as the full extent of the primary and secondary assessment areas (Section 1.2 [Purpose and Need, Proposed Action/Project Description] provides a description of these areas). The effects of past, present, and reasonably foreseeable future actions within the analysis area were assessed qualitatively unless quantitative information or projections for specific environmental resources were available for the assessed actions.

Existing information on past actions in the assessment area was compiled and reviewed. CAL FIRE's THP database was queried for all THPs in Mendocino and Humboldt counties (a small portion of the secondary assessment area falls within southern Humboldt County) to evaluate past (1997[47]–2008), present, and reasonably foreseeable future timber harvest. Information from the historical record was used to assess effects of timber harvest prior to 1997. The spatial extent of these THPs was then clipped to the primary and secondary assessment area boundaries to indicate only THPs within the assessment area. Any THP that had been denied or withdrawn, or went unlogged was then excluded. The resulting THPs were categorized as "past" actions if they were submitted before 2009 and/or had been completed by 2008, or as "present and reasonably foreseeable future" actions if they were submitted in 2009 or 2010 and/or had been completed in 2009 or 2010 or were not yet completed.

Other present and reasonably foreseeable future actions in the primary and secondary assessment areas were identified by compiling a preliminary list of current and planned projects gathered from available sources (including agency Web sites). Actions were then evaluated for inclusion in the cumulative effects analysis based on the following criteria:

- The action has an identified sponsor actively pursuing project development, has completed or issued NEPA and/or CEQA compliance documents, and appears to be "reasonably foreseeable" given other considerations such as public and stakeholder controversy.
- Available information defines the action in sufficient detail to allow meaningful analysis.
- The action could affect resources potentially affected by the alternatives.

The combined effects of these past, present, and reasonably foreseeable future actions were then evaluated together with those of the alternatives to determine the potential for significant cumulative effects (Sections 4.2 though 4.17).

4.1.1 Past, present, and reasonably foreseeable future actions

The past, present, and reasonably foreseeable future actions evaluated for cumulative effects, and their potential effects on resource areas, are summarized in Table 4.1-1 and described below.

[47] 1997 is the first year for which complete THP data is available.

Table 4.1-1. Past, present, and reasonably foreseeable future actions in the primary and secondary assessment areas and their potential for effects on environmental resources included in the cumulative effects analysis.

Action	Environmental resource potentially affected															
	Geology, Soils, & Geomorphology	**Hydrology, Beneficial Uses of Water, & Water Quality**	**Aquatic & Riparian Resources, Species of Concern**	**Vegetation & Plant Species of Concern**	**Terrestrial Habitat, & Wildlife Species of Concern**	**Air Quality**	**Climate & Climate Change**	**Timber Resources**	**Hazards & Hazardous Substances**	**Land Use**	**Traffic**	**Noise**	**Visual Resources**	**Recreation**	**Cultural Resources**	**Social & Economic Conditions**
Past actions																
Timber harvest (pre-1997)	x	x	x	x	x	x	x		x	x			x	x	x	x
Timber harvest (1997–2008)	x	x	x	x	x	x	x		x	x			x	x	x	x
Commercial and residential development		x	x	x	x	x	x		x	x	x		x		x	x
Present and reasonably foreseeable future actions																
Jackson Demonstration State Forest Management Plan	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x
Present and future forest management	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x
Caspar Creek weir pond maintenance and fish passage improvements			x													
Marijuana cultivation	x	x	x	x	x			x	x	x						x
Timberland conversion (e.g., vineyards)	x	x	x	x	x					x			x			x
AT&T Low Effect HCP					x											
The Fisher Family HCP					x											
Commercial and private airports												x				
Fort Bragg waste transfer station					x				x		x	x	x			
Transmission line maintenance				x	x								x			
Road construction and maintenance	x	x	x	x								x				
State Park General Plans		x	x		x						x			x		x
Domestic and municipal water supply development		x	x							x						x
Policy for maintaining instream flows in Northern California coastal streams		x	x							x				x		

4.1.1.1 Past actions

For this cumulative effects analysis, past actions are defined as those that occurred in the primary and secondary assessment areas prior to 2008.

Timber harvest (pre-1997)

Historical timber harvest in the primary and secondary assessment areas is the past action with the greatest influence on existing conditions and that continues to have effects on environmental resources. In the 19th and early 20th centuries, Mendocino County coastal redwood and Douglas-fir forests, much of which was also milled in the primary and secondary assessment areas, provided the timber used to initially build San Francisco, fuel the gold rush and the needs of a growing state, and to rebuild San Francisco after the Great Quake of 1906 (Mendocino County 2009a). The primary assessment area was previously owned and extensively harvested by a sequence of timber companies, including Louisiana-Pacific (MRC bought the property in 1998), and the majority of the secondary assessment area has also been previously logged.

Commercial timber harvest in coastal Mendocino County began in the 1850s, with oxen, streams, and railroads used to transport logs to the mills. Trees were felled and bucked on the hillsides, and the logs were transported by teams of oxen along skid roads to the streams. At the stream, logs were transported to the mill by either stacking the logs in the stream bed in the drier months in preparation for the winter rains and releases from upstream dams which would supply enough water to carry them downstream, or loading the logs into lakes that formed behind temporary splash dams (Jackson 1975). When water conditions were right, the splash dams would be breached, often with the concurrent release of upstream dams for added water. If the head of water generated from the dam release was sufficient to get the logs moving, they would be floated all the way downstream to the mills on the coast, scouring the stream beds and banks as they went. Both of these techniques removing anything in or along the channel that could obstruct a log drive, such as riparian vegetation, large boulders, and sunken logs (Napolitano 1996).

By the late 1800s oxen and water transportation had largely given way to "steam donkeys" and railroads. Railroads were built along the streambeds, or, when the canyons were especially narrow, on trestles hanging over or straddling the stream. With railroad transport, logs were dragged by bull teams or steam donkeys to landings where they were loaded onto the trains that would bring them to the mill (Sawyer et al. 2000). Landings were usually constructed adjacent to or in the streambed, causing considerable alteration of the channel and riparian areas and introducing large amounts of sediment into the stream. Burning was a common part of timber harvest operations during this period (Sawyer et al. 2000). After the trees were felled and debarked, fires were set to get rid of bark and debris that would have otherwise comprised significant obstacles to moving the logs from the woods (O'Dell 1996).

Many areas in the primary and secondary assessment areas have been tractor-logged since the 1940s. Early tractor logging involved extensive excavation for skid trails, truck roads, and landings throughout the drainages. Smaller stream channels were often filled in with soil and logging debris and used as skid trails. Most of the roads, landings, and skid trails in each drainage came together near stream channels, creating pathways for sediment from surface erosion and mass wasting that led to extensive sedimentation of stream channels. Once timber harvest was completed, it was common for massive amounts of woody debris and soil to remain in the stream channels. With improved equipment, loggers could now move logs through standing timber using crawler tractors, enabling them to harvest individual trees instead of whole hillsides (Sawyer et al. 2000).

California's first Forest Practice Act was passed in 1945, which required that 10 to 20 seed trees per hectare be left following logging (Sawyer et al. 2000), although it was declared unconstitutional in 1971. The Z'Berg-Nejedly Forest Practice Act of 1973, and new rules that went into effect in January 1975, contained measures to maintain forest productivity and protect non-timber forest resources, and established stricter standards for construction of new roads. Since that time, environmental resource protection measures in the CFPRs have continually improved, although a Scientific Review Panel on the CFPRs and salmonid habitat, found that, at least up to 1999, the CFPRs and their implementation did not ensure protection of anadromous salmonid populations (Ligon et al. 1999).

Timber harvest (1997 to 2008)

CAL FIRE's THP database (CAL FIRE 2010a) tracks THPs submitted since 1997, allowing for a more quantitative analysis of the effects of timber harvesting since this time. Between 1997 and 2008, nearly 700 THPs, totaling approximately 161,900 ac (65,518 ha) or 44% of the total area, were implemented in the primary and secondary assessment area (Table 4.1-2) (CAL FIRE 2010a). The most common silviculture methods in THPs in the primary assessment area during this period were alternative prescriptions (33%), selection (20%), seed tree removal cut (14%), and transition (11%) (CAL FIRE 2010a). In the secondary assessment area, selection (31%), clearcut (17%), seed tree removal cut (17%), and alternative prescriptions (10%) were the most common silviculture methods used in THPs between 1997 and 2008.

It is reasonable to assume that all THPs in the primary and secondary assessment areas between 1997 and 2008 would have been subject to contemporary CFPRs and environmental regulations including substantial participation by Review Team Agencies[48], but were not covered by an HCP or NCCP. Between 1997 and 2008 environmental resource protection measures in the CFPRs continued to improve, including the passage of the Threatened and Impaired Watershed rules in 2000, with additions such as reductions in the amount of allowable clearcut acres, limitations on yarding on steep slopes, restrictions on winter operations, and culvert requirements to facilitate fish passage.

Table 4.1-2. Summary of THPs implemented between 1997 and 2008 in the assessment area.

Assessment area	THPs		
	Number	Area (ac)	Proportion of assessment area (%)
Primary	272	56,082	26
Secondary	420	105,818	18
Total	692	161,900	44

Timber harvest in Mendocino County has been decreasing since the mid-1950s and decreased by over 65% (based on board feet, the quantity of timber cut and scaled) between 2000 and 2007 (Mendocino County 2009a). This decrease reflects the conversion of old-growth forests to younger stands of timber and reliance on smaller trees, increasingly stringent enforcement of regulatory requirements, protest of timber harvest practices in State and National Forests,

[48] The Review Team Agencies are California Geological Survey, CDFG, Regional Water Quality Control Boards, and CAL FIRE.

increased scrutiny, litigation, and the influence of global markets on timber prices and consequent harvest rates (Mendocino County 2009a).

Commercial and residential development

Based on a review of land cover (using California Resources Agency Legacy Project and University of California Davis, Information Center for the Environment 2006 geographic information system data layers), approximately 6% of the secondary assessment area has been developed for commercial or residential uses (virtually none of the primary assessment area has been developed). The majority of development has occurred between Fort Bragg and Albion along Highway 1, Point Arena and Gualala along Highway 1, and Navarro and Philo along Highway 128. Development in these areas has entailed vegetation clearing, land grading, stream channel alterations, wetland filling, inadvertent construction of fish passage barriers, changes in rainfall runoff patterns, increased vehicle emissions and noise, introduction of non-native species, and other effects associated with the construction and use of commercial and residential property. Because development has been largely concentrated along the coast, development has had a disproportionate effect on coastal resources.

The population of Mendocino County is one of the lowest in the state and its population increased by only 4.6% between 2000 and 2007 (Mendocino County 2009a). During that time, the unincorporated areas of the county experienced more growth than incorporated cities. The population of Ukiah, the county seat, grew only 2.4%, and Willits and Fort Bragg experienced slight declines in population (Mendocino County 2009a). Based on population trends and economic conditions in the county, as well as General Plan limits on development, considerable population increases and associated commercial and residential development are not expected to result in cumulative effects in combination with the proposed alternatives in the reasonably foreseeable future.

4.1.1.2 Present and reasonably foreseeable future actions

Present actions and reasonably foreseeable future actions are those that are located within the primary and secondary assessment area and are: (1) currently under construction by entities other than MRC, (2) approved for construction or in formal planning stages by entities other than MRC, or (3) are probable to be conducted by MRC during the life of the permit but that are not covered by the plan at the time of the incidental take authorization application submittal.

Implementation of the Jackson Demonstration State Forest Management Plan

The EIR for the Jackson Demonstration State Forest Management Plan was finalized in 2008 (CAL FIRE 2008a). Jackson Demonstration State Forest is a 48,652-ac (19,688-ha) redwood/Douglas-fir forest in the secondary assessment area. Its primary purpose is to conduct innovative demonstrations, experiments, and education in forest management; timber production is the primary land use, with recreation as a secondary but compatible land use (CAL FIRE 2008a). The Jackson Demonstration State Forest Management Plan indicates that approximately 9,950 ac (4,026 ha) may be harvested during the first 5 to 10 years of plan implementation, with a potential total of approximately 44,850 ac (18,150 ha) harvested over the 10- to 15-year life of the plan (CAL FIRE 2008a). Silviculture methods vary, but generally equate to light stand thinning or selection harvest methods (CAL FIRE 2008a).

Although the final EIR (CAL FIRE 2008b) determined that the proposed Jackson Demonstration State Forest Management Plan alternative (C1) and research-focused alternative (G) would have no significant cumulative effects on any resource area, less than significant cumulative effects or those less than significant with mitigation could combine with those of the proposed alternatives and result in significant cumulative effects. THPs submitted under the State Forest Management Plan would continue to be subject to agency review to identifiy and mitigate impacts. The less than significant cumulative effects of the Jackson Demonstration State Forest Management Plan include:

- Less than significant alterations to drainage patterns and channel geomorphology.
- Less than significant violations of water quality standards.
- Less than significant increases in soil erosion and sedimentation.
- Less than significant effects related to hazardous materials.
- Less than significant effects on plant communities, special-status plants, fungi, and special-status wildlife species.
- Less than significant effects if roads and trails are not maintained or abandoned.
- Less than significant effects related to construction and use of recreational improvements.
- Less than significant degradation of scenic vistas.
- With mitigation, less than significant effects related to noise.
- Less than significant increase in traffic, roads and highways, and parking capacity.
- Less than significant effect on air quality.
- Less than significant adverse effects on adjacent landowners.
- With mitigation, less than significant effects on heritage resources.

Present and reasonably foreseeable future forest management

THPs

In addition to the Jackson Demonstration State Forest Management Plan there are, as of the date of this analysis (March 2011), 145 THPs, totaling approximately 34,340 ac (13,896 ha) or 6% of the total area, being implemented or in the process of being approved in the secondary assessment area (CAL FIRE 2010a). Selection (33%), transition (27%), and clearcut (13%) silviculture methods are the most common silviculture methods used in the 145 current THPs (CAL FIRE 2010a). Between 2001 and 2008[49], approximately 670 THPs were submitted in the primary and secondary assessment areas (CAL FIRE 2010a); an average of approximately 85 THPs annually. For purposes of this analysis, this average (85 THPs annually) is assumed to represent the number of THPs that will be submitted and implemented in the secondary assessment area in the reasonably foreseeable future (defined in the 2012 CFPRs as those commencing within five years). However, this may be an overestimate, as timber harvest volume in Mendocino County has been declining since 1995 (Mendocino County 2009a). Between 2008 and 2009, the value of the timber crop in the county decreased by 62% and 2009 had the lowest annual timber harvest volume since the county first began keeping records in 1965 (Mendocino County 2009b).

With the passage of the anadromous salmonid protection rules (14 CCR §916.9 and §923) in 2009, it is reasonable to assume that present and reasonably foreseeable future THPs in the secondary assessment area will be subject to these CFPRs and environmental regulations, but would not necessarily be covered by an HCP or NCCP. In 2011 the anadromous salmonid protection rules established 150-ft (46-m) maximum buffers around class 1 streams, including a 30-ft (9-m) no-cut zone adjacent to the stream, 80% overstory and 13 largest tree retention for an

[49] This period represents the years for which complete THP data is available (i.e., there was only incomplete data for 2009 and 2010 at the time of this analysis) that follow the notable decline in THPs that started in 2001 (CAL FIRE 2010a).

additional 70 ft (21 m), 50% overstory retention for an additional 50 ft (15 m), and special operating zones for an additional 50 ft (15 m) if adjacent to clearcut. On the other hand, the staffing decisions resulting from the current state budget situation may well affect the environmental consequences of future THPs if Review Team participation remains curtailed. Given these conditions, the cumulative effects analysis below cautiously assumes that the effects of current and future timber harvest would be similar to those described previously in Section 3, Affected Environment and Environmental Effects, under the No Action alternative, since this alternative would be subject to the anadromous salmonid protection rules and CFPRs, but would not be covered by an HCP or NCCP.

Vegetation management

In the majority of the forests that are being harvested in the primary and secondary assessment area, there is a relatively high percentage of hardwoods. This is presumed to largely be a result of past forest management which has kept an artificially high percentage of stands in an early-successional condition. Therefore, many timber companies, including MRC, seek to shift the balance of hardwoods and conifers, thereby creating a larger supply of more economically valuable timber, including redwood and Douglas-fir.

Biomass harvesting may be a component of THPs. For instance, residual biomass resulting from conversion of logs to lumber is distributed to operators that create products such as landscaping material (mulch, compost, etc.). Additionally, the processing of harvested forest products creates byproducts such as mill residues and pulping liquors (Perlack et al. 2005). These secondary forest residues account for the majority of biomass in use today and 50% of current biomass energy consumption (Perlack et al. 2005). Alternatively, biomass harvesting may occur when there is an excess of biomass (i.e., rough and rotten wood or woody debris and smaller-diameter trees in overstocked forests) that may be removed in fuel-reduction efforts. Much of this excess biomass is not suitable for conventional wood products but can be used for a variety of bioenergy and bio-based product uses (Perlack et al. 2005). In 2006, approximately 4.6 billion cubic feet of harvest residues were generated (Smith et al. 2009 as cited in White 2010).

Caspar Creek weir pond maintenance and fish passage improvements

In 2003 NMFS issued a Biological Opinion to the U.S. Department of Agriculture Forest Service Redwood Sciences Laboratory regarding take of federally threatened[50] Central California Coast coho salmon and northern California steelhead as a result of continued weir pond maintenance and proposed fish passage improvements on North and South Fork Caspar Creek in Jackson Demonstration State Forest (File No. 151422SWR02SR6251). These activities are not covered in the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a). Since 1962, U.S. Department of Agriculture Forest Service and CAL FIRE have maintained two monitoring facilities, one each on North and South Fork Caspar Creek, as a part of the Caspar Creek Watershed Study. Each facility included a sediment/debris stilling pond created by a concrete weir, and a wooden fish ladder just downstream of each weir. Approximately every five years, the ponds require sediment and debris removal, involving the diversion of flow, capture and relocation of any fish, draining and excavation of the pond, and gradual restoration of flows to the pond. CDFG identified the fish ladders as partial barriers to anadromous salmonid passage and, as a result, the U.S. Department of Agriculture Forest Service developed conceptual designs for their demolition and replacement with ladders that would allow year-round passage of salmonids in

[50] In 2003 Central California Coast coho salmon were listed as threatened. In 2005 this listing was changed by NMFS to endangered.

both upstream and downstream directions. The ladders were replaced with a pool-and-weir fishway in November 2009.

In the Biological Opinion, NMFS determined that the continued maintenance and fish passage improvements are not likely to jeopardize the continued existence of Central California Coast coho salmon or northern California steelhead, or to destroy or adversely modify designated coho salmon critical habitat (NMFS 2003).

Marijuana cultivation

Illegal marijuana cultivation has been increasing in the primary and secondary assessment areas in recent years; in 2006 MRC removed 22,801 marijuana plants in the primary assessment area, and in 2010 they removed 304,083 (J. Ramaley, Mendocino Redwood Co., Ft. Bragg, California, pers. comm., 31 March 2011). A similar or slightly higher number of plants is reasonably expected to be cultivated and/or removed over similar-sized areas in the secondary assessment area, due to the fact that MRC actively monitors its property for marijuana cultivation, while other landowners may not.

At marijuana gardens in the primary assessment area, streams are generally dammed and diverted, large amounts of fertilizers are applied, and traps and chemicals are set out to kill and deter herbivores. Approximately 2 to 6 people may reside at or near marijuana gardens, and large amounts of garbage, including decaying batteries, are left (J. Ramaley, Mendocino Redwood Co., Ft. Bragg, California, pers. comm., 31 March 2011). A Mendocino County grand jury report indicates that in 2009 approximately 3.6 million gallons of water per day was likely diverted illegally and sold for marijuana cultivation (Mendocino County Grand Jury 2010). The grand jury also found: animal carcasses, human garbage, human waste, herbicides, and animal poisons at marijuana gardens; water being polluted by fertilizers and pesticides (some of which are banned in the United States); clearcutting and clearing of vegetation; terracing of slopes that contribute to soil erosion; and firearms and "booby" traps that have injured people during cleanup activities (Mendocino County Grand Jury 2010). Indoor marijuana cultivation also has impacts on the environment, such as increased water and electrical demands, fuel combustion emissions related to generator operation, and the use and disposal of fertilizers and pesticides.

Timberland conversion

Between 1969 and1998, 45,345 ac (18,350 ha) (or 40%) of timberlands in the Coast region of California (Alameda, Colusa, Contra Costa, Del Norte, Humboldt, Lake, Marin, Mendocino, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma, Yolo, and western Trinity County) were converted to non-timber land uses (Shih 1999). Approximately 96% of this conversion was for grazing, although the acreage of timberland conversions for grazing declined dramatically over this 30-year period. Meanwhile, the acreage of timberland conversions for subdivision development and vineyards increased (Shih 1999). Between 1991 and 1999, 32% (375 ac [152 ha]) of converted timberland in Mendocino County was for vineyards (Shih 1999). Since that time wine grapes have matched or surpassed timber as the most valuable legal crop in the county (these statistics do not account for the illegal marijuana crop produced in the county) (Mendocino County 2009a, 2009b), so it is reasonable to assume that there would be in an increase in the amount of timberland (and other suitable lands) in the primary and secondary assessment area that would be converted to vineyards.

In addition to the loss of timber production, vineyards, which are generally located on or near ridge tops, can result in the loss of grasslands, which provide migration corridors and foraging areas for a number of terrestrial wildlife species. Vineyards may apply fertilizers as well as increase rainfall runoff and soil erosion, although increased water yield and fine sediment may be captured in drains, reservoirs, and retention ponds, and erosion control measures are often required. Many contemporary vineyards collect their own irrigation supply during the winter to avoid or minimize groundwater pumping and/or stream water use during the summer and fall.

AT&T's Point Arena mountain beaver low effect HCP

The USFWS has approved two HCPs in the secondary assessment area. NMFS has approved no HCPs, and CDFG no NCCPs, in the assessment area. HCP Permit #TE063833-0 was issued in 2002 and covers a period of 10 years. This HCP covers approximately 11 ac (4 ha) of coastal scrub to be used for utility and infrastructure activities at the AT&T Manchester cable station (at the end of Kinney Road, off Highway 1, north of the town of Manchester, in Mendocino County), and an incidental take permit for the endangered Point Arena mountain beaver. In addition to being a current action, this HCP provides an example of the extent, impacts, and protection measures likely to be associated with future telecommunications projects. No other specific present or reasonably foreseeable telecommunication projects were identified in the primary or secondary assessment area.

The Fisher family HCP

HCP Permit #TE170629-0 was issued in 2007 and covers a period of 50 years. This HCP covers 24 ac (9 ha) of coastal scrub to be used for residential improvement activities (43400 Hathaway Crossing, Point Arena, Mendocino County). The USFWS issued an incidental take permit in association with this HCP for the endangered Behren's silverspot butterfly (*Speyeria zerene behrensii*) and endangered Point Arena mountain beaver.

Commercial and private airports

There are two public use airports (Little River and Ocean Ridge near Gualala) and two private use airfields (Fort Bragg and Anchor Bay) in the secondary assessment area (Mendocino County 2009a). The airports are an important part of the Mendocino County's emergency service network and several are important to the economy of the areas served. The potential for commuter service in the county by private carriers has been considered, but is not currently provided (Mendocino County 2009a).

Fort Bragg waste transfer station

Several sites within the secondary assessment area are being considered for a new waste transfer station for the City of Fort Bragg and surrounding areas to replace the current Pudding Creek Recycling Center and Caspar Transfer Station. A siting study for the station assumed that a minimum of 5 ac (2 ha) (but preferably 10 to 20 ac [4 to 8 ha]) would be required to allow for the transfer station building, the scale and gate house, the household hazardous waste building, internal traffic patterns, drop-off areas, buffer zones and storm water management facilities (Winzler & Kelley 2007). The facility would serve self-haul residential and commercial customers and franchise/commercial haulers. Hours of operations are likely to be from 6 am to 6 pm, 6 days per week. At present, the Caspar Transfer Station and Pudding Creek Recycling Center serve approximately 128 self-haul vehicles and 9 commercial vehicles per day, respectively (Winzler & Kelley 2007). The number of trips would be expected to increase in the future, relative to growth and development in the region. The new facility and the access would have to accommodate traffic and minimize off-site queuing. Depending on the site constraints and the configuration of the access road leading up to the site, a turning lane or additional queuing lane may have to be developed on the public street adjoining the facility (Winzler & Kelley 2007).

Transmission line maintenance

Pacific Gas and Electric Company (PG&E) operates and maintains several electrical transmission lines in the primary and secondary assessment areas (e.g., a 60 kV and 150 kV line along the coast, and 60 kV lines in the northern and southern portions of the county). Periodic maintenance involves clearing of vegetation and cutting of some trees along the transmission line corridors in order to maintain required clearance, and occasionally poles are repaired or replaced. PG&E is required to analyze the potential effects of transmission line maintenance and improvements on a segment-by-segment basis. If the effects of the transmission line activities on environmental resources of concern (these are primarily wetlands, special-status plants and animals, and cultural resources) cannot be avoided, PG&E acquires the necessary permits for the work and incorporates protection measures to minimize or mitigate the effects.

Road maintenance

Road management as a part of THPs in the secondary assessment area would likely follow the guidelines for the construction, reconstruction, and maintenance of roads and landings published in the Handbook for Forest and Ranch Roads (Weaver and Hagans 1994) and meet the standards and practices specified in the CFPRs. As such, this analysis assumes that the effects of road management under THPs would be similar to those described previously in Section 3, Affected Environment and Environmental Effects, under the No Action alternative (i.e., although management practices and conservation measures would likely result in less road-related erosion and sediment delivery to stream channels than occurs under existing conditions, the lack of a comprehensive road management plan allows for potentially significant effects associated with road-related sediment delivery).

Outside of THPs, roads in the secondary assessment area are operated and maintained by various entities, including the state, county, and private citizens. The California Department of Transportation has a number of projects planned in the next several years. These include storm damage repair, culvert replacement, fish passage improvements, bridge and guard rail repair, bridge cleaning and painting, and drainage improvements. These improvements, along with maintenance of other paved and unpaved roads in the primary and secondary assessment areas by the California Department of Transportation likely entail periodic grading, resurfacing, and herbicide application. These activities would take place on Highways 1, 20, and 128. Many of the planned projects (culvert replacement, drainage improvements, and storm damage repair) would result in potentially less sediment delivery risk than the existing condition. In addition, fish passage improvements would increase anadromous salmonid access to spawning and rearing habitat. All projects would follow established Best Management Practices to control erosion, sediment delivery to stream channels, and water quality impacts. Additional information on California Department of Transportation projects can be found at http://dot.ca.gov/hq/esc/projects/lookahead/index.php.

Mendocino County Department of Transportation is planning to conduct a 14-mi road upgrade on Fish Rock Road in the Garcia River watershed during the summer of 2012. The project consists of upgrading culverts, removing perched fills, crowning and outsloping road prisms, installing more cross-drains, and generally hydrologically disconnecting the road. This would reduce road-related erosion and sediment delivery to the Garcia River and its tributaries. Mendocino County Department of Transportation also has two culvert/fish passage projects planned for Mill Creek in the upper Garcia River watershed planned for 2013. Two culvert-to-pre-cast bottomless arch upgrades are planned for Mill Creek and another two are being considered on its tributaries. These projects would allow for improved salmonid access to spawning and rearing habitat. All of these projects would result in beneficial effects.

Implementation of State park general plans

There are over 20 parks, beaches, reserves, and recreation areas owned and managed by the California Department of Parks and Recreation in the secondary assessment area (there are no state or national parks in the primary assessment area). These account for approximately 32,100 ac (12,990 ha), or 4%, of the secondary assessment area. General plans have been completed for many of the state parks in the secondary assessment area, which guide long-range development and management of a state park and must be approved before any major park facilities can be developed. Roughly half of the state parks in the secondary assessment area support only day use facilities and uses, such as moderately-sized parking lots, restrooms, hiking, swimming, and fishing, while the other parks include campgrounds, a small number of residences for park employees, ranger stations, paved and unpaved access roads and bridges, and horseback riding and mountain biking trails. Collection of plants and animals is not allowed in any state park, except as permitted under scientific collecting permits issued by the state.

Domestic and municipal water supply development

The majority of domestic and municipal water in the primary and secondary assessment area is supplied by individually maintained groundwater wells. Several special districts or privately-owned utilities are responsible for water supply in a number of the urban centers in the assessment area, and divert water from or operate wells adjacent to several of the watercourses that run through the assessment area (e.g., Point Arena Water Works supplies water from a well adjacent to the Garcia River [City of Point Arena 2006]).

Appendix 5 (Community Water Supply and Sewage Disposal Systems) of the Mendocino County (1991) Coastal Element indicates that the water supply systems operated by several special districts and/or utility companies are inadequate to support projected growth or buildout. However, no plans or supporting documents for water resource development projects were located for this effects analysis.

Policy for Maintaining Instream Flows in Northern California Coastal Streams

On 4 May 2010 the State Water Resources Control Board adopted the Policy for Maintaining Instream Flows in Northern California Coastal Streams, which applies to coastal streams from the Mattole River to San Francisco and includes a portion of Mendocino County (SWRCB 2010). The policy provides principles and guidelines for maintaining instream flows for the purposes of water right administration related primarily to new water right applications, small domestic use and livestock stock pond registrations, and water right change petitions. The State Water Resources Control Board has proposed to include an enforcement element as part of the policy that would govern water right enforcement actions in the coastal streams located in the affected area described above. Because this policy recognizes that surplus water may only be available during peak winter flows, it may increase demand for surface storage facilities in the assessment area.

4.1.2 Significance criteria

The effects of activities proposed under any alternative (i.e., the action) would be cumulatively significant if implementation of the alternative would make a considerable contribution to a cumulative effect. The action's contribution is evaluated in combination with the effects of the past, present, and reasonably foreseeable future actions (Table 4.1-1) to determine whether: (1) there is an overall cumulative effect and (2) the action's contribution is considerable. Both circumstances must exist to conclude that an effect is cumulatively significant. Cumulatively significant effects would do any of the following:

- Cause a significant adverse effect on a resource (using the criteria for significance described in Section 3, Affected Environment and Environmental Effects).
- Adversely affect in a considerable way a resource that already has a degraded or declining condition because of substantial adverse effects that have already occurred.
- Cause an effect that was initially not significant by itself, but that would be part of a cumulatively degrading or declining future trend resulting from other reasonably foreseeable future actions.

4.1.3 Mitigation measures

Where a considerable contribution to a significant cumulative adverse effect is identified, mitigation measures are presented, where feasible. If mitigation described in Section 3 (Affected Environment and Environmental Effects) would also resolve cumulative effects, it is cross-referenced in the sections below. If a new mitigation measure is needed for the cumulative impact, it is described in its entirety in the sections below. If previously identified mitigation measures do not eliminate a significant cumulative impact and no additional mitigation measures are feasible, then the cumulative impact is determined to be significant and unavoidable.

4.2 Geology, Soils, and Geomorphology

The primary assessment area for geology, soils, and geomorphology includes the 213,000 ac (86,200 ha) area covered by the proposed HCP/NCCP (Section 1 [Purpose and Need, Proposed Action/Project Description], Figure 1.2-1). The HCP/NCCP plan area is encompassed entirely within portions of 12 of MRC's watershed analysis units. The secondary assessment area bounds timberlands that MRC could potentially acquire during the life of the permit as well as all property owned by MRC within Mendocino County and not covered by the plan at the time of the incidental take authorization application submittal. Data for the secondary assessment area are limited or unavailable and generally not sufficient to support a similarly detailed analysis. However, land in the secondary assessment area that would potentially be acquired by MRC has similar geology, topography, and climate; has been subject to similar management (i.e., commercial timberland), and has similar erosion processes and rates. The affected environment and potential effects would therefore, be similar to those in the primary assessment area.

Past, present, and reasonably foreseeable future actions within the assessment area that may affect geology, soils, and geomorphology include (Table 4.1-1):

- past timber harvest (pre-1997);
- past timber harvest (1997–2008);
- present and reasonably foreseeable future forest management;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a); and
- timberland conversion (most notably vineyard development).

Past timber harvest activities, particularly those that occurred prior to the 1973 Forest Practices Act, accelerated erosion and sediment delivery to stream channels in the primary and secondary assessment areas. Clearcutting, primitive road-building, ground-based yarding practices in channels and on steep slopes, use of fire, and lack of erosion control measures resulted in changes in hydrology, increased landsliding and channel headcutting, and severe surface erosion. Legacy forest management practices may still have effects on erosion and sediment delivery to stream channels where abandoned roads, skid trails, and anthropogenic valley fills remain untreated. The 1973 CFPRs included measures for water resource protection and erosion control, clearcut size and spacing limitations, equipment exclusion in stream channels and other sensitive areas, and riparian canopy retention standards. The CFPRs have been subsequently modified to require wider stream buffer zones, increased canopy retention standards, inner gorge protection, road management measures, and other protective measures. Timber harvest activities that occurred from 1997 to present generally are similar to those described under existing conditions and the effects are similar to those described in Section 3.2.2 (Geology, Soils, and Geomorphology; Environmental effects and mitigation).

Approximately 145 THPs (approximately 34,340 ac [13,896 ha]) are being implemented or are in the process of being approved in the secondary assessment area (CAL FIRE 2010a THP database). To estimate the effects of these present and reasonably foreseeable future THPs on soils and geology, sediment delivery to stream channels from road-related mass wasting, surface erosion, and point source erosion under the No Action alternative and Proposed Action (Section 3.2.2; Geology, Soils, and Geomorphology; Environmental effects and mitigation) was extrapolated to the secondary assessment area by applying long-term average unit-area rates derived from studies of past erosion and sediment delivery within MRC watershed analysis units[51]. This approach assumes that road type, use, and density; stream density; and road-related sediment delivery in the secondary assessment area are similar to the primary assessment area and that future rates would be similar to past rates. These assumptions are reasonable for the majority of the secondary assessment area, which has similar physiography and landuse as the primary assessment area. Similarly, sediment delivery to stream channels from mass wasting (unrelated to roads) was estimated for past, present, and reasonably foreseeable THPs in the secondary assessment area by applying long-term average unit-area rates derived from landslide inventories conducted in MRC watershed analysis units[52]. This approach assumes that the distribution of potentially unstable terrain that is prone to shallow landsliding (e.g., Terrain Stability Unit 1, Terrain Stability Unit 2, and Terrain Stability Unit 3) in the secondary assessment area is similar to the primary assessment area and that future rates would be similar to past rates. This assumption is reasonable for the majority of the secondary assessment area, which has similar geology, geomorphology, and hillslope processes as the primary assessment area. Table 4.2-1 summarizes the results of this extrapolation and provides estimates of sediment delivery within the cumulative effects assessment area (i.e., combining MRC actions in the primary assessment area and the past, present, and reasonably foreseeable THPs in the secondary assessment areas) and the ratio of management-related sediment delivery to background sediment delivery under the No Action alternative and Proposed Action.

[51] Information regarding the distribution, type, and use of roads in the secondary assessment area was not available at the resolution necessary to estimate sediment delivery by road length.
[52] Information related to unstable terrains and associated sediment delivery from mass wasting (unrelated to roads) was not available for the secondary assessment area.

Table 4.2-1. Estimated sediment delivery within the cumulative effects assessment area.

Action	Estimated sediment delivery, tons yr^{-1}					Ratio management to background
	Mass wasting[a] (unrelated to roads)	Road-related			Total	
		Mass wasting[b]	Surface erosion[c]	Point source erosion[d]		
Background	168,000	0	0	0	168,000	NA
No Action	255,000	124,000	35,000	313,000	727,000	4.3
Proposed Action	253,000	122,000	29,000	94,000	498,000	3.0

[a] The background rate of mass wasting is assumed to be 152 tons mi^2 yr^{-1}. Sediment delivery from management-related mass wasting (unrelated to roads) under the No Action alternative assumes a rate of 293 tons mi^2 yr^{-1}. Sediment delivery from mass wasting under the Proposed Action is the long-term average annual value.

[b] Sediment delivery from road-related mass wasting under the Proposed Action is the average annual value for first ten years of the proposed HCP/NCCP, the period in which MRC provides detailed information about anticipated changes in the road network. Information was not available to characterize forest roads in the secondary assessment area, so a unit-area rate of road-related shallow landsliding (169 tons mi^2 yr^{-1}) derived from data in MRC watershed analysis units was applied to the secondary assessment area outside watershed analysis units. Assumes road type, use, and density are similar in watershed analysis unit areas and secondary assessment area.

[c] Sediment delivery from road-related surface erosion under the No Action alternative assumes future delivery is the same as existing conditions in MRC watershed analysis units (26,350 tons yr^{-1} from roads within 200 ft [61 m] of channel, or 32 tons mi^2 yr^{-1}). Sediment delivery from surface erosion under the Proposed Action is the average annual value for first ten years of the proposed HCP/NCCP, the period in which MRC provides detailed information about anticipated changes in the road network.

[d] Sediment delivery from point source erosion associated with roads under the No Action alternative assumes that future sediment delivery rates from point source erosion equal past rates in watershed analysis units (283 tons mi^2 yr^{-1}). Assumes no control of point sources under the No Action alternative. Sediment delivery from point source erosion associated with roads under the Proposed Action is assumed to be 30% of existing conditions.

NA = not applicable

The final EIR for the Jackson Demonstration State Forest Management Plan indicated that cumulative effects related to increases in erosion and sedimentation and alterations to drainage patterns and channel geomorphology would be less than significant (CAL FIRE 2008b). Conversion of timberlands and vineyard development may result in highly localized increases in erosion; although the location and timing of these changes are unknown, their extent is limited. Overall, past actions in combination with smaller contributions by present and reasonably foreseeable future actions have resulted in a cumulative effect on geology, soils, and geomorphology in the primary and secondary assessment areas.

The potential cumulative effects of the alternatives would vary during the 80-year assessment period based on silviculture treatments, changes in the road network, treatment of controllable point sources of erosion, and implementation of other conservation measures intended to reduce management-related erosion and sediment delivery to stream channels. Potential cumulative effects may include chronic degradation of water quality, reduction in the quality of spawning gravel deposits, reduced stream habitat complexity, and reduced abundance and diversity of aquatic organisms.

4.2.1 No Action alternative

Increased sediment delivery to stream channels from shallow landsliding and deep-seated landsliding under the No Action alternative would result in potentially significant impacts on erosion and sediment delivery in the primary assessment area. Likewise, the impacts of increased road-related sediment delivery to stream channels due to increased harvest levels after decade 4 would be potentially significant. These impacts would make a considerable contribution to an existing cumulative effect. As such, the No Action alternative would have a **potentially significant cumulative effect** on erosion and associated sediment delivery to stream channels. Because mitigation is not proposed under the No Action alternative, its effects on erosion and sediment delivery to stream channels would be significant and unavoidable.

4.2.2 Proposed Action

Table 4.2-1 provides estimates of sediment delivery within the primary and secondary assessment areas and the ratio of management-related sediment delivery to background sediment delivery under the Proposed Action. The assessment of cumulative effects under the Proposed Action assumes an average annual value for sediment delivery from mass wasting (unrelated to roads) over the 80-year plan period. Sediment delivery from road-related mass wasting and surface erosion under the Proposed Action assumes an average annual value following the first ten years of HCP/NCCP implementation, the only period in which MRC provides detailed information about anticipated changes in the existing road network. Sediment delivery from point source erosion associated with roads under the Proposed Action is assumed to be 30% of existing conditions. In some cases, the effects of conservation measures intended to reduce management-related erosion and sediment delivery cannot be quantified and are not considered in the cumulative effects analysis.

Under the Proposed Action, effects on hillslope mass wasting, harvest-related surface erosion, and road-related surface erosion and mass wasting would be beneficial. Implementation of measures under the Proposed Action that include specific changes in the length, location, and use of the road network, removal of unnecessary roads that chronically produce sediment, and control of point sources of sediment associated with roads would likely reduce management-related sediment delivery to below levels observed under existing conditions. As such, the Proposed Action would not make a considerable contribution to the cumulative effect on erosion and associated sediment delivery where MRC owns most of the land in a watershed. In areas where MRC owns a small percentage of the land in a watershed, the degree to which the Proposed Action contributes to cumulative effects would largely depend on the existing land uses in that watershed. The Proposed Action is not expected to make a considerable contribution to the cumulative effects on erosion and associated sediment delivery to stream channels in cases where the remainder of the watershed is also managed for industrial or non-industrial timber or livestock production. In cases where the remainder of the watershed is privately or publicly owned land that is not managed for timber or livestock production, the Proposed Action may increase sediment delivery to stream channels but it would not be a considerable contribution. Therefore, the Proposed Action would have a **less than significant cumulative effect** on geology, soils, and geomorphic resources.

4.2.3 Alternative A

Management practices and conservation measures related to erosion and sediment delivery to stream channels under Alternative A would be the same as those under the Proposed Action, with additional measures to protect and enhance aquatic and riparian habitats. Implementation of Alternative A would likely result in less erosion and sediment delivery to stream channels from all sources than the Proposed Action and the effect would be beneficial. Therefore, Alternative A would not make a considerable contribution to the existing cumulative effect and would have a **less than significant cumulative effect** on geology, soils and geomorphic resources.

4.2.4 Alternative B

Under Alternative B, no commercial timber harvest or other forest management activities would occur within the terrestrial reserves. Outside of reserves, timber harvest practices and conservation measures related to erosion and sediment delivery would occur in accordance with the CFPRs, with effects similar to the No Action alternative. For the primary assessment area as a whole, there would be beneficial effects on hillslope mass wasting and no effects on surface erosion compared with existing conditions. Road use and management in the reserves would be focused on measures to reduce sediment production and delivery from roads, and would include decommissioning or relocating roads whenever possible. Road management outside the reserves would be similar to the No Action alternative, and would not include a comprehensive road management plan or schedule for road inventory. The effects of road-related sediment delivery to stream channels would, therefore, be potentially significant. As such, road-related sediment delivery to stream channels under Alternative B has the potential to make a considerable contribution to an existing cumulative effect and, therefore, result in a **potentially significant cumulative effect** on erosion and associated sediment delivery.

With implementation of **Mitigation Measure 3.2-3** (Develop and implement a comprehensive road management approach) (Section 3.2.2; Geology, Soils, and Geomorphology; Environmental effects and mitigation), however, the contribution of Alternative B to the existing cumulative effect on erosion and sediment delivery to stream channels would be less than considerable. After mitigation, Alternative B would have a **less than significant cumulative effect** on erosion and sediment delivery.

4.2.5 Alternative C

Under Alternative C, effects on hillslope mass wasting, harvest-related surface erosion, and road-related surface erosion and mass wasting would be the same as the Proposed Action during the proposed 40-year plan period. Therefore, Alternative C would not contribute considerably to the existing cumulative effect on erosion and associated sediment delivery, and would result in a **less than significant cumulative effect**.

4.3 Hydrology, Beneficial Uses of Water, Water Quality

Past, present, and reasonably foreseeable future actions within the assessment area that may affect hydrology, beneficial uses, and/or water quality include (Table 4.1-1):

- past timber harvest (pre-1997);
- past timber harvest (1997 to 2008);
- past commercial and residential development;
- present and reasonably foreseeable future forest management;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a);
- marijuana cultivation;
- timberland conversion (most notably vineyard development);
- road maintenance;
- implementation of State Park General Plans;
- domestic and municipal water supply resource development; and

- the State Water Resources Control Board adopted Policy for Maintaining Instream Flows in Northern California Coastal Streams (SWRCB 2010).

While recent timber harvest activities (i.e., 1997 to 2008) have been more protective of local watercourses than early activities (i.e., prior to 1977) due to the implementation of CFPRs and environmental regulations, timber harvest activities during both periods have not been covered by an HCP or NCCP. Hydrology effects from past timber harvest and present and reasonably foreseeable future THPs would be similar to those described under the No Action alternative (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation) (i.e., potentially significant) since these THPs likely were, are, or would be implemented without additional measures beyond the CFPRs. Effects would generally increase peak flows and low flows within the primary and secondary assessment area. Past commercial and residential development has resulted in stream channel alterations, wetland filling, and changes in rainfall runoff that may also have affected peak flows. Illegal marijuana cultivation has resulted in the unregulated damming and diverting of streams as well as increased water demands; these activities reduce peak and low flows. Timberland conversion, particularly to vineyards, may increase overall water yield (i.e., peak flows) through increased rainfall runoff. Water resource development for domestic and municipal water supplies is primarily located at the downstream end of watersheds in the assessment area, thereby resulting in a less than significant effect on hydrology.

In addition to hydrology effects, early timber harvest activities (i.e., prior to 1977) in the primary and secondary assessment areas resulted in significant water quality effects on watercourses due to scouring of stream beds by the use of splash dams, addition of large sediment loads from construction of railroads and landings adjacent to streams, increased surface erosion, mass wasting, and sedimentation of stream channels from tractor logging, and decreased stream shading due to harvest in the riparian zone. As with hydrology, water quality effects of more recent timber harvest (i.e., 1997 to 2008) have been reduced due to the implementation of CFPRs and additional environmental regulations; however, none of these timber harvest activities have been covered by an HCP or NCCP and continued effects on suspended sediments and water temperature have occurred. Overall, water quality effects from present and reasonably foreseeable future THPs would be similar to those described under the No Action alternative (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation) (i.e., potentially significant, less than significant, have no effect, or beneficial, depending on the water quality parameter) since these THPs likely are or would be implemented without additional measures beyond the CFPRs for resource protection. Implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a) would support improvements to water quality.

Water quality effects from illegal marijuana cultivation include increased nutrients and chemicals resulting from unregulated application of large amounts of fertilizers, herbicides, and animal poisons (some of which have been banned) and improper disposal of human waste and garbage (including batteries). The latter can increase concentrations of bacteria, heavy metals, and other organic contaminants (i.e., polychlorinated biphenyls) to watercourses in the primary and secondary assessment area. Slope terracing for illegal marijuana gardens also contributes to soil erosion potentially increasing suspended sediment and turbidity in receiving waters. Vineyard development would further contribute to nutrient increases in watercourses. Without a comprehensive road management plant, sediment delivery from road maintenance both inside and outside THPs would be potentially significant. Recreation and tourism activities conducted under State Park General Plans that increase sediment delivery to watercourses from the use of roads and trails would likely increase turbidity in affected streams within the assessment area. In addition, activities associated with maintenance and use of campgrounds may increase bacterial levels and adversely affect attainment of recreational beneficial uses (water contact recreation) in some assessment area watercourses.

Implementation of sedimentation and water temperature Total Maximum Daily Loads (Section 3.3; Hydrology, Beneficial Uses of Water, and Water Quality), the CFPRs, and other state and federal laws provide protections to hydrology, beneficial uses of water, and water quality parameters under many of the aforementioned past, present, and reasonably foreseeable future actions. However, some of these actions, such as pre-1997 timber harvest did not protect beneficial uses in the past; others, such as illegal marijuana cultivation, do not currently protect them. Although several more recent actions including 1997-2008 timber harvest activities, timberland conversion to vineyards, recreation and tourism activities, and general road maintenance do possess measures to protect hydrology and water quality, the combined effect of past, present, and reasonably foreseeable future actions has resulted in a cumulative effect on hydrology, beneficial uses of water, and/or water quality.

Anticipated effects under each alternative are analyzed below in combination with the aforementioned effects from past, present, and reasonably foreseeable future actions to assess their contribution to cumulative effects on hydrology, beneficial uses of water, and water quality.

4.3.1 No Action alternative

Under the No Action alternative there would be a potentially significant effect on hydrology, acting to increase peak flows relative to existing conditions such that the potential for flooding or erosion/siltation would also increase in almost half of the planning watersheds in decades 4–8 of the analysis period. There would be a less than significant effect on hydrology due to slightly increased low flows and flow variability and a less than significant effect due to continued or future flooding potential at locations near skid trail crossings (Section 3.3.2; Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). Road-related surface erosion would increase under the No Action alternative relative to existing conditions, though there would be a beneficial effect on water quality due to temperature (decreasing water temperatures through increased stream shading and a less than significant effect due to a lack of significant changes in nutrients. Since the primary factors affecting dissolved oxygen in the primary assessment area would not clearly positively or negatively reinforce one another, effects on dissolved oxygen under the No Action alternative cannot be determined given the available information.

A **potentially significant cumulative effect** on hydrology, beneficial uses of water, and water quality would result from the No Action alternative because (1) there is an overall cumulative effect of past, future, and reasonably foreseeable future actions, and (2) and the No Action alternative's effects on peak flows and turbidity would contribute considerably to the overall cumulative effect. Because mitigation is not proposed under the No Action alternative, its effects on hydrology, beneficial uses of water, and water quality would remain significant and unavoidable.

4.3.2 Proposed Action

Under the Proposed Action, there would be a less than significant effect on hydrology due to increases in peak flows and low flows in a few more heavily harvested planning watersheds (Section 3.3.2, Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). There would be a beneficial effect on hydrology due to decreased flooding potential from correction of watercourse diversions and alterations to channel cross-sectional shape and gradient at skid trail crossings. Implementation of measures under the Proposed Action that include specific changes in the length, location, and use of the road network, removal of unnecessary roads that chronically produce sediment, and control of point sources of sediment associated with roads would have a beneficial effects on suspended sediment and turbidity compared with existing conditions. In addition, there would be beneficial effects under the Proposed Action on water quality, due to increased streamside shading and decreased water temperatures, and increased dissolved oxygen, due to the secondary effects of decreased suspended sediments and water temperature (Section 3.3.2, Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). There would be a less than significant effect on water quality due to a lack of significant change in nutrients.

Therefore, the Proposed Action would not contribute considerably to the overall cumulative effect of past, present and reasonably foreseeable future actions in the assessment area, and would have a **less than significant cumulative effect** on hydrology, beneficial uses of water, and water quality.

4.3.3 Alternative A

Under Alternative A, there would be no effect on hydrology due to a lack of changes in peak flows and a less than significant effect due to the potential for slightly increased low flows and flow variability (Section 3.3.2, Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). There would be a beneficial effect on hydrology due to decreased flooding potential from correction of watercourse diversions and alterations to channel cross-sectional shape and gradient at skid trail crossings. As with the Proposed Action, Alternative A would have beneficial effects on water quality due to decreases in suspended sediment and turbidity, decreases in water temperatures from increased streamside shading, and increases in dissolved oxygen, as a secondary effect of decreased suspended sediments and water temperature. There would be a less than significant effect on water quality due to a lack of significant change in nutrients under Alternative A (Section 3.3.2, Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation).

Therefore, Alternative A would not contribute considerably to the overall cumulative effect of past, present, and reasonably foreseeable future actions, and would have a **less than significant cumulative effect** on hydrology, beneficial uses of water, and water quality.

4.3.4 Alternative B

Under Alternative B, there would be a less than significant effect on hydrology due to increased peak flows and/or low flows occurring only in local channels draining clearcut areas from decades 3 to 8 of the analysis period and not at the scale of the planning watershed or the primary assessment area[53] (Section 3.3.2, Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). Under Alternative B, increases in management-related and road-related surface erosion outside of reserves would result in potentially significant effects on suspended sediment and turbidity (Section 3.3.2, Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation). Effects on overall stream water temperature would be potentially beneficial under Alternative B, although effects on dissolved

[53] Low flows are analyzed only at the scale of the primary assessment area.

oxygen and nutrients would be potentially significant (Section 3.3.2.5, Hydrology, Beneficial Uses of Water, and Water Quality; Environmental effects and mitigation).

With implementation of **Mitigation Measure 3.2-1** (reduce the potential for sediment delivery to stream channels from management-related shallow landsliding), **Mitigation Measure 3.2-2** (reduce the potential for sediment delivery to stream channels from management-related surface erosion), and **Mitigation Measure 3.2-3** (develop and implement a comprehensive road management approach) (Section 3.2.2; Geology, Soils, and Geomorphology; Environmental effects and mitigation), the contribution of Alternative B to the existing cumulative effect on suspended sediment and turbidity, dissolved oxygen, and nutrients would be less than considerable. Therefore, with mitigation, Alternative B would have a **less than significant cumulative effect** on hydrology, beneficial uses of water, and water quality.

4.3.5 Alternative C

Like the Proposed Action, Alternative C would not contribute considerably to the overall cumulative effects on hydrology, suspended sediment and turbidity, water temperature, and nutrients resulting from past, present, and reasonably foreseeable future actions. Therefore, Alternative C would have **less than significant cumulative effect** on hydrology, beneficial uses of water, and water quality.

4.4 Aquatic and Riparian Habitats and Species of Concern

Past, present, and reasonably foreseeable future actions within the assessment area that may affect aquatic and riparian habitats and species of concern include (Table 4.1-1):

- past timber harvest (pre-1997);
- past timber harvest (1997 to 2008);
- past commercial and residential development;
- present and reasonably foreseeable future forest management;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a);
- Caspar Creek weir pond maintenance and fish passage improvements;
- marijuana cultivation;
- timberland conversion (most notably vineyard development);
- implementation of State Park General Plans;
- domestic and municipal water supply resource development;
- road maintenance; and
- the State Water Resources Control Board adopted Policy for Maintaining Instream Flows in Northern California Coastal Streams (SWRCB 2010).

Past timber harvest prior to the 1973 Z'berg-Nejedly Forest Practice Act of 1973 included few if any protection measures for aquatic and riparian resources. Clearcutting, primitive road-building, ground-based yarding practices in stream channels and on steep slopes, use of fire, and lack of erosion control measures resulted in changes in hydrology, increased landsliding and channel headcutting, and severe surface erosion. These practices resulted in severe sedimentation of streams and degradation of aquatic habitat, much of which remains evident. Early timber harvest practices included transporting logs downstream, scouring stream beds and banks and removing riparian vegetation, large boulders, and large woody debris in or along the channel. Constructed landings also caused considerable alteration of channel and riparian areas and introduced large amounts of sediment into streams. Legacy forest management practices may still have effects on erosion and sediment delivery to steams where abandoned roads, skid trails, and anthropogenic valley fills remain untreated. Similarly, historical commercial and residential development has included vegetation clearing, land grading, stream channel alterations, wetland filling, inadvertent construction of fish passage barriers, changes in runoff patterns, and introduction of non-native species—activities which have historically had impacts on aquatic and riparian habitats and associated species. Contemporary environmental regulations (e.g., NEPA, Clean Water Act, Clean Air Act, and CEQA) include protection measures for aquatic and riparian resources. The CFPRs included measures for water resource protection and erosion control, clearcut size and spacing limitations, equipment exclusion in stream channels and other sensitive areas, and riparian canopy retention standards. The CFPRs have been subsequently modified to require wider stream buffer zones, increased canopy retention standards, inner gorge protection, road management measures, and other protective measures. However, a Scientific Review Panel on the CFPRs and salmonid habitat found that, at least up to 1999, the CFPRs and their implementation did not ensure protection of anadromous salmonid populations (Ligon et al. 1999). Timber harvest activities that occurred from 1997 to present generally are similar to those described under existing conditions and the effects are similar to those described in Section 3.4.2 (Aquatic and Riparian Habitats and Species of Concern, Environmental effects and mitigation).

It is reasonable to assume that present and reasonably foreseeable future THPs in the secondary assessment area (including road management) will be subject to improved CFPRs and environmental regulations with the passage of the anadromous salmonid protection rules (14 CCR §916.9 and §923) in 2009. As described in Section 4.1.1.2 (Present and reasonably foreseeable future actions), the cumulative effects analysis presented here relies on the assumption that the effects of timber harvest under future THPs on aquatic and riparian habitats and species of concern would be similar to those described under the No Action alternative in Section 3.4.2 (Aquatic and Riparian Habitats and Species of Concern, Environmental effects and mitigation). For example, implementation of the Jackson Demonstration State Forest Management Plan would include no significant effects on special-status aquatic species as analyzed in the final EIR for the project (CAL FIRE 2008b). Under the related Caspar Creek weir pond maintenance and fish passage improvements, NMFS determined that the continued maintenance and fish passage improvements are not likely to jeopardize the continued existence of Central California Coast coho salmon or northern California steelhead, or to destroy or adversely modify designated coho salmon critical habitat (NMFS 2003).

Present and future conversion of timberland to other land uses, particularly vineyards, may include increase application of fertilizers and herbicides as well as increase runoff and soil erosion, although erosion control measures are often required and some contemporary vineyards are beginning to collect their own irrigation water during the winter to avoid or minimize groundwater pumping and/or stream water use during the summer and fall. The location and timing of these changes are unknown and their extent within the secondary assessment area is limited. Marijuana cultivation is an unregulated activity that has the potential to severely impact aquatic and riparian resources through degradation of aquatic habitats via application of fertilizers and pesticides, diversion of large amounts of water, littering (such as decaying batteries) and removal of streamside vegetation. While State Park General Plans include human use elements (e.g., campgrounds, parking lots, restrooms, trails, fishing opportunities), they also include protections for large areas of habitat that benefit aquatic species. The recently adopted State Water Resources Control Board Policy for Maintaining Instream Flows in Northern California

Coastal Streams (SWRCB 2010) is intended to ensure adequate instream flows to protect aquatic habitats and species of concerns, thus it is likely to result in beneficial effects on aquatic resources. This policy applies to water resource development for domestic and municipal water supplies, thereby minimizing the potential for these activities to cause detrimental effects on hydrology and aquatic resources. Herbicide use under all the alternatives would continually decrease compared with existing conditions, and would continue to be restricted and regulated by federal, state, and local agencies. The potential for contamination of surface waters and the resultant risk of toxic effects on aquatic and riparian species of concern is anticipated to be low. Effects of herbicide use are analyzed in Sections 3.10 (Affected Environment and Environmental Effects, Hazards and Hazardous Substances) and 4.10 (Cumulative Effects, Hazards and Hazardous Substances).

Many of the aforementioned past, present, and reasonably foreseeable future actions have been implemented or will be implemented in accordance with the CFPRs and other state and federal laws, which provide protections to aquatic habitats and species of concern. However, some of these actions, such as historical timber harvest and commercial and residential development, did not protect aquatic resources in the past; others, such as illegal marijuana cultivation, do not currently protect them. Although several present and reasonable foreseeable future actions include measures to adequately protect aquatic resources, the combined effect of past, present, and reasonably foreseeable future actions has resulted in a cumulative effect on aquatic and riparian habitats and species of concern in the primary and secondary assessment areas.

Anticipated effects of implementing each alternative are analyzed below in combination with the aforementioned effects from past, present, and reasonably foreseeable future actions to assess their contribution to cumulative effects on aquatic and riparian habitats and species of concern.

4.4.1 No Action alternative

Under the No Action alternative, sediment delivery to aquatic habitats from shallow landsliding and deep-seated landsliding, and from road-related sources, would increase relative to existing conditions. Similarly, implementation of the No Action alternative would likely result in increased peak stream flows and increased turbidity during high flows compared with existing conditions, though low flows would not be affected. Increased sediment delivery, peak flows, and turbidity would contribute further to the degraded quality and reduced quantity of aquatic habitat in the primary and secondary assessment areas that has occurred due to historical timber harvest and may continue to occur as a result of other actions described above. Herbicide use under the No Action alternative would decrease relative to existing conditions and the potential for adverse effects on aquatic and riparian species of concern is expected to be low.

Forest management practices and riparian conservation measures under the No Action alternative would protect riparian functions such as large woody debris recruitment, stream shading, sediment filtration, bank stability, and nutrient input and would result in a trend towards improved riparian conditions relative to existing conditions. These practices and measures would benefit habitat used by aquatic species of concern and contribute to maintenance and development of microclimate conditions suitable for amphibians and other species that use riparian habitats throughout the primary assessment area. Although the effects of past land and resource management have resulted in adverse cumulative effects on riparian conditions, the beneficial effects of the No Action alternative on riparian conditions would not contribute to these cumulative effects.

The combined effects of increases in sediment delivery, peak flows, and turbidity under the No Action alternative would reduce the quantity and quality of habitat and contribute to significant cumulative effects on salmonids (coho salmon in the Central California Coast and Southern Oregon/Northern California Coast Evolutionarily Significant Units, Chinook salmon in the California Coastal Evolutionarily Significant Unit, and steelhead in the Central California Coast and Northern California Distinct Population Segments) and their critical habitat. For the same reasons, the No Action alternative would also contribute to significant cumulative effects on coastal tailed frog, California red-legged frog, northern red-legged frog, southern torrent salamander, and foothill yellow-legged frog. Therefore, the No Action alternative would have **potentially significant cumulative effects** on aquatic and riparian species of concern. Because mitigation is not proposed under the No Action alternative, its effects on aquatic and riparian species of concern would remain potentially significant and it would contribute to significant and unavoidable cumulative effects on these species.

4.4.2 Proposed Action

Sediment delivery to streams and other aquatic habitats would be reduced over time under the Proposed Action and would be less than under existing conditions. Likewise, peak flows would be slightly reduced and there would be no appreciable change in summer low flows relative to existing conditions. The reduction in sediment-related effects and the decreased potential for displacement and mortality of aquatic species during high flow events would improve habitat conditions for aquatic and riparian species of concern relative to existing conditions. These effects would be due in large part to a reduction in the amount of land harvested per decade and an increase in the proportion of selection harvest relative to existing conditions, and the implementation of a comprehensive road management plan.

As under the No Action alternative, forest management practices and riparian conservation measures under the Proposed Action would help protect riparian functions such as large woody debris recruitment, stream shading, sediment filtration, bank stability, and nutrient input and would result in a trend towards improved riparian conditions relative to existing conditions. These practices and measures would benefit habitat used by aquatic species of concern and contribute to maintenance and development of microclimate conditions suitable for amphibians and other species that use riparian habitats throughout the primary assessment area. Herbicide use under the Proposed Action would decrease relative to existing conditions and the potential for adverse effects on aquatic and riparian species of concern is expected to be low.

Although the effects of past land and resource management have resulted in adverse cumulative effects on aquatic and riparian habitats and species of concern, the effects of the Proposed Action would not contribute considerably to these effects. Therefore, implementation of the Proposed Action would have **no cumulatively significant effect** on aquatic and riparian species of concern.

4.4.3 Alternative A

Implementation of Alternative A would have effects similar to those of the Proposed Action, with additional protections and benefits for aquatic and riparian habitats and species of concern. Harvest restrictions, including a prohibition on harvest within one site-potential tree height (approximately 150 ft [46 m]) of all Class I streams, and road management measures are expected to reduce surface erosion from roads and streamside areas, reduce road-related mass wasting, and reduce delivery of coarse and fine sediment to streams relative to existing conditions and the Proposed Action. As under the Proposed Action, the amount of land harvested per decade would be less than existing conditions and the proportion of selection harvest would be greater, likely resulting in slightly reduced peak flows and no appreciable change in summer low flows relative to existing conditions.

As under the No Action alternative and the Proposed Action, forest management practices and riparian conservation measures under Alternative A would help protect riparian functions such as large woody debris recruitment, stream shading, sediment filtration, bank stability, and nutrient input and would result in a trend towards improved riparian conditions relative to existing conditions. These practices and measures would benefit habitat used by aquatic species of concern and contribute to maintenance and development of microclimate conditions suitable for amphibians and other species that use riparian habitats throughout the primary assessment area. Herbicide use under Alternative A would decrease relative to existing conditions and the potential for adverse effects on aquatic and riparian species of concern is expected to be low.

Alternative A would not make a considerable contribution to adverse cumulative effects and would have **no cumulatively significant effect** on aquatic and riparian habitats and species of concern.

4.4.4 Alternative B

Under Alternative B, sediment delivery from surface erosion in the reserve areas would be less than levels expected under existing conditions and the other alternatives. Outside the reserves, soil compaction and sediment delivery to stream channels from surface erosion is expected to be substantially greater than under existing conditions due to predominantly clearcut silvicultural treatments that result in less canopy retention and basal area, more ground disturbance, and greater hydrologic change (e.g., increased runoff) than under existing conditions or other alternatives. Sediment delivery to stream channels from shallow landsliding outside reserves would also increase relative to existing conditions. Inside reserves, sediment delivery from shallow landslides and road-related erosion would be less than from the same areas under existing conditions or under other alternatives. Outside reserves, road-related erosion and sediment delivery to stream channels would increase compared with existing conditions and would be similar to the No Action alternative. Road-related sediment delivery outside reserves would be due primarily to the lack of a comprehensive road management approach and schedule for road inventory under this alternative. Sediment production and delivery from harvest areas outside reserves would also increase compared with existing conditions and the No Action alternative.

Management under Alternative B would have no discernable effects on peak flows or low flows at the scale of the primary assessment area. Herbicide use under Alternative B would decrease relative to existing conditions and the potential for adverse effects on aquatic and riparian species of concern is expected to be low. There would be no herbicide use in the reserves. Riparian buffer widths and riparian management measures outside of reserves would be the same as the No Action alternative. Effects on habitat used by aquatic species of concern, and riparian microclimate conditions for amphibians and other riparian species, would be the same as the No Action alternative. Inside the reserves there would be no harvest in riparian buffer zones and riparian functions such as large woody debris recruitment, stream shading, sediment filtration, bank stability, and nutrient input would be enhanced relative to existing conditions and the other alternatives.

Increases in fine sediment delivery to aquatic habitats under Alternative B would occur outside the reserves and in areas downstream of non-reserve forestlands, resulting in an overall loss of usable aquatic habitat and reduction in habitat quality relative to existing conditions. These impacts would contribute to adverse cumulative effects. Despite potential improvements in aquatic habitat complexity, water temperature, and riparian functions outside the reserves, the increased sediment delivery to aquatic habitats would result in **potentially significant cumulative effects** on anadromous salmonids (coho salmon, Chinook salmon, and steelhead) and amphibian species of concern at the scale of the primary assessment area.

With implementation of **Mitigation Measure 3.2-1** (Reduce the potential for sediment delivery to stream channels from management-related shallow landsliding), **Mitigation Measure 3.2-2** (Reduce the potential for sediment delivery to stream channels from management-related surface erosion), and **Mitigation Measure 3.2-3** (Develop and implement a comprehensive road management approach) (Section 3.2.2 Geology, Soils, and Geomorphology; Environmental effects and mitigation), the contribution of Alternative B to the existing cumulative effect of sediment delivery on anadromous salmonids and amphibian species of concern would be less than considerable. Therefore, with mitigation Alternative B would have a **less than significant cumulative effect** on anadromous salmonids and amphibian species of concern.

4.4.5 Alternative C

The effects of Alternative C would be the same as those of the Proposed Action through year 40. Therefore, like the Proposed Action, the effects of Alternative C would be beneficial and would not contribute to adverse cumulative effects. Therefore, implementation of Alternative C would have **no cumulatively significant effect** on aquatic and riparian species of concern.

4.5 Vegetation and Plant Species of Concern

Past, present, and reasonably foreseeable future actions within the assessment area that may affect rare/unique plant communities and plant species of concern include:

- past timber harvest operations (pre-1997);
- past timber harvest operations (1997–2008);
- past commercial and residential development;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a);
- present and reasonably foreseeable future forest management;
- marijuana cultivation;
- timberland conversion (most notably vineyard development);
- transmission line maintenance; and
- road maintenance.

Past timber harvest prior to the enactment of the CFPRs (in 1973) and past commercial and residential development prior to the passage of contemporary environmental regulations (e.g., NEPA, Clean Water Act, Clean Air Act, and CEQA) included few if any protection measures for vegetation resources. As a result, these past actions likely resulted in the direct removal or alteration of California Natural Diversity Database Special Community Types and Habitat Elements (e.g., wetlands, hardwoods, and old-growth forest) in the primary and secondary assessment areas. Similarly, these actions likely resulted in the direct removal of populations and/or habitat degradation and fragmentation of the 45 plant species of concern that have the potential to occur in timber-related California Wildlife Habitat Relationships habitat types.

Past timber harvest following the enactment of the CFPRs, as well as present and reasonably foreseeable future timber harvest and implementation of the Jackson Demonstration State Forest Management Plan are regulated under the CFPRs. Treatment of rare plants in THPs under CFPRs increased in approximately 2000 due to increased CDFG participation in the review team process. Therefore, potential effects on rare/unique plant communities and plant species of concern are likely similar to those under the No Action alternative. There are management strategies under the CFPRs for the protection of wetlands that would extend to Northern Coastal Salt Marsh, but none for Mendocino Pygmy Cypress Forest and hardwoods. Therefore, there would be potentially significant effects on Mendocino Pygmy Cypress Forest and hardwoods due to removal and/or alteration of habitat conditions as a result of these actions. For the 46 plant species of concern, either CFPR guidelines (for federal- and/or state-listed plant species) or CEQA standards (14 CCR §15380[d]) (for those species that are exclusively designated with a California Rare Plant Rank) would likely apply to these actions. As such, seasonally-appropriate surveys would be conducted if necessary to avoid a significant impact and documented populations would be evaluated for potential significant project impacts. If potential impacts are identified, management measures would be implemented to ensure that impacts are avoided, minimized, or mitigated.

Past commercial and residential development since the passage of contemporary environmental regulations, the majority of timberland conversion, and transmission line maintenance are all actions that are subject to state and federal laws that include protection measures for many vegetation resources. For example, under CEQA, the lead agencies are responsible for identifying and mitigating impacts on California Natural Diversity Database Special Community Types. Wetlands in the primary and secondary assessment area are protected under Section 404 of the Clean Water Act. Under CEQA, mitigation is mandated for impacts on some hardwoods, specificially oaks (California Public Resources Code Section 21083.4). However, hardwoods other than oaks, are not protected by federal or state law and could be removed or altered as a result of these actions. Because of their importance as habitat for wildlife species of concern, potential effects on old-growth forest are discussed in Section 3.6 (Terrestrial Habitats and Wildlife Species of Concern). Depending on the status of the plant species of concern, federal regulations and/or CEQA would apply to these actions, and seasonally-appropriate surveys would be conducted, if necessary to avoid a significant impact, and documented populations would be evaluated for potential significant project impacts. If potential impacts are identified, management measures would be implemented to ensure that impacts are avoided, minimized, or mitigated.

Marijuana cultivation is an unregulated activity that has the potential to impact nearly all the vegetation resources of concern, either through the direct removal of California Natural Diversity Database Special Community Types, habitat elements, or populations of the plant species of concern, and/or alteration and fragmentation of their habitat conditions.

Regulations on present and reasonably foreseeable future road maintenance are variable. Outside of THP, where CFPRs apply, there are few if any conservation or management strategies for protection of vegetation resources during road maintenance. As a result, road maintenance may result in the direct removal of California Natural Diversity Database Special Community Types, Habitat Elements, or populations of the plant species of concern, and/or alteration and fragmentation of their habitat conditions.

The CFPRs and other state and federal laws provide protections to most of the vegetation resources of concern under many of these past, present, and reasonably foreseeable future actions. However, several of these actions, such as past timber harvest (prior to the CFPRs), marijuana cultivation, and some aspects of road maintenance, include little or no protections for vegetation resources, and have resulted in an overall cumulative effect on the vegetation resources of concern.

4.5.1 No Action alternative

The No Action alternative would result in less than significant effects on Northern Coastal Salt Marsh, hardwoods, and wetlands. Conservation and management strategies that would be in place under the No Action alternative are sufficient to ensure that the No Action alternative would not make a considerable contribution to a cumulative effect on Northern Coastal Salt Marsh, wetlands, or hardwoods.

In addition to the plant communities discussed above, several California Natural Diversity Database Special Community Types occur in the secondary assessment area but not in the primary assessment area (Section 3.5 [Vegetation and Plant Species of Concern], Table 3.5-10). These communities are: Grand Fir Forest, Upland Douglas-fir Forest, Northern Coastal Bluff Scrub, Coastal and Valley Freshwater Marsh, Coastal Brackish Marsh, Coastal Terrace Prairie, Fen, and Sphagnum Bog. If, in the future, MRC acquires land in the secondary assessment area with one of these plant communities, MRC would not implement forest management activities in these community types under the No Action alternative. Therefore, the No Action alternative would not make a considerable contribution to a cumulative effect on these California Natural Diversity Database Special Community Types.

For forest management activities covered under THP (e.g., timber harvesting, yarding and transporting) there would be less than significant effects under the No Action alternative on all 46 plant species of concern with the potential to occur in timber-related California Wildlife Habitat Relationships habitat types, as CFPR and CEQA guidelines as supported by agency policy would apply (Section 3.5.2, Vegetation and Plant Species of Concern, Environmental effects and mitigation). The protections under these strategies are sufficient to ensure that for these THP-related activities the No Action alternative would not make a considerable contribution to a cumulative effect on these species of concern. However, prior to forest management activities not subject to the CFPRs (e.g., vegetation management, pre-commercial thinning, road maintenance, re-opening of old roads) there would be potentially significant effects on these species, given that CEQA survey or impact assessment requirements would not apply. Therefore, for these non-THP activities, the No Action alternative would contribute considerably to the overall cumulative effect of past, present, and reasonably foreseeable future actions on the 46 plant species of concern with the potential to occur in timber-related California Wildlife Habitat Relationships habitat types. Finally, there would be potentially significant effects on plant species of concern that potentially occur only in non-timber California Wildlife Habitat Relationships habitat types under the No Action alternative given that non-THP activities are not subject to the CFPRs or CEQA. Therefore, for these non-THP activities, the No Action alternative would contribute considerably to the overall cumulative effect and would have a **potentially significant cumulative effect** on the plant species of concern with the potential to occur only in non-timber habitat types.

Herbicide use under the No Action alternative would increase relative to existing conditions and there is a potential for adverse effects on vegetation and plant species of concern due to application of forest chemicals. Effects of herbicide use are analyzed in Sections 3.10 (Affected Environment and Environmental Effects, Hazards and Hazardous Substances) and 4.10 (Cumulative Effects, Hazards and Hazardous Substances).

The No Action alternative lacks measures for the protection of Mendocino Pygmy Cypress Forest and would result in potentially significant effects on this plant community due to its removal or alteration of habitat conditions (Section 3.5.2, Vegetation and Plant Species of Concern, Environmental effects and mitigation). Mendocino Pygmy Cypress Forest is a unique community restricted to Mendocino County, and any effects on this community resulting from forest management activities could be considered significant. Therefore, the No Action alternative would have a **potentially significant cumulative effect** on Mendocino Pygmy Cypress Forest. Because mitigation is not proposed under the No Action alternative, this cumulative effect would remain significant and unavoidable.

4.5.2 Proposed Action

The Proposed Action would result in less than significant impacts on the following California Natural Diversity Database Special Community Types and Habitat Elements due to the conservation and management strategies that would be in place: hardwoods, Mendocino Pygmy Cypress Forest, Northern Coastal Salt Marsh, and wetlands (Section 3.5.2, Vegetation and Plant Species of Concern, Environmental effects and mitigation). The protections under the Proposed Action are sufficient to ensure that management activities would not make a considerable contribution to a cumulative effect on these communities.

Several additional California Natural Diversity Database Special Community Types occur only in the secondary assessment area (these communities are listed above in Section 4.5.1). If, in the future, MRC acquires land in the secondary assessment area with one of these plant communities, MRC would not implement forest management activities in these community types under the Proposed Action. Therefore, the Proposed Action would not make a considerable contribution to a cumulative effect on these California Natural Diversity Database Special Community Types.

Section 3.5.1 (Vegetation and Plant Species of Concern, Affected environment/Environmental setting) provides a list of the 46 plant species of concern with the potential to occur in timber-related California Wildlife Habitat Relationships habitat types and summarizes the various management strategies and potential effects under the Proposed Action. Twenty-one of these species would be covered by the HCP/NCCP under the Proposed Action. Prior to any covered management activities (i.e., PTHP-related or non-PTHP related), MRC would conduct a floristic survey for covered species at least twice during the term of HCP/NCCP, the first survey being within a three-year window. For covered species that are documented, protection would be provided through either the application of species-specific HCP/NCCP conservation measures or programmatic measures particular to a management category. Given the protocols and protections provided to covered plant species of concern and a monitoring/adaptive management framework to provide feedback to improve future management, the potential for loss of a population or part of a population, or habitat degradation, would be substantially avoided or minimized. Therefore, effects on covered plant species of concern in California Wildlife Habitat Relationships timber-related habitat types under the Proposed Action would be less than significant. The protections under the HCP/NCCP are sufficient to ensure that the Proposed Action would not make a considerable contribution to a cumulative effect on the 21 covered species.

Twenty-five of the species of concern with the potential to occur in timber-related California Wildlife Habitat Relationships habitat types would not be covered by the HCP/NCCP under the Proposed Action but are either federal- and/or state-listed or exclusively designated as a California Rare Plant Rank species. When conducting any covered management activities, MRC would conduct a floristic survey for covered species at least twice during the term of HCP/NCCP; however, this survey may or may not document the presence of non-covered species. For PTHP-related management activities, if one of these 25 species is documented, CAL FIRE would consult with CDFG in a project-specific review to ensure that operations are conducted to meet the CEQA (14 CCR §15380[d]) and CFPR (14 CCR §919.4) standards, and therefore potential effects would be avoided or minimized. When conducting non-PTHP related activities, if one of these 25 species is documented, measures to avoid impacts on non-covered but CESA-listed species would be developed with CDFG. However, due to lack of a survey protocol, for all covered activities a non-covered plant species of concern may go undetected, resulting in the potential for loss of a population or part of a population, or degradation of habitat for a species. Therefore, these management activities may result in potentially significant effects on all non-covered species of concern in California Wildlife Habitat Relationships timber-related habitat types under the Proposed Action. Therefore, the Proposed Action could contribute considerably to the overall cumulative effect on all non-covered plant species of concern with the potential to occur in California Wildlife Habitat Relationships timber-related habitat types.

The remaining plant species of concern potentially occur only in non-timber habitat types. MRC's floristic survey standards and protections for covered species would still apply. For those that inhabit covered communities, the HCP/NCCP defines community-based measures that would assist in the protection of these species by avoiding or minimizing the potential for loss of a population or part of a population, or degradation of its habitat. For those species that inhabit communities that are not covered, covered species would be protected under the developed survey protocol and mitigation measures. As a result, there would be less than significant effects on covered plant species of concern that potentially occur only in non-timber habitat types. However, given the lack of survey and mitigation protocols for non-covered species under the Proposed Action, loss of a population or part of a population, or degradation of habitat could occur. Therefore, there would be potentially significant effects on non-covered species that potentially occur only in non-timber habitat types. The Proposed Action would contribute considerably to the overall cumulative effect on non-covered plant species of concern that potentially occur only in non-timber habitat types, resulting in a **potentially significant cumulative effect**.

With implementation of **Mitigation Measure 3.5-1** (adopt the CDFG survey protocol and guidance for all covered activities, and for non-PTHP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all plant species of concern) (Section 3.5.2, Vegetation and Plant Species of Concern, Environmental effects and mitigation), the contribution of the Proposed Action to cumulative effects on non-covered species of concern with the potential to occur in timber and non-timber California Wildlife Habitat Relationships habitat types would be reduced to **less than significant cumulative effect**.

Herbicide use under the Proposed Action would decrease relative to existing conditions and the potential for adverse effects on plant species of concern is expected to be low. Where herbicides are used to control competing vegetation, there may be potential benefits to covered plants. Effects of herbicide use are analyzed in Sections 3.10 (Affected Environment and Environmental Effects, Hazards and Hazardous Substances) and 4.10 (Cumulative Effects, Hazards and Hazardous Substances).

4.5.3 Alternative A

Effects on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern under Alternative A would be the same as under the Proposed Action. Alternative A would not make a considerable contribution to a cumulative effect on

California Natural Diversity Database Special Community Types and Habitat Elements due to the conservation and management strategies that would be place. As described above in Section 4.5.1, several additional California Natural Diversity Database Special Community Types occur in the secondary assessment area but not in the primary assessment area. For the same reasons described above for the Proposed Action, Alternative A would not make a considerable contribution to a cumulative effect on these California Natural Diversity Database Special Community Types.

When conducting any covered management activities, Alternative A would not make a considerable contribution to a cumulative effect on the 21 covered plant species of concern with the potential to occur in timber-related California Wildlife Habitat Relationships habitat types, due to the protocols and protections provided to covered plant species of concern and a monitoring/adaptive management framework to provide feedback to improve future management. However, when conducting covered management activities, Alternative A would contribute considerably to the overall cumulative effect on non-covered species that potentially occur in California Wildlife Habitat Relationships timber-related habitat types, given the lack of survey and mitigation protocols for non-covered species under Alternative A. Finally, while Alternative A would not make a considerable contribution to a cumulative effect on covered plant species of concern that potentially occur only in non-timber habitat types, it would contribute considerably to the overall cumulative effect on non-covered species that potentially occur only in non-timber habitat types given the lack of survey and mitigation protocols for non-covered species under Alternative A. This would be a **potentially significant cumulative effect**.

With implementation of **Mitigation Measure 3.5-1** (adopt the CDFG survey protocol and guidance for all covered activities, and for non-PTHP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all plant species of concern) (Section 3.5.2, Vegetation and Plant Species of Concern, Environmental effects and mitigation), the contribution of Alternative A to cumulative effects on non-covered species of concern with the potential to occur in timber and non-timber California Wildlife Habitat Relationships habitat types would be reduced to **less than significant cumulative effect**.

Herbicide use under Alternative A would decrease relative to existing conditions and the potential for adverse effects on plant species of concern is expected to be low. Where herbicides are used to control competing vegetation, there may be potential benefits to covered plants. Effects of herbicide use are analyzed in Sections 3.10 (Affected Environment and Environmental Effects, Hazards and Hazardous Substances) and 4.10 (Cumulative Effects, Hazards and Hazardous Substances).

4.5.4 Alternative B

Under Alternative B there would be no effect on California Natural Diversity Database Special Community Types and Habitat Elements within reserves (Section 3.5.2, Vegetation and Plant Species of Concern, Environmental effects and mitigation). Outside of reserves, guidelines for protection of California Natural Diversity Database Special Community Types and Habitat Elements would be defined by the 2012 CFPRs. The CFPRs lack measures for the protection of Mendocino Pygmy Cypress Forest and hardwoods; therefore, outside of the reserves, Alternative B would contribute considerably to the overall cumulative effect on Mendocino Pygmy Cypress Forest and hardwoods. These would be **potentially significant cumulative effects**. The CFPRs do have conservation and management strategies for Northern Coastal Salt Marsh and wetlands. The protections under these strategies are sufficient to ensure that the outside of the reserves, Alternative B would not make a considerable contribution to a cumulative effect on Northern

Coastal Salt Marsh or wetlands. Several additional California Natural Diversity Database Special Community Types occur in the secondary assessment area but not in the primary assessment area (Section 4.5.1). Outside of the reserves, Alternative B would not make a considerable contribution to a cumulative effect on these California Natural Diversity Database Special Community Types. With implementation of **Mitigation Measure 3.5-2** (adopt Mendocino Pygmy Cypress Forest protection measures) and **Mitigation Measure 3.5-3** (implement protection measures for hardwoods) (Section 3.5.2, Vegetation and Plant Species of Concern, Environmental effects and mitigation), the effects of Alternative B on Mendocino Pygmy Cypress Forest and hardwoods would be **less than significant cumulative effect**.

Outside of reserves, guidelines for protection of species of concern would be defined by the 2012 CFPRs and effects under Alternative B would be the same as under the No Action alternative. For forest management activities covered under the Proposed Action, protections under the CFPRs are sufficient to ensure that, for THP-related activities, Alternative B would not make a considerable contribution to a cumulative effect on these species of concern outside of the reserves. However, prior to non-THP activities there would be potentially significant effects on these same species given that CEQA survey or impact assessment requirements would not apply. Finally, there would be potentially significant effects on plant species of concern that potentially occur only in non-timber habitat types under Alternative B given non-THP activities are not subject to the CFPRs or CEQA. Therefore, for these non-THP activities, Alternative B, outside of reserves, would contribute considerably to the overall cumulative effects on the plant species of concern with the potential to occur only in non-timber habitat types. These would be **potentially significant cumulative effects**. With implementation of **Mitigation Measure 3.5-4** (for non-THP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all species of concern) (Section 3.5.2, Vegetation and Plant Species of Concern, Environmental effects and mitigation), non-THP activities under Alternative B would not make a considerable contribution to cumulative effects on plant species of concern outside of the reserves and the effects would be **less than significant cumulative effect**.

Total herbicide use under Alternative B would increase relative to existing conditions. There would be no herbicide use in the reserves. There is a potential for adverse effects on vegetation and plant species of concern due to application of forest chemicals outside of the reserves. Effects of herbicide use are analyzed in Sections 3.10 (Affected Environment and Environmental Effects, Hazards and Hazardous Substances) and 4.10 (Cumulative Effects, Hazards and Hazardous Substances).

4.5.5 Alternative C

Alternative C would include the same conservation measures for California Natural Diversity Database Special Community Types (in both the primary and secondary assessment areas) and Habitat Elements as the Proposed Action during the 40-year plan period. Therefore, Alternative C would not make a considerable contribution to a cumulative effect on these communities during the first 40 years of the analysis period due to the conservation and management strategies that would be in place.

Alternative C would implement many of the same conservation measures for plant species of concern as the Proposed Action during the 40-year plan period. However, under Alternative C only state-listed plant species of concern would be covered by an HCP. Therefore only two plant species would be covered by the HCP under Alternative C. When conducting any covered management activities, Alternative C would not make a considerable contribution to a cumulative effect on the two covered plant species of concern with the potential to occur in timber-related

California Wildlife Habitat Relationships habitat types, due to the protocols and protections provided to covered plant species of concern and a monitoring/adaptive management framework to provide feedback to improve future management. However, when conducting covered management activities, Alternative C would contribute considerably to the overall cumulative effect on the 44 non-covered species that potentially occur in California Wildlife Habitat Relationships timber-related habitat types, given the lack of survey and mitigation protocols under this alternative for non-covered species. This would be a This would be a **potentially significant cumulative effect**. Finally, while Alternative C would not make a considerable contribution to a cumulative effect on covered plant species of concern that potentially occur only in non-timber California Wildlife Habitat Relationships habitat types, it would contribute considerably to the overall cumulative effect on non-covered species that potentially occur only in non-timber habitat types given the lack of survey and mitigation protocols under Alternative C for non-covered species. This would be a **potentially significant cumulative effect**.

With implementation of **Mitigation Measure 3.5-1** (adopt the CDFG survey protocol for all covered activities, and for non-PTHP activities that disturb or destroy potential habitat, consult with CDFG to evaluate and mitigate for potential project impacts on all plant species of concern) (Section 3.5.2, Vegetation and Plant Species of Concern, Environmental effects and mitigation), Alternative B would not contribute to cumulative effects on non-covered species of concern with the potential to occur in timber and non-timber California Wildlife Habitat Relationships habitat types would be reduced to **less than significant cumulative effect**.

Herbicide use under Alternative C would decrease relative to existing conditions and the potential for adverse effects on plant species of concern is expected to be low. Where herbicides are used to control competing vegetation, there may be potential benefits to covered plants. Effects of herbicide use are analyzed in Section 3.10 (Affected Environment and Environmental Effects, Hazards and Hazardsous Substances) and Section 4.10 (Cumulative Effects, Hazards and Hazardous Substances).

4.6 Terrestrial Habitat and Wildlife Species of Concern

Past, present, and reasonably foreseeable future actions within the assessment area that may affect terrestrial habitat and wildlife species of concern include (Table 4.1-1):

- past timber harvesting (pre-1997);
- past timber harvesting (1997 to 2008);
- past commercial and residential development;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a);
- present and reasonably foreseeable future forest management;
- marijuana cultivation;
- timberland conversion;
- AT&T Low Effect HCP;
- Fisher Family HCP;
- Fort Bragg waste transfer station;
- transmission line maintenance; and
- implementation of State Park General Plans.

Past timber harvest and past commercial and residential development prior to the passage of contemporary environmental regulations (e.g., ESA, CESA, NEPA, and CEQA) included few if any protection measures for terrestrial resources. Historical timber harvest practices during this time included vast clearcutting, primitive road-building, ground-based yarding practices on steep slopes, and lack of erosion control measures. Similarly, commercial and residential development during this time included vegetation clearing, land grading, wetland filling, inadvertent increased vehicle emissions and noise, and introduction of non-native species. These past actions have historically had major impacts on terrestrial habitats and associated wildlife species through habitat removal, degradation, fragmentation, and direct mortality.

Present and reasonably foreseeable activities include THPs, which are regulated under the CFPRs and take prohibitions for listed species under the ESA and CESA. Since THPs have included or would include resource protection measures that meet the requirements of these regulations in addition to multi-agency participation review through the THP process, there would likely be less than significant effects on terrestrial habitats and wildlife species of concern. Similarly, implementation of the Jackson Demonstration State Forest Management Plan would include overall less than significant effects on special-status wildlife species as analyzed in the EIR for the project (CAL FIRE 2008b). Present and reasonably foreseeable future conversion of timberland to other land uses, particularly vineyards, may decrease and fragment habitat for wildlife species that use forest habitats, though such activities remain subject to current environmental regulations protecting species of concern and their habitats. Marijuana cultivation is an unregulated activity that has the potential to severely impact terrestrial resources through direct mortality, degradation of terrestrial wildlife habitats due to habitat removal, habitat degradation (e.g., trash, vegetation removal), and by impacting water sources for terrestrial species through application of fertilizers and pesticides. Other present and reasonably foreseeable actions in the secondary assessment area include construction and operation of the Fort Bragg waste transfer station, transmission line maintenance, and implementation of State Park General Plans. These activities have the potential to affect wildlife species of concern primarily due to human presence and associated influences such as noise, vibration, lighting, potential mortality from vehicles (including construction vehicles) and a limited amount of habitat alteration, though such impacts are avoided, minimized and/or compensated for through the current environmental regulation and review process. While State Park General Plans include human use elements (e.g., campgrounds, parking lots, restrooms, trails, fishing opportunities), they also include protections for large areas of habitat that benefit many wildlife species (e.g., northern spotted owls, marbled murrelet). Both the AT&T HCP for Point Arena mountain beaver and Fisher Family HCP anticipate some take of Point Arena mountain beaver through harassment, though they contain measures to minimize effects from construction and measures to rehabilitate impacted habitat.

All of these past, present, and reasonably foreseeable future actions result in an overall cumulative effect on terrestrial habitats and wildlife species of concern, mainly due to the substantial habitat elimination, degradation, and fragmentation that has occurred as a result of past timber harvest, commercial and residential development, and illegal marijuana cultivation.

4.6.1 No Action alternative

Effects of implementing the No Action alternative would include a general increase in modeled advanced-successional forests and an increase in advanced-successional patch size and connectivity—particularly riparian buffer zones. However, there would be potentially significant effects on species of concern that are associated with rocky outcrops (golden eagle, American peregrine falcon, pallid bat, and/or Townsend's western big-eared bat), since there are no measures under the No Action alternative to maintain and preserve rocky outcrop habitat. Under this alternative, CFPRs and USFWS take-avoidance strategies would minimize threats of take of marbled murrelet, northern spotted owl, and Point Arena mountain beaver. Resulting habitat retention may lead to less than significant effects, although unoccupied and nascent habitat might still be modified.

Herbicide use under the No Action alternative would decrease relative to existing conditions and the potential for adverse effects on terrestrial species of concern is expected to be low. Effects of herbicide use are analyzed in Sections 3.10 (Affected Environment and Environmental Effects, Hazards and Hazardous Substances) and 4.10 (Cumulative Effects, Hazards and Hazardous Substances).

The No Action alternative would contribute to cumulative effects on golden eagle, American peregrine falcon, pallid bat, and/or Townsend's western big-eared bat. Therefore, the No Action alternative would have **potentially significant cumulative effects** on these terrestrial species of concern. Because mitigation is not proposed under the No Action alternative, this cumulative effect would remain significant and unavoidable.

4.6.2 Proposed Action

Effects of implementing the Proposed Action would include a general increase in modeled advanced-successional forests and an increase in advanced-successional patch size and connectivity—particularly in riparian buffer zones. Under this alternative, conservation strategies for covered species would result in beneficial effects on northern spotted owl, marbled murrelet, Point Arena mountain beaver, and other species of concern associated with similar habitats. Less than significant effects are likely for some species that may be indirectly affected by harvest activities. However, the CFPRs and project-specific protection measures through CDFG consultation coupled with MRC's proposed HCP/NCCP conservation measures would offset effects on these species through required buffer zones, critical work windows, and protection of nest and screen trees. There are overall net benefits to wildlife species of concern because of increases in habitat at the scale of assessment, implementation of conservation measures to protect covered species—which consequently indirectly protect habitat for other species of concern—and implementation of project-specific mitigation measures.

Herbicide use under the Proposed Action would decrease relative to existing conditions and the potential for adverse effects on terrestrial species of concern is expected to be low. Effects of herbicide use are analyzed in Sections 3.10 (Affected Environment and Environmental Effects, Hazards and Hazardous Substances) and 4.10 (Cumulative Effects, Hazards and Hazardous Substances).

While there are overall cumulative effects from past, present, and reasonably foreseeable future actions, the Proposed Action would not make a considerable contribution to these effects. Therefore, the Proposed Action would have a **less than significant cumulative effect** on terrestrial habitat and wildlife species of concern.

4.6.3 Alternative A

As with the Proposed Action, Alternative A provides overall enhanced benefits to terrestrial habitat and wildlife species of concern. For the same reasons as mentioned above for the Proposed Action, Alternative A would not make a considerable contribution to the overall cumulative effect, and would have a **less than significant cumulative effect** on terrestrial habitat and wildlife species of concern.

4.6.4 Alternative B

Effects of implementing Alternative B include a general increase in modeled advanced-successional forests and an increase in advanced-successional patch size and connectivity—particularly in upland stands in the terrestrial reserves. However, there would be a potentially significant impact on old-growth forests outside of reserves due to lesser protection under CFPRs. There would also be potentially significant effects on species that are associated with rocky outcrops (golden eagle, American peregrine falcon, pallid bat, and/or Townsend's western big-eared bat) since there are no measures under Alternative B to maintain and preserve rocky outcrop habitat outside of the terrestrial reserves. Under this alternative, habitat for marbled murrelet, northern spotted owl, Point Arena mountain beaver, and species using similar habitats would be adequately protected within the terrestrial reserves.

Herbicide use under Alternative B would decrease relative to existing conditions and the potential for adverse effects on terrestrial species of concern is expected to be low. There would be no herbicide use in the reserves. Effects of herbicide use are analyzed in Sections 3.10 (Affected Environment and Environmental Effects, Hazards and Hazardous Substances) and 4.10 (Cumulative Effects, Hazards and Hazardous Substances).

A **potentially significant cumulative effect** on terrestrial habitat and wildlife species of concern would result because there is an overall cumulative effect of past, present, and reasonably foreseeable future actions and the effects on species associated with old-growth forests and rocky outcrops outside of the reserves under Alternative B would make a considerable contribution to the overall cumulative effect. After mitigation, however, the contribution of Alternative B to the overall cumulative effect is eliminated by **Mitigation Measure 3.6-1** (restrict harvest of old-growth trees and stands, and protect screen trees) and **Mitigation Measure 3.6-2** (protect rocky outcrops) (Section 3.6.2, Terrestrial Habitats and Wildlife Species of Concern, Environmental effects and mitigation). Therefore, Alternative B would have a **less than significant cumulative effect** on terrestrial habitat and wildlife species of concern.

4.6.5 Alternative C

Similar to the Proposed Action, Alternative C provides overall enhanced benefits to terrestrial habitat and wildlife species of concern. For the same reasons as mentioned above for the Proposed Action, Alternative C would not make a considerable contribution to the overall cumulative effect, and would have a **less than significant cumulative effect** on terrestrial habitat and wildlife species of concern.

4.7 Air Quality

Past, present, and reasonably foreseeable future actions within the assessment area that may affect air quality include (Table 4.1-1):

- past timber harvest (pre-1997);
- past timber harvest (1997 to 2008);
- past commercial and residential development;
- present and reasonably foreseeable future forest management;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a); and
- timberland conversion (most notably vineyard development).

Previous timber harvest (pre-1997) and prior THPs (1997–2008) may have contributed to adverse air quality at the time, but no longer contribute to air quality conditions in the assessment area because particulate emissions from road use and slash burning are short-term and directly associated with the activity. Past commercial and residential development may have affected air quality in the assessment area, but Mendocino County is in attainment with all federal and state air quality standards except the state standard for respirable particulate matter[54], suggesting that the effect has not been cumulatively substantial. Prior development could contribute to respirable particulate matter emissions if the developed properties continue to use wood-burning stoves and fireplaces as a source of heat.

Timber operations under current and future THP s (including those of MRC) would continue to follow current burning restrictions and any new restrictions that could be adopted by the Mendocino County Air Quality Management District. Other timber operators in the assessment area would continue to comply with the California Air Resources Board and Environmental Protection Agency requirements to reduce emissions which would continue to protect ambient air quality. The final EIR for the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008b) assumes that effects on air quality resulting from implementation of the management plan would be less than significant. If timberland conversion (e.g., to vineyards) entails substantial ground work resulting in dust emissions or burning, then this activity could contribute to increased levels of respirable particulate matter.

These past, present, and reasonably foreseeable actions in the assessment area have resulted in a cumulative effect on air quality, particularly in regards to respirable particulate matter from road use, slash burning, and vehicle emissions. However, California Air Resources Board and Environmental Protection Agency requirements to reduce emissions, the CFPRs, and Mendocino County Air Quality Management District burning restrictions are designed to move the basin into attainment status for respirable particulate matter. Timber operations (including those of MRC) in the assessment area would be subject to these requirements and restrictions such that respirable particulate matter emissions are anticipated to decrease over time. In addition, the federal Clean Air Act and other laws and regulations intended to curb air pollution (e.g., the use of catalytic converters and clean-burning diesel engines) have made a positive contribution to the mitigation of cumulative air quality effects.

4.7.1 No Action alternative

Effects of implementing the No Action alternative would include increases in harvest area and/or volume that may result in greater emissions from forest management activities, primarily as a result of the continued practice of slash burning, which results in respirable particulate matter emissions. The increase in harvest would also require a corresponding increase in the use of log trucks and personal vehicles by MRC employees and contractors (Section 3.12, Traffic). The increase in use of forest roads as a result of increased harvest levels is not anticipated to result in a substantial increase in dust emissions because MRC would continue its existing dust abatement activities (i.e., application of water to logging roads via water-spray trucks). Alternative forms of dust abatement such as the application of approved materials (magnesium chloride, calcium chloride, and lignin) may also be used.

[54] Respirable particulate matter refers to that less than 10 microns in diameter; it is also referred to as PM_{10}.

Under this alternative, MRC would continue to follow burning restrictions and any new restrictions that could be adopted by the Mendocino County Air Quality Management District. MRC would continue to comply with the California Air Resources Board and Environmental Protection Agency requirements to reduce emissions and CFPRs and Mendocino County Air Quality Management District burning restrictions to protect ambient air quality. Because MRC would continue to comply with burning restrictions, respirable particulate matter emissions attributable to slash burning are not anticipated to contribute substantially to the existing respirable particulate matter levels. MRC's compliance with CARB and Environmental Protection Agency requirements would further reduce emissions from vehicle use. Air quality effects under the No Action alternative attributable to slash burning and vehicle emissions are expected to be less than significant (Section 3.7.2, Air Quality, Environmental effects and mitigation).

Although past, present, and reasonably foreseeable future actions have resulted in a cumulative effect on air quality, primarily particulate matter, the No Action alternative would not make a considerable contribution to it because: (1) restrictions and regulations are in place to reduce respirable particulate matter emissions and move the county into attainment with all state and federal air quality standards, and (2) activities under the No Action alternative are not anticipated to contribute substantially to the existing respirable particulate matter levels. Therefore, the No Action alternative would have a **less than significant cumulative effect** on air quality.

4.7.2 Proposed Action

Effects of implementing the Proposed Action would also include increases in harvest area and/or volume, relative to existing conditions, that may result in greater emissions from forest management activities. Slash burning is anticipated to increase over time, with the total amount burned reaching levels comparable to what would be expected under the No Action alternative. As under the No Action alternative, MRC would continue to follow burning restrictions and any new restrictions that could be adopted by the Mendocino County Air Quality Management District. Because MRC would continue to comply with burning restrictions, respirable particulate matter emissions attributable to slash burning are not anticipated to contribute substantially to the existing respirable particulate matter levels.

The increase in harvest would also require a corresponding increase in the use of log trucks and personal vehicles by MRC employees and contractors (Section 3.12, Traffic). The increase in use of forest roads as a result of increased harvest levels is not anticipated to result in a substantial increase in dust emissions because MRC would continue its existing dust abatement activities. MRC's compliance with California Air Resources Board and Environmental Protection Agency requirements would further reduce emissions from vehicle use. Air quality effects under the Proposed Action attributable to slash burning and vehicle emissions are expected to be less than significant (Section 3.7.2, Air Quality, Environmental effects and mitigation).

Although past, present, and reasonably foreseeable future actions have resulted in a cumulative effect on air quality, primarily particulate matter, the Proposed Action would not make a considerable contribution to it because: (1) restrictions and regulations are in place to reduce respirable particulate matter emissions and move the county into attainment with all state and federal air quality standards, and (2) activities under the Proposed Action are not anticipated to contribute substantially to the existing respirable particulate matter levels. Therefore, the Proposed Action would have a **less than significant cumulative effect** on air quality.

4.7.3 Alternative A

As with the Proposed Action, conservation measures (e.g., restrictions on areas in which timber can be harvested, exclusion of heavy equipment in Aquatic Management Zones) could reduce MRC's contributions to area respirable particulate matter over time by improving road conditions. Total slash burned would increase over time relative to existing conditions, but at a rate less than and reaching levels lower than under the No Action alternative. The changes in harvest levels may have minor effects on the generation of criteria pollutants such as respirable particulate matter, but these effects are unlikely to change the overall air quality conditions in the air basin. MRC would also comply with CARB and Environmental Protection Agency regulations to reduce emissions as described under the No Action alternative.

Under Alternative A, MRC would accelerate the development and implementation of a system-wide Road Management Plan, which includes a measure to treat mainline haul roads (after 15 June) so as not to require daily dust abatement by 2020 (with the exception of portions of roads where tractors cannot be trailered). Implementation of this measure would substantially reduce the amount of fugitive dust generated from use of mainline roads relative to the No Action alternative and other alternatives. For non-mainline roads, MRC would continue water drafting for dust abatement as described above for the No Action alternative. Air quality effects under Alternative A attributable to slash burning and vehicle emissions are expected to be less than significant (Section 3.7.2, Air Quality, Environmental effects and mitigation).

Although past, present, and reasonably foreseeable future actions have resulted in a cumulative effect on air quality, primarily particulate matter, Alternative A would not make a considerable contribution to it because: (1) restrictions and regulations are in place to reduce respirable particulate matter emissions and move the county into attainment with all state and federal air quality standards, (2) there would be a reduction in dust emissions from mainline haul roads relative to existing conditions and the No Action alternative, and (3) activities under Alternative A are not anticipated to contribute substantially to the existing respirable particulate matter levels. Therefore, Alternative A would have a **less than significant cumulative effect** on air quality.

4.7.4 Alternative B

Effects of implementing Alternative B include a reduction in harvest, primarily due to establishment of no-harvest reserves for covered wildlife species. Harvesting and management outside of the reserves would be similar to the No Action alternative. Total slash burned under Alternative B would be substantially less than under the No Action alternative, contributing to lower respirable particulate matter emissions. Outside of the reserves, conservation measures (e.g., restrictions on areas in which timber can be harvested, exclusion of heavy equipment in Aquatic Management Zones) could reduce MRC's contributions to area respirable particulate matter over time by improving road conditions. Air quality effects under Alternative B attributable to slash burning and vehicle emissions are expected to be less than significant (Section 3.7.2, Air Quality, Environmental effects and mitigation).

Although past, present, and reasonably foreseeable future actions have resulted in a cumulative effect on air quality, primarily particulate matter, Alternative B would not make a considerable contribution to it because: (1) restrictions and regulations are in place to reduce respirable particulate matter emissions and move the county into attainment with all state and federal air quality standards, and (2) activities under Alternative B are not anticipated to contribute substantially to the existing respirable particulate matter levels. Therefore, Alternative B would have a **less than significant cumulative effect** on air quality.

4.7.5 Alternative C

Cumulative effects under Alternative C would be similar to those under the Proposed Action. Although past, present, and reasonably foreseeable future actions have resulted in a cumulative effect on air quality, primarily particulate matter, Alternative C would not make a considerable contribution to it because: (1) restrictions and regulations are in place to reduce respirable particulate matter emissions and move the county into attainment with all state and federal air quality standards, and (2) activities under Alternative C are not anticipated to contribute substantially to the existing respirable particulate matter levels. Therefore, Alternative C would have a **less than significant cumulative effect** on air quality.

4.8 Climate and Climate Change

Past, present, and reasonably foreseeable future actions within the assessment area that may affect climate and climate change include (Table 4.1-1):

- past timber harvest (pre-1997);
- past timber harvest (1997–2008);
- past commercial and residential development;
- present and reasonably foreseeable future forest management;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a); and
- timberland conversion (most notably vineyard development).

Previous timber harvest (pre-1997) and prior THPs (1997–2008) may have contributed to climate change effects through changes in the amount of carbon sequestered in area forests. Public and private timberlands in the region, however, contribute to the sequestration of carbon as described in Section 3.8.2 (Climate and Climate Change, Environmental effects and mitigation). Because the forestry sector sequesters more carbon than it generates, maintenance of the forestry sector is an important factor in mitigating the effects on climate change as a result of carbon emissions from other sources in the environment. Past commercial and residential development may also have affected greenhouse gas emissions in the assessment area.

Timber operations under current and future THPs (including those of MRC) would continue to follow regulations to achieve the goal of maxium sustained production of high-quality timber products, while giving consideration to various other forest benefits and amenities (Section 3.9, Timber Resources). The forestry sector is expected to be maintained through the continued management of timberlands for sustained yield of forest products and the continued restriction of Timberland Production Zone forestland conversions. In addition, other efforts to mitigate greenhouse gas generation (e.g., use of forests as carbon offset mitigation banks) may further bolster the long-term sustainability of the forestry sector. The final EIR for the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008b) determined that the proposed Jackson Demonstration State Forest Management Plan alternative (C1) and research-focused alternative (G) would have no significant cumulative effects on any resource area. Timberland conversion could result in a reduction in carbon sequestration as trees are replaced with grasslands, vineyards, and other non-timber land uses.

Although these past, present, and reasonably foreseeable future actions in the assessment area may result in a reduction in carbon sequestration relative to existing conditions, their combined effect is not considered to be cumulatively substantial because the timber sector is anticipated to sequester more carbon than it generates, offsetting carbon emissions from other sources in the environment.

4.8.1 No Action alternative

Effects of implementing the No Action alternative would include a transition towards uneven-aged silviculture and discontinuing use of traditional clearcutting in the primary assessment area. Under the No Action alternative, the amount of carbon sequestered in forest biomass is anticipated to increase over time relative to existing conditions. While increased carbon sequestration is generally considered beneficial with respect to greenhouse gas emissions, effects on climate change under the No Action alternative would be less than significant (Section 3.8.2, Climate and Climate Change, Environmental effects and mitigation).

No cumulatively significant effect on climate change would result from the No Action alternative because: (1) past, present, and reasonably foreseeable future actions will serve to maintain the forest industry, maintaining the ability of regional forests to serve as a carbon sink, and (2) activities under the No Action alternative are anticipated to contribute to an increase in carbon sequestration levels.

4.8.2 Proposed Action

Under the Proposed Action, the amount of carbon sequestered is anticipated to increase over time as MRC has discontinued the use of traditional clearcutting and is transitioning towards uneven-aged silviculture. In addition, the enhanced riparian buffer widths for Class I and II streams are anticipated to result in higher levels of carbon sequestration than under the No Action alternative. Maintenance of the forest landscape under the Proposed Action is expected to positively contribute to overall trends in sustaining the forest landscape for carbon sequestration.

No cumulatively significant effect on climate change would result from the Proposed Action because: (1) past, present, and reasonably foreseeable future actions will serve to maintain the forest industry, maintaining the ability of regional forests to serve as a carbon sink, and (2) activities under the Proposed Action are anticipated to contribute to an increase in carbon sequestration levels.

4.8.3 Alternative A

As with the Proposed Action, the enhanced riparian buffer widths for Class I and II streams under Alternative A are anticipated to result in higher levels of carbon sequestration than under the No Action alternative. Maintenance of the forest landscape under Alternative A is expected to positively contribute to overall trends in sustaining the forest landscape for carbon sequestration.

No cumulatively significant effect on climate change would result from Alternative A because: (1) past, present, and reasonably foreseeable future actions will serve to maintain the forest industry, maintaining the ability of regional forests to serve as a carbon sink, and (2) activities under Alternative A are anticipated to contribute to an increase in carbon sequestration levels.

4.8.4 Alternative B

Under Alternative B, establishment of reserves would result in reduced timber harvesting within these areas and, therefore, the ability of these reserve stands to sequester carbon would be increased. Overall, the level of carbon sequestration under Alternative B would be increased relative to the No Action alternative. Maintenance of the forest landscape under Alternative B is expected to positively contribute to overall trends in sustaining the forest landscape for carbon sequestration.

No cumulatively significant effect on climate change would result from Alternative B because: (1) past, present, and reasonably foreseeable future actions will serve to maintain the forest industry, maintaining the ability of regional forests to serve as a carbon sink, and (2) activities under Alternative B are anticipated to contribute to an increase in carbon sequestration levels.

4.8.5 Alternative C

Similar to the Proposed Action, Alternative C provides for increased carbon sequestration and maintenance of a forested landscape. Cumulative effects under Alternative C would be similar to those under the Proposed Action. **No cumulatively significant effect** on climate change would result from Alternative C because: (1) past, present, and reasonably foreseeable future actions will serve to maintain the forest industry, maintaining the ability of regional forests to serve as a carbon sink, and (2) activities under Alternative C are anticipated to contribute to an increase in carbon sequestration levels.

4.9 Timber Resources

As noted in Section 3.9 (Timber Resources), the CFPRs specify that, for lands which neither a nonindustrial TMP or a Sustained Yield Plan has been approved, maxium sustained production would be achieved by meeting three standards: (1) balancing growth and harvest over time as defined in the CFPRs, (2) maintaining a timber inventory capable of sustaining the Long-Term Sustained Yield, and (3) having the projected annual harvest level for all future rolling 10-year periods not exceed the long-term sustained yield. The following analysis does not rely on an assessment of past, present and reasonably foreseeable future actions, but rather on maxium sustained production requirements under the CFPRs. Potential effects on area employment and economic sectors dependent on timber resource management is presented in Section 4.17 (Social and Economic Conditions).

4.9.1 No Action alternative

Under the No Action alternative, anticipated harvest levels would never exceed growth and net growth as a percentage of inventory is expected to be positive in all decades, indicating that harvest and growth are balanced (as defined in the CFPRs). The average annual harvest level in any decade is not anticipated to exceed the long-term sustained yield such that timber management and harvesting under the No Action alternative would contribute to achievement of maxium sustained production. Therefore, there would be **no cumulatively significant effects** on timber resources under the No Action alternative. Under the No Action alternative, continued management of timberlands for sustained yield of forest products and the continued restriction of Timberland Production Zone forestland conversions would occur within the primary and secondary assessment areas.

4.9.2 Proposed Action

As with the No Action alternative, anticipated harvest levels under the Proposed Action would never exceed growth and net growth as a percentage of inventory is expected to be positive in all decades, indicating that harvest and growth are balanced. The average annual harvest level in any decade is not anticipated to exceed the long-term sustained yield such that timber management and harvesting under the Proposed Action would contribute to achievement of maxium sustained production. Therefore, there would be **no cumulatively significant effects** on timber resources under the Proposed Action. Under the Proposed Action, the continued management of timberlands for sustained yield of forest products and the continued restriction of Timberland Production Zone forestland conversions would occur within the primary and secondary assessment areas.

4.9.3 Alternative A

As with the Proposed Action, the continued management of timberlands for sustained yield of forest products and the continued restriction of Timberland Production Zone forestland conversions under Alternative A would occur within the primary and secondary assessment areas. Therefore, there would be **no cumulatively significant effects** on timber resources under Alternative A.

4.9.4 Alternative B

As with the Proposed Action, the continued management of timberlands for sustained yield of forest products and the continued restriction of Timberland Production Zone forestland conversions under Alternative B would occur within the primary and secondary assessment areas. Therefore, there would be **no cumulatively significant effects** on timber resources under Alternative B.

4.9.5 Alternative C

As with the Proposed Action, the continued management of timberlands for sustained yield of forest products and the continued restriction of Timberland Production Zone forestland conversions under Alternative C would occur within the primary and secondary assessment areas. Therefore, there would be **no cumulatively significant effects** on timber resources under Alternative C.

4.10 Hazards and Hazardous Substances

Past, present, and reasonably foreseeable future actions within the assessment area that may affect hazards and hazardous substances include (Table 4.1-1):

- past timber harvest (pre-1997);
- past timber harvest (1997–2008);
- past commercial and residential development;
- present and reasonably foreseeable future forest management;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a);
- marijuana cultivation;
- timberland conversion (most notable vineyard development); and
- the Fort Bragg waste transfer station.

Use of hazardous substances such as pesticides (including herbicides), fertilizers, and petroleum products during previous timber harvest (pre-1997) and under prior recent THPs (1997–2008) may have had adverse effects on water quality and terrestrial and aquatic biota in the assessment area at the time. Past commercial and residential development may have degraded water quality in the assessment area through application of chemicals (e.g., fertilizers, pesticides) to residential and commercial properties.

Continued use of chemicals on commercial and residential properties may adversely affect water quality and biota if these chemicals make their way into area streams. The use, storage, and disposal of hazardous substances under current and future THPs (including those of MRC) would continue to be restricted and regulated by numerous local, state, and federal laws and regulations designed to avoid significant adverse effects. The final EIR for the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008b) determined that the proposed Jackson Demonstration State Forest Management Plan alternative (C1) and research-focused alternative (G) would have no significant cumulative effect related to hazards and hazardous substances. Illegal marijuana cultivation in the assessment area may adversely affect water quality and aquatic biota as streams may be dammed and diverted, large amounts of fertilizers are applied, and traps and chemicals are set out to kill and deter herbivores. Indoor marijuana cultivation may also have impacts on the environment through the use and disposal of fertilizers and pesticides. Timberland conversion (e.g., to vineyards) may adversely affect water quality and biota if hazardous substances are used and make their way into area streams. The Fort Bragg waste transfer station could have adverse effects through the collection and storage of hazardous substances on site.

Although these past, present, and reasonably foreseeable actions in the assessment area have the potential for adverse effects individually and in combination, the legal use, storage, and disposal of hazardous substances in the assessment area would continue to be restricted and regulated by federal, state, and local agencies. The regulations are designed to minimize the potential for adverse effects on the environment. Little can be done to regulate the use of hazardous substances in illegal operations (i.e., marijuana cultivation) and the use of chemicals at these operations could contribute to cumulative environmental effects.

4.10.1 No Action alternative

Under the No Action alternative, a number of herbicides and adjuvants would continue to be used by MRC under regulation by the California Department of Agriculture and by the Environmental Protection Agency. Total herbicide use under the No Action alternative would increase compared with existing conditions. Given the level of regulation, the application method, frequency, toxicity, and bioaccumulation potential, and consideration of MRC's approach to herbicide transport, the potential for contamination of surface waters and the resultant risk of toxic effects on aquatic and terrestrial wildlife resources, is anticipated to be less than significant under the No Action alternative (Section 3.10.2, Hazards and Hazardous Substances, Environmental effects and mitigation). However, there is an increased likelihood of direct application of herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern in areas where these resources are undetected (i.e., surveys have not been performed). This would result in loss of affected plants, vegetation communities, or habitat elements. Therefore, there would be potentially significant effects on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern due to application of forest chemicals under the No Action alternative.

The risk of wildfire under the No Action alternative would not substantially increase and MRC's response to wildfire would follow its current (2011) Fire Suppression Plan or updates to this plan in the future. Effects due to wildfire under this alternative are anticipated to be less than significant (ection 3.10.2.2, Hazards and Hazardous Substances).

Although activities under the No Action alternative are not anticipated to contribute considerably to the potential for hazardous substances to reach area streams or increase the risk of wildfire, herbicide use may cause loss of sensitive vegetation or plant species of concern. Such effects would likely be infrequent and of limited extent and would therefore be **less than significant cumulative effects**.

4.10.2 Proposed Action

The application of herbicides would not be a covered activity under the incidental take authorizations. Under the Proposed Action, there would be little difference in the use of herbicides and adjuvants relative to the No Action alternative. MRC would continue to follow all California Department of Agriculture and Environmental Protection Agency regulations for use of forest chemicals and would to maintain and update its Herbicide Spill Contingency Plan. In addition, total herbicide use would decrease compared with existing conditions, with the exception of the first two decades when it would increase. The risk of contamination of surface waters and impacts on non-target vegetation by herbicides and adjuvants, and the resultant risk of toxic effects on aquatic and terrestrial wildlife resources, would be less than significant (Section 3.10.2, Hazards and Hazardous Substances, Environmental effects and mitigation). The risk of wildfire under the Proposed Action would be similar to existing conditions and MRC's response to wildfire would follow its Fire Suppression Plan as under the No Action alternative.

No cumulatively significant effects related to hazards and hazardous substances would occur under the Proposed Action because activities under the Proposed Action are not anticipated to contribute considerably to the potential for hazardous substances to reach area streams, cause loss of sensitive plants or vegetation types, or increase the risk of wildfire.

4.10.3 Alternative A

The application of herbicides would not be a covered activity under the incidental take authorizations. Under Alternative A, there would be little change in the use of herbicides and adjuvants for control of vegetation relative to the No Action alternative. MRC would continue to follow all California Department of Agriculture and Environmental Protection Agency regulations for use of forest chemicals and to maintain and update its Herbicide Spill Contingency Plan. In addition, total herbicide use would decrease compared with existing conditions, with the exception of the first two decades when it would increase. The risk of contamination of surface waters and impacts on non-target vegetation by herbicides and adjuvants, and the resultant risk of toxic effects on aquatic and terrestrial wildlife resources, would be less than significant (Section 3.10.2, Hazards and Hazardous Substances, Environmental effects and mitigation). The risk of wildfire under Alternative A would be similar to existing conditions and MRC's response to wildfire would follow its Fire Suppression Plan as under the No Action alternative.

No cumulatively significant effects related to hazards and hazardous substances would occur under Alternative A because activities under Alternative A are not anticipated to contribute considerably to the potential for hazardous substances to reach area streams, cause loss of sensitive plants or vegetation types, or increase the risk of wildfire.

4.10.4 Alternative B

Under Alternative B, there would be little change in the use of herbicides and adjuvants for control of vegetation relative to the No Action alternative. MRC would continue to follow all California Department of Agriculture and Environmental Protection Agency regulations for use of forest chemicals and to maintain and update its Herbicide Spill Contingency Plan. Total herbicide use under Alternative B would increase compared with existing conditions. Given the level of regulation, the application method, frequency, toxicity, and bioaccumulation potential, and consideration of MRC's approach to herbicide transport, the risk of contamination of surface waters and the resultant risk of toxic effects on aquatic and terrestrial wildlife resources, would be low (Section 3.10.2, Hazards and Hazardous Substances, Environmental effects and mitigation). The no-harvest reserves established under Alternative B would further reduce the potential for toxic compounds to reach streams passing through the reserves. However, there is an increased likelihood of direct application of herbicides on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern in areas where these resources are undetected (i.e., surveys have not been performed). This would result in loss of affected plants, vegetation communities, or habitat elements. Therefore, there would be **potentially significant cumulative effects** on California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern due to application of forest chemicals under Alternative B. With implementation of **Mitigation Measure 3.10-1** (Perform surveys for all California Natural Diversity Database Special Community Types, Habitat Elements, and plant species of concern in the management area prior to herbicide application according to CDFG's guidelines [CDFG 2005b] and protocols [CDFG 2009c]), the effects would be **less than significant**.

The establishment of no-harvest reserves under Alternative B may affect access to these reserves during a wildfire for suppression activities. However, over time the reserves would take on an older structure, and be less prone to intensive fires. The risk of wildfire under Alternative B would be similar to existing conditions and MRC's response to wildlife would follow its Fire Suppression Plan as under the No Action alternative.

Activities under Alternative B are not anticipated to contribute considerably to the potential for hazardous substances to reach area streams, affect vegetation or plant species of concern, or increase the risk of wildfire. With implementation of the mitigation measure described above for sensitive plants and vegetation communities, **no cumulatively significant effects** related to hazards and hazardous substances would occur under Alternative B.

4.10.5 Alternative C

Under Alternative C, herbicide application would be the same as under the Proposed Action. Therefore, effects due to application of forest chemicals under Alternative C would be the same as under the Proposed Action. Similarly, effects on wildfire under Alternative C would be the same as under the Proposed Action. Activities under Alternative C are not anticipated to contribute considerably to the potential for hazardous substances to reach area streams or increase the risk of wildfire. **No cumulatively significant effects** related to hazards and hazardous substances would occur under Alternative C.

4.11 Land Use

Past, present, and reasonably foreseeable future actions within the assessment area that may affect land use include (Table 4.1-1):

- past timber harvest (pre-1997);
- past timber harvest (1997–2008);
- past commercial and residential development;
- present and reasonably foreseeable future forest management;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a);
- marijuana cultivation;
- timberland conversion (most notable vineyard development);
- domestic and municipal water supply resource development; and
- the State Water Resources Control Board adopted Policy for Maintaining Instream Flows in Northern California Coastal Streams (SWRCB 2010).

The effects of timber management and harvest of previous timber harvest (pre-1997) and prior THPs (1997–2008) were consistent with past and current land use plans and policies. Additionally, the Timberland Production Zone zoning establishes the presumption that timber harvesting is expected to and would occur in the future. Therefore timber management under current and future THPs would not be in conflict with applicable land use plans, policies, or regulations. No effects on land use would occur from implementation of the Jackson Demonstration State Forest Management Plan because timber production is the primary land use on the Jackson Demonstration State Forest, with recreation as a secondary but compatible land use (CAL FIRE 2008b).

Prior commercial and residential development may have altered land use patterns or otherwise resulted in a change in land use. However, any change in land use designation or zoning would have been approved by the appropriate local agency such that the change would not be in conflict with any applicable land use plan, policy, or regulation. Therefore, this action has had no adverse effect on land use and would not contribute to an overall cumulative effect on land use.

Illegal marijuana cultivation may result in conversion of timberland or other land uses to "agriculture" and may be in conflict with applicable land use plans. Timberland conversion results in a change in land use; however, like other development activities, these changes would have to be approved by the appropriate local agency such that the change would not be in conflict with any applicable land use plan, policy, or regulation. Therefore, this action would have had no adverse effect on land use and would not contribute to an overall cumulative effect on land use. Domestic and municipal water supplies may ultimately affect land use through development opportunities, but this also would not result in a substantial contribution to cumulative effects on land use. The Policy for Maintaining Instream Flows in Northern California Coastal Streams (SWRCB 2010) may affect land use by limiting the supply of water available for domestic and municipal use, but would not result in a substantial contribution to cumulative effects on land use.

Although these past, present, and reasonably foreseeable future actions in the assessment area may have, or will result in changes in land use, their combined effect is not considered to be cumulatively substantial because most changes would have to be approved by the appropriate local agency such that the change would not be in conflict with any applicable land use plan, policy, or regulation.

4.11.1 No Action alternative

Under the No Action alternative, the forestry sector is expected to be maintained through the continued management of timberlands for sustained yield of forest products and the continued restriction of Timberland Production Zone forestland conversions. Timber management activities on the MRC forestlands are consistent with activities occurring on other commercial forestlands in the assessment area. Implementation of the No Action alternative would not result in the creation of a new and incompatible land use, because timber management activities on the MRC forestlands would be consistent with past management activities and with existing land use plans and policies. Therefore, the No Action alternative would have no effect on land use (Section 3.11.2, Land Use, Environmental effects and mitigation).

No cumulatively significant effect on land use would occur under the No Action alternative, given the lack of land use effects anticipated under the alternative itself and that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on land use.

4.11.2 Proposed Action

As under the No Action alternative, the forestry sector is expected to be maintained through the continued management of timberlands for sustained yield of forest products and the continued restriction of Timberland Production Zone forestland conversions under the Proposed Action. Implementation of the Proposed Action would not result in the creation of a new and incompatible land use, because timber management activities in the primary assessment area would be consistent with past management activities and with existing land use plans and policies. Therefore, the Proposed Action would have no effect on land use (Section 3.11.2, Land Use, Environmental effects and mitigation).

No cumulatively significant effect on land use would occur under the Proposed Action, given the lack of land use effects anticipated under the Proposed Action itself and that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on land use.

4.11.3 Alternative A

Similar to the No Action alternative, the forestry sector is expected to be maintained through the continued management of timberlands for sustained yield of forest products and the continued restriction of Timberland Production Zone forestland conversions under Alternative A. Implementation of Alternative A would not result in the creation of a new and incompatible land use, because timber management activities on the MRC forestlands would be consistent with past management activities and with existing land use plans and policies. Therefore, Alternative A would have no effect on land use (Section 3.11.2, Land Use, Environmental effects and mitigation).

No cumulatively significant effect on land use would occur under Alternative A, given the lack of land use effects anticipated under the alternative itself and that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on land use.

4.11.4 Alternative B

Similar to the No Action alternative, the forestry sector is expected to be maintained through the continued management of timberlands for sustained yield of forest products and the continued restriction of Timberland Production Zone forestland conversions under Alternative B. Implementation of Alternative B would not result in the creation of a new and incompatible land use, because timber management activities on the MRC forestlands would be consistent with past management activities and with existing land use plans and policies. Therefore, Alternative B would have no effect on land use (Section 3.11.2, Land Use, Environmental effects and mitigation).

No cumulatively significant effect on land use would occur under Alternative B, given the lack of land use effects anticipated under the alternative itself and that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on land use.

4.11.5 Alternative C

Like the Proposed Action, , the forestry sector is expected to be maintained through the continued management of timberlands for sustained yield of forest products and the continued restriction of Timberland Production Zone forestland conversions under Alternative C. **No cumulatively significant effect** on land use would occur under Alternative C, given the lack of land use effects anticipated under the alternative itself and that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on land use.

4.12 Traffic

Past, present, and reasonably foreseeable future actions within the assessment area that may affect traffic include (Table 4.1-1):

- past commercial and residential development;
- present and reasonably foreseeable future forest management;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a);
- the Fort Bragg waste transfer station; and
- implementation of State Park general plans.

The effects on traffic from past commercial and residential development, namely an increase is local traffic levels, have largely occurred; however if these developments continue to grow in population or employment, there could be continued increases in local traffic levels. Any increase in traffic volume associated with development is not anticipated to conflict with applicable plans, ordinances, policies, or programs, and would not substantially increase hazards due to design features or incompatible uses and would not contribute substantially to a cumulative traffic effect.

Traffic associated with timber harvesting and management activities currently does not contribute greatly to local traffic volumes and traffic conditions in the region are not considered to be impaired. Increased traffic volume associated with current and future THPs would be relative to the level of harvest. The final EIR for the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008b) indicates that there would be less than significant effects on traffic. Land conversion could remove some truck traffic from local roadways as timber harvest is reduced; however increased employment at vineyards resulting from land conversion could lead to slight increases in automotive traffic. Traffic to and from the Fort Bragg waste transfer station is expected to increase in the future, relative to growth and development in the region. If implementation of the State Park general plans results in an increase in visitors, this could potentially increase traffic volumes in the area.

Additional traffic generated by these actions is not anticipated to contribute substantially to area traffic volumes or conflict with applicable plans, ordinances, policies, or programs, and would not substantially increase hazards due to design features or incompatible uses. Therefore, these actions would not result in a cumulative effect on traffic.

4.12.1 No Action alternative

Effects of implementing the No Action alternative would include an increase in the amount of log truck and contractor vehicle use associated with timber harvest in the primary assessment area. Traffic associated with MRC's timber harvesting and management activities currently does not contribute greatly to local traffic volumes and traffic conditions in the region are not considered to be impaired. Under the No Action alternative, the increase in traffic volume associated with MRC's activities is not anticipated to conflict with applicable plans, ordinances, policies, or programs, and would not substantially increase hazards due to design features or incompatible uses. Therefore, traffic effects under this alternative are anticipated to be less than significant (Section 3.12.2, Traffic, Environmental effects and mitigation).

No cumulatively significant effect on traffic would occur under the No Action alternative, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on traffic, and that the No Action alternative does not make a considerable contribution to traffic effects.

4.12.2 Proposed Action

Effects associated with implementation of the Proposed Action would include an increase in the amount of log truck and contractor vehicle use resulting from increased timber harvest in the primary assessment area. Management activities under the Proposed Action would be similar to and generate traffic volumes comparable to what would occur under the No Action alternative. Under the Proposed Action, the increase in traffic volume associated with MRC's activities is not anticipated to conflict with applicable plans, ordinances, policies, or programs, and would not substantially increase hazards due to design features or incompatible uses. Therefore, traffic effects under this alternative are anticipated to be less than significant (Section 3.12.2, Traffic, Environmental effects and mitigation).

No cumulatively significant effect on traffic would occur under the Proposed Action, given that past, present and reasonably foreseeable actions in the assessment area have not had a cumulative effect on traffic, and that the Proposed Action does not make a considerable contribution to traffic effects.

4.12.3 Alternative A

Similar to the No Action alternative, the effects on traffic volumes due to changes in timber harvesting levels under Alternative A are not expected to be significant. Management activities under Alternative A would be similar to what would occur under the No Action alternative and would generate somewhat lower traffic volumes. Under Alternative A, the traffic volume associated with MRC's activities is not anticipated to conflict with applicable plans, ordinances, policies, or programs, and would not substantially increase hazards due to design features or incompatible uses. Therefore, traffic effects under this alternative are anticipated to be less than significant (Section 3.12.2, Traffic, Environmental effects and mitigation).

No cumulatively significant effect on traffic would occur under Alternative A, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on traffic, and that Alternative A does not make a considerable contribution to traffic effects.

4.12.4 Alternative B

Similar to the No Action alternative, the effects on traffic volumes due to changes in timber harvesting levels under Alternative B are not expected to be significant. Management activities under Alternative B would be similar to what would occur under the No Action alternative and generate traffic volumes less than under the No Action alternative. Under Alternative B, the reduced traffic volume associated with MRC's activities is not anticipated to conflict with applicable plans, ordinances, policies, or programs, and would not substantially increase hazards due to design features or incompatible uses. Therefore, traffic effects under this alternative are anticipated to be less than significant (Section 3.12.2, Traffic, Environmental effects and mitigation).

No cumulatively significant effect on traffic would occur under Alternative B, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on traffic, and that Alternative B does not make a considerable contribution to traffic effects.

4.12.5 Alternative C

Similar to the Proposed Action, the effects on traffic volumes due to changes in timber harvesting levels under Alternative C are not expected to be significant. Management activities under Alternative C would be similar to and generate traffic volumes comparable to what would occur under the No Action alternative. **No cumulatively significant effect** on traffic would occur under Alternative C, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on traffic, and that Alternative C does not make a considerable contribution to traffic effects.

4.13 Noise

Past, present, and reasonably foreseeable future actions within the assessment area that may affect noise include (Table 4.1-1):

- present and reasonably foreseeable future forest management;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a);
- commercial and private airports; and
- the Fort Bragg waste transfer station.

Past actions in the assessment area with noise effects no longer contribute to ambient noise levels as the effect was a direct result of activities at the time. Timber harvest operations conducted under current and reasonably foreseeable future THPs are a source of potentially significant noise. Noise associated with individual timber harvesting and management activities contributes to local ambient noise levels, but is generally remote, isolated to areas of substantial activity (such as yarding), seasonal, and temporary in nature. Increased use of helicopter logging could result in a significant noise effect without mitigation. The final EIR for the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008b) indicates that with mitigation, there would be less than significant effects related to noise. Land conversion that entails timber harvest would have similar noise effects compared with current and future THPs.

The public and private airfields in the secondary assessment area are themselves a source of noise to local receptors. Traffic to and from the Fort Bragg waste transfer station is expected to increase in the future, relative to growth and development in the region, resulting in increased vehicular noise. Additional noise generated by these actions is not anticipated to be permanent or contribute substantially to ambient noise levels or expose persons to noise levels in excess of standards established in the local general plan or noise ordinance. Therefore, these actions are unlikely to result in a cumulative effect on noise.

4.13.1 No Action alternative

Effects of implementing the No Action alternative would include an increase in the amount of equipment use associated with timber harvest in the primary assessment area. Noise associated with MRC's timber harvesting and management activities currently contributes to local ambient noise levels, but is remote (isolated to areas of substantial activity, such as yarding), seasonal, and temporary in nature. Substantial changes in the types of yarding or the relative amount of each yarding type relative to current operations are not anticipated under the No Action alternative. Under the No Action alternative, noise generated by these activities would remain about the same as existing conditions and noise effects are anticipated to be less than significant (Section 3.13.2, Noise, Environmental effects and mitigation).

No cumulatively significant effect on noise would occur under the No Action alternative, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on noise, and that the No Action alternative would not make a considerable contribution to noise effects.

4.13.2 Proposed Action

Effects of implementing the Proposed Action would include an increase in the amount of equipment use associated with timber harvest in the primary assessment area. Management activities under the proposed Action would be similar to existing conditions and generate noise levels similar to the No Action alternative. However, there likely would be a slight decrease in the percentage of cable yarding relative to existing conditions and the No Action alternative (5%), with a corresponding increase in the percentage of tractor yarding. This could result in a slight decrease in ambient noise levels during yarding activities in areas where tractor yarding predominates. Any change in ambient noise levels would not be substantial, and would be remote, seasonal, and temporary in nature. Noise effects under the Proposed Action would be less than significant (Section 3.13.2, Noise, Environmental effects and mitigation).

No cumulatively significant effect on noise would occur under the Proposed Action, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on noise, and that the Proposed Action would not make a considerable contribution to noise effects.

4.13.3 Alternative A

Similar to the No action alternative, the effects on noise levels due to changes in timber harvesting levels under Alternative A are not expected to be significant. Management activities under Alternative A would be similar to existing conditions and generate noise levels similar to the No Action alternative. However, because of measures contained in the HCP/NCCP requiring the use of helicopter yarding when more than one mile of road would need to be built, there would be an increase in the amount of helicopter use under Alternative A. Ambient noise levels would be substantially increased in some areas not currently subject to helicopter logging, such that noise effects under Alternative A would be potentially significant and would require mitigation. With **Mitigation Measure 3.13-1** (minimize noise from helicopter operations), however, noise effects under Alternative A would be less than significant (Section 3.13.2, Noise, Environmental effects and mitigation).

Although the increase in helicopter yarding could result in a significant noise effect without mitigation, **no cumulatively significant effect** on noise would occur under Alternative A because past, present and reasonably foreseeable actions in the assessment area have not had a cumulative effect on noise and, with mitigation, Alternative A would not contribute considerably to noise effects.

4.13.4 Alternative B

Management activities under Alternative B would be similar to existing conditions and generate noise levels similar to the No Action alternative. However, because of the restrictions on yarding, loading, road building, and road use within the reserves, additional helicopter yarding would be required, particularly in the areas adjacent to the reserves. Ambient noise levels would be substantially increased in some areas not currently subject to helicopter logging, such that noise effects under Alternative B would be potentially significant and would require mitigation. With **Mitigation Measure 3.13-1** (minimize noise from helicopter operations), however, noise effects under Alternative B would be less than significant (Section 3.13.2, Noise, Environmental effects and mitigation).

Although the increase in helicopter yarding could result in a significant noise effect without mitigation, **no cumulatively significant effect** on noise would occur under Alternative B because past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on noise and, with mitigation, Alternative B would not contribute considerably to noise effects.

4.13.5 Alternative C

Similar to the Proposed Action, the effects on noise due to changes in timber harvesting levels under Alternative C are not expected to be significant. Management activities under Alternative C would be similar to and generate noise levels comparable to what would occur under the No Action alternative. **No cumulatively significant effect** on noise would occur under Alternative C, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on noise, and that Alternative C would not make a considerable contribution to noise effects.

4.14 Visual Resources

Past, present, and reasonably foreseeable future actions within the assessment area that may affect visual resources include (Table 4.1-1):

- past timber harvest (pre-1997);
- past timber harvest (1997–2008);
- past commercial and residential development;
- present and reasonably foreseeable future forest management;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a);
- timberland conversion (most notably vineyard development);
- the Fort Bragg waste transfer station; and
- transmission line maintenance.

Past timber harvest has altered the visual landscape through alteration of the forest canopy, primarily through extensive use of even-aged management resulting in large clearcut areas. These areas have been reforested and are actively growing towards a more mature state with greater canopy coverage. Past commercial and residential development has likewise altered the visual landscape, primarily around existing urban areas. These actions have contributed to an overall cumulative visual effect that is not considered significant because not all areas harvested using clearcutting are accessible and visible from area roadways and these areas will re-grow into a more visually appealing state.

Timber operations under current and future THPs would continue to follow current restrictions on the use of even-aged management and clearcutting, resulting in smaller and more dispersed areas where this silvicultural method is used. Visual effects are anticipated to be gradually reduced over time and current and future THPs would not contribute significantly to an overall cumulative effect on visual resources. The final EIR for the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008b) indicates that there would be less than significant degradation of scenic vistas. Land conversion of existing timberlands (e.g., to vineyards) or at the Fort Bragg waste transfer station could similarly alter the visual landscape through removal of forest canopy. Periodic maintenance of transmission line corridors would have little visual impact as these corridors have been part of the visual landscape for some time and their characteristics would not substantially change. Overall, existing visual conditions experienced by highway travelers and recreation area users are not anticipated to change substantially from existing conditions, such that these actions would not result in a cumulative effect on visual resources.

4.14.1 No Action alternative

Effects of implementing the No Action alternative would include an increase in timber harvesting from existing conditions. However, existing visual conditions experienced by highway travelers and recreation area users would not change substantially from existing conditions under the No Action alternative. Adverse visual effects of timber harvesting would be reduced to some extent because MRC has discontinued the use of traditional clearcutting and is transitioning towards uneven-aged silviculture. In addition, MRC would employ a unique harvest prescription designed specifically to minimize visual effects in stands identified as requiring special management for aesthetic purposes (i.e., visual buffers). Therefore, effects on visual resources under the No Action alternative are anticipated to be minor and less than significant (Section 3.14.2, Visual Resources, Environmental effects and mitigation).

No cumulatively significant effect on visual resources would occur under the No Action alternative, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on visual resources, and that the No Action alternative would not contribute considerably to effects on these resources.

4.14.2 Proposed Action

Effects of implementing the Proposed Action would include an increase in timber harvesting from existing conditions. Adverse visual effects of timber harvesting would be reduced to some extent because MRC has discontinued the use of traditional clearcutting and is transitioning towards uneven-aged silviculture. As under the No Action alternative, MRC would employ a unique harvest prescription designed specifically to minimize visual effects in stands identified as requiring special management for aesthetic purposes (i.e., visual buffers). Therefore, effects on visual resources under the Proposed Action are anticipated to be minor and less than significant (Section 3.14.2, Visual Resources, Environmental effects and mitigation).

No cumulatively significant effect on visual resources would occur under the Proposed Action, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on visual resources, and that the Proposed Action would not contribute considerably to effects on these resources.

4.14.3 Alternative A

Under Alternative A, harvesting and management activities would be the same as the Proposed Action, with additional measures to enhance conservation of key aquatic and terrestrial habitats. Therefore, additional stands, some of which would be visible from highways and recreation areas, would be subject to harvest restrictions that could enhance their visual character. As under the No Action alternative, MRC would employ a unique harvest prescription designed specifically to minimize visual effects in stands identified as requiring special management for aesthetic purposes (i.e., visual buffers). Visual quality under Alternative A is expected to increase relative to existing conditions and what would occur under the No Action alternative because more landscape with high canopy cover would be visible. Therefore, effects on visual resources under Alternative A would be beneficial (Section 3.14.2, Visual Resources, Environmental effects and mitigation).

No cumulatively significant effect on visual resources would occur under Alternative A, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on visual resources, and that Alternative A would have beneficial effects on these resources.

4.14.4 Alternative B

Visual quality under Alternative B is expected to decrease relative to existing conditions and what would occur under the No Action alternative because areas outside of the reserves would be intensively harvested using clearcutting and the resulting open areas may be visible. However, restrictions on clearcut unit size and adjacency under the CFPRs would help to minimize these impacts on the viewshed. In addition, MRC would develop visual buffers (as needed) as part of each THP that would avoid visual impacts. Therefore, effects on visual resources under Alternative B would be less than significant (Section 3.14.2, Visual Resources, Environmental effects and mitigation).

No cumulatively significant effect on visual resources would occur under Alternative B, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on visual resources, and that Alternative B would no contribute considerably to effects on these resources.

4.14.5 Alternative C

Similar to the Proposed Action, the effects on visual resources due to changes in timber harvesting levels under Alternative C are not expected to be significant. Management activities under Alternative C would be similar to and generate visual effects comparable to what would occur under the No Action alternative. **No cumulatively significant effect** on visual resources would occur under Alternative C, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on visual resources, and that Alternative C would not contribute considerably to effects on these resources.

4.15 Recreation

Past, present, and reasonably foreseeable future actions within the assessment area that may affect recreation include (Table 4.1-1):

- past timber harvest (pre-1997);
- past timber harvest (1997–2008);
- present and reasonably foreseeable future forest management;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a);
- implementation of State Park General Plans; and
- the State Water Resources Control Board adopted Policy for Maintaining Instream Flows in Northern California Coastal Streams (SWRCB 2010).

Past timber harvest activities have affected recreation in the assessment area through changes in fish and wildlife habitat. These effects are anticipated to diminish over time as the forested landscape and streams recover from these legacy impacts. It is anticipated that most THPs have not resulted in a change in access for recreational use.

Timber operations under current and future THPs would continue to follow current CFPRs and other regulations that are more protective if terrestrial and aquatic habitats than in the past. Anglers could experience potential benefits from improved fishery conditions. Other expected habitat improvements throughout the assessment area as a result of continued implementation of other HCPs, continued implementation of existing regulations on other commercial timberlands, continued management of U.S. Department of Agriculture Forest Service and Bureau of Land Management lands pursuant to Northwest Forest Plan guidelines, and continued management of state parks and forests would also provide recreational benefits. The final EIR for the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008b) indicates that there would be less than significant effects related to construction and use of recreational facilities. The Policy for Maintaining Instream Flows in Northern California Coastal Streams (SWRCB 2010) could provide a beneficial effect on aquatic resources. Overall, existing opportunities for recreational use are not anticipated to change substantially from existing conditions, such that these actions would not result in a cumulative effect on recreation.

4.15.1 No Action alternative

No change in MRC policy regarding access to recreational opportunities on its lands is anticipated under the No Action alternative. There would be no substantial change in existing access to the primary assessment area for recreational use compared with existing conditions. Therefore, there would be no effect on recreational resources under the No Action alternative (Section 3.15.2, Recreation, Environmental effects and mitigation).

No cumulatively significant effect on recreation would occur under the No Action alternative, given the lack of effects on recreation anticipated under the alternative itself and that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on recreation.

4.15.2 Proposed Action

As is the case under the No Action alternative, changes in MRC policy regarding access to recreational opportunities on its lands are not anticipated under the Proposed Action. Under the Proposed Action, conservation measures for protection of aquatic and terrestrial habitats would generally result in improvements over time, relative to existing conditions (Section 3.4, Aquatic and Riparian Resources and Species of Concern; and Section 3.6, Terrestrial Habitats and Wildlife Species of Concern), such that recreational experiences such as hiking, camping, picnicking, hunting, and fishing would be enhanced. Therefore, effects on recreational resources under the Proposed Action would be beneficial (Section 3.15.2, Recreation, Environmental effects and mitigation).

No cumulatively significant effect on recreation would occur under the Proposed Action, given the beneficial effects on recreation anticipated under the Proposed Action and that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on recreation.

4.15.3 Alternative A

No change in MRC policy regarding access to recreational opportunities on its lands is anticipated under Alternative A. The enhanced conservation measures under Alternative Awould result in improvements in forest conditions and aquatic and terrestrial habitats over time, relative to existing conditions (Section 3.4, Aquatic and Riparian Resources and Species of Concern; and Section 3.6, Terrestrial Habitats and Wildlife Species of Concern). Therefore, recreational experiences such as hiking, camping, picnicking, hunting, and fishing would be enhanced. Effects on recreational resources under Alternative A would therefore be beneficial (Section 3.15.2, Recreation, Environmental effects and mitigation).

No cumulatively significant effect on recreation would occur under Alternative A, given the beneficial effects on recreation anticipated under the alternative itself and that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on recreation.

4.15.4 Alternative B

No change in MRC policy regarding access to recreational opportunities on its lands is anticipated under Alternative B. Establishment of reserves under Alternative B would result in reduced timber harvesting within these areas and, therefore, provide some potential for associated recreational benefits. It is not known whether these reserve areas would be the sites on which recreational activities would be allowed or could occur. Outside of the reserves, clearcutting could result in a decrease in the quality of visual resources which could affect the recreational experience in these areas. Effects on recreational resources under Alternative B would be less than significant (Section 3.15.2, Recreation, Environmental effects and mitigation).

No cumulatively significant effect on recreation would occur under Alternative B, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on recreation, and that Alternative B would not contribute considerably to effects on recreation.

4.15.5 Alternative C

As is the case under the Proposed Action, no change in MRC policy regarding access to recreational opportunities on its lands is anticipated under Alternative C. **No cumulatively significant effect** on recreation would occur under Alternative C, given the beneficial effects on recreation anticipated under the alternative itself and that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on recreation.

4.16 Cultural Resources

Past, present, and reasonably foreseeable future actions within the assessment area that may affect cultural resources include (Table 4.1-1):

- past timber harvest (pre-1997);
- past timber harvest (1997–2008);
- past commercial and residential development;
- present and reasonably foreseeable future forest management; and
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a).

Impacts on cultural resources as a result of timber harvest and other forest management activities have occurred in the past. Public sensitivity to the need to protect these resources has increased over time, especially in the past 40 years, resulting in increased regulatory oversight of timber harvest practices that could result in adverse impacts on cultural resources. The Z'Berg-Nejedly Forest Practice Act of 1973 and subsequent promulgation of rules specific to cultural resources by the Board of Forestry have served to minimize potential adverse effects on these resources. Continued implementation of these CFPRs would ensure that these rules continue to be implemented on private commercial timberlands in California and appropriate protection and impact minimization measures are identified in future THPs. Similar measures would also be implemented at the Jackson Demonstration State Forest to protect cultural resources (CAL FIRE 2008b). With these protections, past, present, and reasonably foreseeable future actions would not result in a cumulative effect on cultural resources.

4.16.1 No Action alternative

The potential effects of implementing the No Action alternative would include increases in harvest area that may, in turn, result in a greater potential for effects on cultural resources, primarily as a result of a larger footprint where activities would occur. As a result of the larger harvest footprint, the number of cultural and historic properties potentially affected by timber harvest could increase. However, much of the increased harvest area would consist of areas harvested sometime in the past such that cultural and historic sites within the harvest footprint would largely be known and effects on these resources would be avoided. Harvest and related actions would occur in accordance with existing regulations that protect cultural resources. Therefore, potential effects on cultural resources under the No Action alternative are anticipated to be less than significant (Section 3.16.2, Cultural Resources, Environmental effects and mitigation).

No cumulatively significant effect on cultural resources would occur under the No Action alternative, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on cultural resources, and that the No Action alternative would not contribute considerably to effects on these resources.

4.16.2 Proposed Action

Under the Proposed Action, there would be no change the way in which cultural resources regulations are applied and MRC would continue to comply with the CFPR cultural resources protections discussed above under the No Action alternative. Under the Proposed Action, the volume of timber extracted per acre of harvest is expected to increase such that harvest would occur on a smaller area than under the No Action alternative. As a result of the smaller harvest footprint, potential effects on cultural and historic properties are expected to be less than under the No Action alternative and have a less than significant effect on cultural resources (Section 3.16.2, Cultural Resources, Environmental effects and mitigation).

No cumulatively significant effect on cultural resources would occur under the Proposed Action, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on cultural resources, and that the Proposed Action would not contribute considerably to effects on these resources.

4.16.3 Alternative A

Under Alternative A, MRC would continue to comply with the CFPR cultural resources protections discussed above under the No Action alternative. As is the case under the Proposed Action, the volume of timber extracted per acre of harvest is expected to increase under Alternative A such that harvest would occur on a smaller area than under the No Action alternative. As a result of the smaller harvest footprint, potential effects on cultural and historic properties are expected to be less than under the No Action alternative and have a less than significant effect on cultural resources (Section 3.16.2, Cultural Resources, Environmental effects and mitigation).

No cumulatively significant effect on cultural resources would occur under Alternative A, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on cultural resources, and that Alternative A would not contribute considerably to effects on these resources.

4.16.4 Alternative B

Under Alternative B, MRC would continue to comply with the CFPR cultural resources protections discussed above under the No Action alternative. As is the case under the Proposed Action, the volume of timber extracted per acre of harvest is expected to increase under Alternative B such that harvest would occur on a smaller area than under the No Action alternative. As a result of the smaller harvest footprint, potential effects on cultural and historic properties are expected to be less than under the No Action alternative and have a less than significant effect on cultural resources (Section 3.16.2, Cultural Resources, Environmental effects and mitigation).

No cumulatively significant effect on cultural resources would occur under Alternative B, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on cultural resources, and that Alternative B would not contribute considerably to effects on these resources.

4.16.5 Alternative C

Cumulative effects on cultural resources under Alternative C would be similar to those under the Proposed Action. **No cumulatively significant effect** on cultural resources would occur under Alternative C, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on cultural resources, and that Alternative C would not contribute considerably to effects on these resources.

4.17 Social and Economic Conditions

Past, present, and reasonably foreseeable future actions within the assessment area that may affect social and economic conditions include (Table 4.1-1):

- past timber harvest (pre-1997);
- past timber harvest (1997–2008);
- past commercial and residential development;
- present and reasonably foreseeable future forest management;
- implementation of the Jackson Demonstration State Forest Management Plan (CAL FIRE 2008a);
- marijuana cultivation;
- timberland conversion (most notably vineyard development);
- implementation of State Park General Plans; and
- domestic and municipal water supply resource development.

Forest management activities carried out under past (pre-1997 and 1997 to 2008), present, and reasonably foreseeable future THPs influence the local economy in a number of ways. Timber operators typically employ full-time, part-time and seasonal workers. Additional full-time and part-time workers are employed at associated mills and treating and distribution businesses Timber operators also purchase products and engage in contracts with numerous suppliers, most of which are located in Mendocino County. The majority of these contracts are involved in the timber harvest and hauling operations. In addition, timber operation often require contracting for owl surveys, plant surveys, tree planting, and vegetation treatment on an annual basis. Regional employment is directly linked to the level of timber harvest in the region.

Effects on social and economic conditions that would occur from present Jackson Demonstration State Forest timber harvest and related activities would be less than significant as these activities would likely have less effect on social and economic conditions than activities in the primary assessment area because less timber is harvested from Jackson Demonstration State Forest. Recreation and tourism at State Parks would likely result in minor beneficial changes in social and economic conditions through increased employment at the parks. Water resource development could provide the conditions necessary to support projected growth or buildout.

Commercial and residential development in the past has provided for employment of both skilled and unskilled workers and resulted in the ability to accommodate population growth in the county. Historically, the timber industry has been an important component of the regional economy, but less so in recent years. Past timber harvest activity has resulted in conversion of timberland to other uses. Past timberland conversion has largely resulted in an increase in agricultural land for grazing, although the acreage of timberland conversions for grazing has also declined dramatically in recent years. Recently most timberland conversion has been to vineyards; production of wine grapes has matched or surpassed timber as the most valuable legal crop in the county. Illegal marijuana still remains an economically valuable crop in the county.

Mendocino County has experienced relatively steady population growth over the past decade, but at a rate lower than the state average. Past, present, and reasonably foreseeable future actions in the assessment area are likely to have contributed substantially to population growth in the region, but this is not considered to be a cumulative effect because growth is not in excess of applicable regional plans and policies. These actions have not and would not induce substantial population growth, remove obstacles to population growth, or encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively.

4.17.1 No Action alternative

As discussed in Section 3.17.2 (Social and Economic Conditions, Environmental effects and mitigation) regional employment and payroll are likely to be affected by several internal (i.e., MRC-related) and external influences that are unrelated to MRC's harvest activities under the No Action alternative. In addition, regulatory requirements would continue to affect management activities in the primary assessment area and have the potential to affect employment and payroll in the timber industry. Under the No Action alternative, timber harvest (volume) is anticipated to increase from existing conditions during the first decade and continue to increase over the next 40 years, with harvest volume stabilizing after that time. This increase in harvest would result in a corresponding increase in employment and payroll by MRC and its contractors. The increase in employment and payroll over time by MRC is not anticipated to result in substantial population growth, housing construction, or activities that could significantly affect the environment. Therefore, effects on socioeconomic conditions under the No Action alternative are anticipated to be less than significant (Section 3.17.2, Social and Economic Conditions, Environmental effects and mitigation).

No cumulatively significant effect on social and economic conditions would occur under the No Action alternative, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on social and economic conditions, and that the No Action alternative would not contribute considerably to these conditions.

4.17.2 Proposed Action

Under the Proposed Action, timber harvesting activities would continue to occur on the MRC forestlands and, therefore, the need would still exist for MRC to employ timber management and support staff. The trend under the Proposed Action is for a steadier, more contiguous climb in employment and payroll compared with similar projections under the No Action alternative. This is viewed as a potential benefit from the perspective of providing a level of predictive stability to the regional economy. In addition, the implementation of measures contained in the proposed

HCP/NCCP that augment existing practices described under the No Action alternative (e.g., road management and decommissioning actions) would generate additional employment needs for skilled equipment operators. The employment of contract employees for road upgrading and decommissioning work, and skilled workers associated with the monitoring elements of the HCP/NCCP would likely increase over time. The changes in regional employment and payroll anticipated under the Proposed Action are not anticipated to result in substantial population growth, housing construction, or activities that could significantly affect the environment. Therefore, effects on socioeconomic conditions under the Proposed Action would be beneficial but less than significant (Section 3.17.2, Social and Economic Conditions, Environmental effects and mitigation).

No cumulatively significant effect on social and economic conditions would occur under the Proposed Action, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on social and economic conditions, and that the Proposed Action would not contribute considerably to these conditions.

4.17.3 Alternative A

Under Alternative A, timber harvesting activities would continue to occur on the MRC forestlands and, therefore, the need would still exist for MRC to employ timber management and support staff. Under Alternative A, the volume of timber harvested from the primary assessment area would increase over the 80-year permit term compared with existing conditions, but would stabilize at a harvest volume less than under the No Action alternative. However, the trend under Alternative A is for a steadier, more contiguous climb in employment and payroll compared with similar projections under the No Action alternative. In addition, the implementation of measures contained in the proposed HCP/NCCP that augment existing practices described under the No Action alternative would generate additional employment needs for skilled equipment operators. The employment of contract employees for road upgrading and decommissioning work, and skilled workers associated with the monitoring elements of the HCP/NCCP would likely increase over time. The changes in regional employment and payroll anticipated under Alternative A are not anticipated to result in substantial population growth, housing construction, or activities that could significantly affect the environment. Therefore, effects on socioeconomic conditions under Alternative A would be less than significant (Section 3.17.2, Social and Economic Conditions, Environmental effects and mitigation).

No cumulatively significant effect on social and economic conditions would occur under Alternative A, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on social and economic conditions, and that Alternative A would not contribute considerably to these conditions.

4.17.4 Alternative B

The establishment of no-harvest terrestrial habitat reserves under Alternative B could result in the loss of some additional timber volume relative to the No Action alternative, such that there would be a corresponding reduction in MRC employment under Alternative B relative to employment under the No Action alternative. The decreases in timber harvesting could have a substantial effect on local businesses supported by the indirect effects of MRC employment. However, the changes in regional employment and payroll anticipated under Alternative B are not anticipated to result in substantial population growth, housing construction, or activities that could significantly affect the environment. Therefore, effects on socioeconomic conditions under Alternative B would be less than significant (Section 3.17.2, Social and Economic Conditions).

No cumulatively significant effect on social and economic conditions would occur under Alternative B, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on social and economic conditions, and that Alternative B would not contribute considerably to these conditions.

4.17.5 Alternative C

Cumulative effects on social and economic conditions under Alternative C would be similar to those under the Proposed Action. **No cumulatively significant effect** on social and economic conditions would occur under Alternative C, given that past, present and reasonably foreseeable future actions in the assessment area have not had a cumulative effect on social and economic conditions, and that Alternative C would not contribute considerably to these conditions.

5 OTHER REQUIRED NEPA AND CEQA ANALYSES

5.1 Growth-inducing Effects

NEPA (40 CFR §1502.16[b], 40 CFR §1508.8[b]) and the CEQA Guidelines (Section 15126[f]) require an evaluation of the growth-inducing effects of a proposed project. Growth-inducing effects are those that would allow for additional population growth and/or development in areas that would otherwise go undeveloped without implementation of the proposed project.

The following analysis of growth inducing effects is based primarily on the information and discussion in Land Use (Section 3.11) and Social and Economic Conditions (Section 3.17). This analysis is based on an evaluation of whether the alternatives would eliminate existing obstacles to population growth and development or promote economic expansion.

5.1.1 Elimination of obstacles to population growth and development

The alternatives would not result in any additional infrastructure capacity or a change in regulatory structure that would allow additional development in the region. MRC-owned lands are designated as "Forestry" in the Mendocino County General Plan and most of the primary assessment area is zoned as Timberland Production Zone under the California's Timberland Productivity Act of 1982. The Timberland Production Zone classification is intended to promote continued timberland management. Land use in a Timberland Production Zone classification is restricted to growing and harvesting timber, in addition to other compatible uses and establishes a presumption that timber harvesting is expected to and would occur on such lands. As has been witnessed throughout California, once the restrictive Timberland Production Zone zoning is removed, suitable timberland is often rezoned again, parcelized, sub-divided, and converted to other non-timber growing uses. None of the alternatives would cause rezoning of forest land, result in the loss of forest land through conversion to non-forest use, or result in changes in zoning or the existing environment which could result in the conversion on forest land to non-forest use. Therefore, the alternatives would not eliminate any obstacles to population growth or development.

5.1.2 Promotion of economic expansion

The alternatives would not cause increased activity in the local or regional economy which could promote population growth in the region. The California Employment Development Department projected that employment in the Natural Resources and Mining sector would increase from 800 to 850 (6.3%) from 2006 to 2016 in the North Coast region (Del Norte, Humboldt, Lake, and Mendocino counties) (Employment Development Department 2009a). MRC's future employment levels are dependent on the volume of timber harvested, which is contingent on the volume of timber available for harvest as well as economic conditions such as the demand for lumber. While future economic conditions are too speculative to predict, the volume of timber available for harvest would rise steadily over the 80-year term of the HCP/NCCP (under the Proposed Action), stabilizing at approximately the same level as under the No Action alternative. Overall, the minor changes in timber harvesting under the alternatives compared with existing conditions would have a negligible effect on local businesses supported by the indirect effects of MRC employment. The changes in regional employment and payroll anticipated under the alternatives are not anticipated to result in substantial population growth, housing construction, or activities that could promote economic expansion.

5.2 Significant and Unavoidable Effects

CEQA (Guidelines Section 15126[b and c]) requires that any significant environmental effects of a proposed project be clearly disclosed if the significant effects cannot be avoided.

With the proposed mitigation measures, no significant and unavoidable impacts of the Proposed Action or Alternatives A, B, or C have been identified (Table ES-1). The No Action alternative would have significant effects on geology, soils, and geomorphology; hydrology, beneficial uses of water, and water quality; vegetation and plant species of concern; and terrestrial habitat and wildlife species of concern (Table ES-1), but no mitigation is proposed for these effects.

5.3 Irreversible and Irretrievable Commitment of Resources

In accordance with NEPA, Section 102 (40 USC 4332), an EIS must explain any aspects of the proposed project that would result in an irreversible commitment of resources. CEQA similarly requires an EIR to discuss uses of nonrenewable resources that would occur during the initial phases and the continued operation of a project (CEQA Guidelines sec. 15126.2[c]). Irreversible commitment of resources is the use or degradation of nonrenewable resources such as fossil fuels, soils and minerals, wetlands, and cultural resources. Irretrievable commitments of resources cause a loss of production or use of a renewable resource, such as timber, rangeland, or wildlife habitat.

The following analysis is focused on old-growth forest, cultural resources, and fossil fuel nonrenewable resources. There are no other nonrenewable or renewable resources that would be irreversibly or irretrievably committed by the Proposed Action or alternatives. The analysis is based primarily on the information and discussion in Timber Resources (Section 3.9), Traffic (Section 3.12), and Cultural Resources (Section 3.16).

Under the No Action, Proposed Action, and Alternatives A and C, MRC would not harvest any old-growth redwood or old-growth Douglas-fir forest. Under Alternative B, old-growth forest could be harvested outside the no-harvest reserves. Under all the alternatives, timber harvest volume is anticipated to increase from existing conditions during the first decade and continue to increase over the next 40 to 80 years, with harvest volume stabilizing after that time. This increase in harvest would result in a corresponding increase in the use of log trucks and vehicles by MRC contractors and, therefore, fossil fuel consumption, compared with existing conditions. Under all alternatives, MRC would continue to comply with the CFPRs in the preparation of THP or PTHPs to protect cultural resources. Based on these analyses, all of the alternatives would result in a moderate increase in the irreversible and irretrievable consumption of fossil fuels; only Alternative B would result in the potentially irreversible and irretrievable commitment of old-growth forest resources.

5.4 Short-term Uses and Long-term Productivity

In accordance with NEPA, Section 102 (40 USC 4332), an EIS must include a discussion of relationship between the short-term uses of man’s environment and the maintenance and enhancement of long-term productivity.

The management measures and amount of harvest under the alternatives have been designed to ensure that the long-term productivity of timber is ensured and other environmental resources are conserved or enhanced over the long term, despite the short-term uses of environmental resources during implementation. The alternatives include mechanisms to avoid, minimize, and mitigate for impacts on environmental resources from the activities covered in the requested federal and state incidental take authorizations.

6 ORGANIZATIONS AND PERSONS CONSULTED

CDFG, as the former CEQA lead agency, and CAL FIRE, as the current CEQA lead agency, contacted the responsible agencies, as required under CEQA. Because CDFG will be authorizing take under California Fish and Game Code Section 2835 and will be issuing a Master Agreement for Timber Operations, CDFG is a responsible agency under CEQA.

The following Reviewing Agencies and entities were consulted:

- California Natural Resources Agency
- California Coastal Commission
- California State Parks Office of Historic Preservation
- California Department of Parks and Recreation
- California Department of Water Resources
- California Department of Fish and Game, Region 3
- California Department of Fish and Game, Marine Region
- California Department of Health Services
- California Office of Emergency Services
- California State Lands Commission
- California Highway Patrol
- California Department of Transportation (Caltrans), District 1
- MRC
- Native American Heritage Commission
- Regional Water Quality Control Board, Region 1
- Tribal Historic Preservation Officers

6.1 Native American Consultation

USFWS and NMFS sent 16 scoping letters to local Native American tribes on 4 October 2002 requesting input regarding comments or concerns related to the HCP or EIS. A single response was received via telephone from a representative of the Stewart's Point Rancheria on 18 October 2002 requesting drafts of the HCP and NEPA documents when available and noting unspecified concerns about northern spotted owls and collecting. The representative of the Stewart's Point Rancheria indicated that they would send USFWS a map of their tribal area with a list of their concerns. This map has not been received.

On 22 September 2009, USFWS sent 12 scoping letters to local tribes requesting National Historic Preservation Act-related information on any cultural resources that may be affected by this HCP. No responses were received. The Applicant (MRC) was queried on potential tribal issues and indicated that ancestral lands for the Pinoleville Tribe are located in the primary assessment area in the Ackerman Creek watershed, and that MRC currently cooperates with that tribe. Because many tribal people were placed in reservations such as at Fort Bragg and Covelo, it is difficult to discern where their ancestral lands would be, outside of the location of the various Rancherias. The primary and secondary assessment areas would likely include at least some the ancestral lands for almost all of the tribes in Mendocino County.

Native Americans will be notified on an individual PTHP-by-PTHP basis per current CFPR regulations pertaining to the protection of cultural resources and the measures outlined in the PTEIR. This should ensure that effects on Native American cultural resources are less than significant.

6.2 California Professional Geologist Certification

Oversight, technical review, and approval of the data, analysis, and results presented in the Soils, Geology, and Geomorphology portions of this EIS/PTEIR were provided by Mr. John Coyle, a California Licensed Professional Geologist (PG #4049) and California Certified Engineering Geologist (CEG #1263). A signed and stamped letter certifying Mr. Coyle's participation is included as Appendix W.

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8 DISTRIBUTION LIST

8.1 Elected Officials

8.1.1 Federal

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Washington, D.C. 20510-0504

Senator Barbara Boxer
U.S. Senate
112 Hart Senate Office Building
Washington, D.C. 20510-0504

Congressman Mike Thompson
U.S. House of Representatives
119 Cannon House Office Building
Washington, D.C. 20515

8.1.2 State

Senator Noreen Evans
State Capital
Room 4034
Sacramento, CA 94248-0001

Assembly Member Wesley Chesbro
State Capital
Room 2141
Sacramento, CA 94249-0001

8.1.3 Local

Board of Supervisors
Mendocino County
501 Low Gap Road, Room 1010
Ukiah, CA 95482

8.2 Federal Government

Environmental Protection Agency
Office of Federal Activities
NEPA Compliance Division
EIS Filing Section
Ariel Rios Building (South Oval Lobby)
Mail Code 2252-A, Room 7241
1200 Pennsylvania Avenue, NW
Washington, D.C. 20044

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Federal Activities Office, Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

U.S. Forest Service
Ms. Sherry Tune
Forest Supervisor, Mendocino National Forest
825 North Humboldt Avenue
Willows, CA 95988

Bureau of Land Management
Mr. Rich Burns
Field Manager, Ukiah Field Office
2550 North State Street
Ukiah, CA 95482

8.3 State and Local Government

California Natural Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814

California Department of Forestry and Fire Protection
Headquarters
1416 9th Street
Sacramento, CA 95814

California Department of Forestry and Fire Protection
Northern Administration Office
135 Ridgeway Avenue
Santa Rosa, CA 95401

California Department of Forestry and Fire Protection
Sonoma-Lake Napa Unit
1199 Big Tree Road
St. Helena, CA 94574

California Department of Forestry and Fire Protection
Mendocino Unit
17501 N. Highway 101
Willits, CA 95490

California Department of Fish and Game
Habitat Conservation Planning Branch
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

California Department of Fish and Game
Northern Region; Main Office
601 Locust Street
Redding, CA 96001

California Department of Fish and Game
Northern Region; Eureka Field Office
619 Second Street
Eureka, CA 95501

California Department of Fish and Game
Northern Region; Fort Bragg Field Office
32330 North Harbor Drive
Fort Bragg, CA 95437

California Department of Fish and Game
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558

California Department of Fish and Game
Marine Region
20 Lower Ragsdale Drive, Suite 100
Monterey, CA 93940

California Department of Parks and Recreation
Mendocino District
c/o Russian Gulch State Park
12301 North Highway 1, Box 1
Mendocino, CA 95460

California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105-2219

California Coastal Commission
North Coast District Office
710 E Street
Eureka, CA 95501

California Office of Historic Preservation
1725 23rd Street, Suite 100
Sacramento, CA 95816

California Department of Health Services
1515 K St #400
Sacramento, CA 95814

California Emergency Management Agency
3650 Schriever Ave
Mather, CA 95655

California Native American Heritage Commission
915 Capitol Mall, Room 364
Sacramento, CA 95814

California State Lands Commission
100 Howe Avenue, Suite 100 South
Sacramento, CA 95825-8202

California Highway Patrol
P.O. Box 942898
Sacramento, CA 94298-0001

California Department of Transportation, District 1
P. O. Box 3700
Eureka, CA 95502-3700

Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236

State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100

North Coast Regional Water Quality Control Board
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403

California Air Resources Board
1001 I Street
Sacramento, CA 95814

Office of Environmental Health Hazard Assessment
P. O. Box 4010
Sacramento, CA 95812-4010

Dept of Pesticide Regulation
P.O. Box 4015
Sacramento, CA 95812-4015

Mendocino Council of Governments
367 N. State Street, Suite 206
Ukiah, CA 95482

8.4 Local Organizations

8.4.1 Tribes

Stewart's Point Rancheria
1420 Gureneville Road, Suite 3
Santa Rosa, CA 95401

Dry Creek Rancheria of Pomo Indians
P.O. Box 607
Geyserville, CA 95441

Lytton Band of Pomo Indians
1250 Coddington Court, Suite 1
Santa Rosa, CA 95401

Michewal-Wappo Tribe of Alexander Valley
P.O. Box 7342
Santa Rosa, CA 95407

Guidiville Indian Rancheria
P.O. Box 339
Talmage, CA 95481

Sherwood Valley Band of Pomo Indians
190 Sherwood Hill Drive
Willits, CA 95490

Noyo River Indian Community
P.O. Box 91
Fort Bragg, CA 95437

Potter Valley Rancheria of Pomo
112 North School Street
Ukiah, CA 95482

Coyote Valley Band of Pomo Indians
P.O. Box 39
Redwood Valley, CA 95470-0039

Laytonville Rancheria
P.O. Box 1239
Laytonville, CA 95454

Round Valley Indian Tribes
P.O. Box 448
Covelo, CA 95428

Redwood Valley Rancheria
3250 Road I
Redwood Valley, CA 95470

Pinoleville Indian Reservation
367 North State Street, Suite 204
Ukiah, CA 95482

Hopland Band of Pomo Indians
P.O. Box 610
Hopland, CA 95449

Manchester Point Arena Band of Pomo Indians
P.O. Box 623
Point Arena, CA 95468

8.4.2 Libraries

Mendocino County Public Library
Main Branch Library
105 N. Main St.
Ukiah, CA 95482

Mendocino County Public Library
Willits Branch Library
390 E. Commercial St.
Willits, CA 95490

Mendocino County Public Library
Fort Bragg Branch Library
499 Laurel St.
Fort Bragg, CA 95437

Mendocino County Public Library
Coast Community Branch Library
225 Main St.
Point Arena, CA 95468

8.5 Other Organizations and Persons

Mendocino Redwood Company
P.O. Box 996
Ukiah, CA 95482

The Humane Society of the United States
2100 L Street, NW
Washington, D.C. 20037

People for the Ethical Treatment of Animals
501 Front Street
Norfolk, VA 23510

California Audubon
4225 Hollis Street
Emeryville, CA 94608

American Bird Conservancy
P.O. Box 249
4249 Loudoun Avenue
The Plains, VA 20198-2237

Redwood Chapter of the Sierra Club
P.O. Box 466
Santa Rosa, CA 95402

Kathy Bailey
Forest Conservation Committee, Sierra Club of California
P.O. Box 265
Philo, CA 95466

Kimberley Delfino
Defenders of Wildlife, California Office
926 J Street, Suite 522
Sacramento, CA 95814

Lori Hubbart
California Native Plant Society, Dorothy King Young Chapter
P.O. Box 985
Point Arena, CA 95468

Greg Jirak
California Native Plant Society, Forestry Program Coordinator
P.O. Box 985
Point Arena, CA 95468

Mary Pjerrou
Greenwood Watershed Association
P.O. Box 106
Elk, CA 95432

Ben Henthorne
Stewart’s Point Rancheria
3535 Industrial Drive, Suite B-2
Santa Rosa, CA 95401

Willits Environmental Center
650 South Main Street
Willits, CA 95490

Mendocino Coast Environmental Center
45011 Ukiah Street
Mendocino, CA 95460

Mendocino Environmental Center
106 West Standley Street
Ukiah, CA 95482

Peter Baye
Friends of the Gualala River
P.O. Box 1543
Gualala, CA 95445

Mary Huckaby
Greenwood Watershed Association and Greenwood Earth Alliance
P.O. Box 106
Elk, CA 95432

Linda Perkins
P.O. Box 467
Albion, CA 95410

William G. Johnson
21520 Orr Springs Rd.
Ukiah, CA 95482

Mr. Phil Detrich
P.O. Box 278
Mt. Shasta, CA 96067

Efron and Lillia Davidson
P.O. Box 1677
Mendocino, CA 95460

9 GLOSSARY

Term	Definition
abandonment (as in road or landing)	According to the CFPRs, “abandonment means leaving a logging road reasonably impassable to standard production four wheel-drive highway vehicles, and leaving a logging road and landings in a condition which provides for long-term functioning of erosion controls with little or no continuing maintenance.”
activity center	A nest or spot where a single owl or a pair of owls consistently roosts during the breeding season; it can be located as a point on a map. Although, within a single year, there can be multiple roost sites in a territory, only the roost site believed to be most central to the owl’s biology will receive activity center status. Activity centers for the same owl or pair of owls can occur in different locations each year.
adaptive management	Monitoring results of management decisions in relation to changing biological and social goals and, if necessary, modifying management strategies to produce better results. Also called adaptive resource management.
adjuvant	A substance added to a chemical to aid the effect of the main ingredient. In forestry applications, adjuvants are commonly added to herbicides to increase adhesion and effectiveness of the herbicide.
advanced successional	Generally refers to relatively older forest stands with larger trees and higher canopy closure than commonly grown under typical timber management schemes. This EIS/PTEIR uses the term “advanced successional” in the context of the timber model and when analyzing the effects of the alternatives.
age class	A distinct group of trees originating from a single natural event or regeneration activity, or a group of trees used in inventory or management, e.g., a 10-year age class. Often correlated with size class.
aggradation	Deposition in one place of material eroded from another place. Aggradation raises the elevation of streambeds, floodplains, and the bottoms of other bodies of water. The process of building up a surface by deposition.
alevin	A newly hatched salmonid with yolk sack still attached found dwelling in redds and gravels.
allochthonous	Organic matter production originating outside the stream.
alluvial	Having originated through the transport by and deposition of running water. Found in clay, silt, sand, gravel, or similar material. Pertaining to or composed of alluvium, or deposited by running water.
Aquatic Management Zone	As defined in the proposed MRC HCP/NCCP, the zone along Class I, Class II, and Class III watercourses where riparian function is managed.
anadromous	Ascending from the sea to rivers for spawning.
anadromous fish	Fish that spawn in freshwater, migrate to the ocean or estuaries to grow and mature, and return to freshwater to reproduce. Salmon and steelhead are examples.
aquifer	Water-bearing stratum of permeable rock, sand, or gravel. A body of rock that is sufficiently permeable to conduct ground water and to yield significant quantities of water to wells and springs.
bankfull width	The channel width at bankfull discharge. This stage is delineated by the presence of a floodplain at the elevation of incipient flooding and indicated by deposits of fine sediments such as sand or silt at the active scour mark, break in stream bank slope, and/or perennial vegetation limit (Flosi et al. 1998).
basal area	The area of the cross section of a tree stem, including the bark, generally at breast height (4.5 ft [1.3 m] above the ground). As used in the EIS/PTEIR, the term refers to the amount of basal area per acre, unless otherwise specified.
bedload	Sediment that is not continuously in suspension but is transported along the channel bottom in the lower layers of streamflow by rolling and bouncing. The part of the stream’s load that is moved on or immediately above the stream bed, such as the larger or heavier particles (boulders, pebbles, gravel).

Term	Definition
biodiversity	The number and variety of organisms found within a specified geographic region, including the variability within and between species and within and between ecosystems.
biomass	Organic material, such as leaves, needles, branches, stems, and vertebrate and invertebrate animal species.
board feet	A unit of measure equaling a piece of lumber 1 in. thick, 1 ft wide, and 1 ft long, or its equivalent in dried and surfaced lumber. It is often expressed in units of thousand board feet.
bog	A hydrologically isolated, low-nutrient wetland that receives its water from precipitation only. Bogs typically have no inflow and rarely have outflows. Bogs have peat soils (except where over bedrock), and specially adapted vegetation, such as sphagnum moss, Labrador tea, bog laurel, sundews, and some sedges. Bogs may have an over-story of spruce, hemlock, cedar, or other tree species, and may be associated with open water.
bole	The trunk of a tree.
broadcast burning	A controlled burn, where fire is intentionally ignited in a designated area within well-defined boundaries; used to reduce of fuel hazard after logging or for site preparation before planting.
buffer strip	A strip of land where disturbance is not allowed or is limited to preserve or enhance aesthetic and other qualities along or adjacent to roads, trails, and watercourses.
buffer zone	The area surrounding or adjacent to a sensitive resource (e.g., nest tree, plant population, stream) in which timber operations cannot be conducted or is limited in timing or degree.
cable yarding	A harvest technique in which cut logs are suspended above the ground via a series of cables and transported to a landing.
CEQA	California Environmental Quality Act
canopy	The more or less continuous layer of branches and foliage formed collectively by the crowns of adjacent trees and other woody species.
canopy closure	The degree to which canopy blocks sunlight or obscures the sky. It can only be accurately determined from vertical point measurements taken under the canopy that account for the openings in the branches and crowns.
carrying capacity	The maximum number of organisms that can be sustained in a given area of habitat.
catastrophic event	An infrequent, large-scale, high intensity disturbance of natural or anthropogenic causes, such as disease or pestilence, large flood events, or severe fire that would require action to protect public safety and drinking water, and prevent significant damage to natural resources.
CDFG	California Department of Fish and Game
channel	Natural or artificial waterway of perceptible extent that periodically or continuously contains moving water.
channel migration zone	The area where the active channel of a stream is prone to move over time. Stream channels are dynamic features of the landscape that change position. Channel migration zone delineation is based on historical meander patterns.
chaparral	A plant community dominated by densely growing shrubs adapted to dry summers and moist winters.
Class I watercourse	Also Class I stream. A Class I watercourse has fish always or seasonally present on-site, and includes habitat to sustain fish migration and spawning; and/or domestic supplies, including springs, on site and/or within 100 feet downstream of the operations area.
Class II watercourse	Also Class II stream. A Class II watercourse has fish always or seasonally present off-site within 1000 feet downstream; and/or aquatic habitat for non-fish aquatic species. Excludes Class III waters that are tributary to Class I waters.
Class III watercourse	Also Class III stream. A Class III watercourse has no aquatic life present, and shows evidence of being capable of sediment transport to Class I and II waters under normal high water flow conditions.

Term	Definition
clearcut	Removal of a stand of trees in one harvest.
climax	The culminating, highly temporally stable condition in plant succession for a given environment. An ecosystem will stay at the climax stage until disturbance affects the ecosystem and the stages of ecological succession begin again.
coarse woody debris	Large pieces of wood, such as logs, pieces of logs, large branches, stumps, and snags, which add to forest biodiversity, increase forest structure complexity, and provide multiple-use habitat for many different animals.
commercial thinning	To promote timber growth, increase average stand diameter, and improve forest health by removing trees.
connectivity	The extent to which suitable habitat patches are linked, in some cases by strips of like vegetation, enabling movement of and dispersal by species.
conservation measure	A specific action taken to (a) avoid or minimize take, (b) compensate for loss of habitat, or (c) improve conditions for covered species.
conservation strategy	A collective set of measures to avoid, minimize, or mitigate the potential take (or equivalent take) of species addressed by the HCP/NCCP, or for protecting, rehabilitating, enhancing, or restoring habitats for these species.
controllable erosion	As defined by the North Coast Regional Water Quality Control Board (2004), controllable erosion is soil that can be delivered to a watercourse, is human created, greater than 10 cubic yards in size, and can be reasonably controlled by prevention and minimization measures. As defined in MRC's watershed analyses, controllable erosion has no minimum volume component.
core area	An area surrounding an initial northern spotted owl activity center and based on best available forested stands where habitat will not be disturbed.
corvid	A bird of the family Corvidae; includes crows, ravens. jays, and magpies.
critical habitat	Under the federal ESA, critical habitat is defined as: (1) the specific areas within the geographic area occupied by a federally listed species on which are found physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a listed species, when it is determined that such areas are essential for the conservation of the species.
culvert	Buried pipe that allows streamflow or road drainage to pass under a road.
debris flow	A moving mass of rock fragments, soil, and mud, more than half the particles of which are larger than sand size that can travel many miles down steep, confined mountain channels.
decommissioning	The act of permanently closing a road or road features to control erosion and maintain water movement. Methods of decommissioning include removal of bridges, culverts, and fills.
deep-seated landslide	An area where landslide material has moved downslope either as a relatively cohesive mass (rotational slides and translational block slides) or as an irregular, hummocky mass (earthflow). The failure surface is generally deeper than 5 ft and is usually well-exposed at the head scarp.
diameter at breast height	The diameter of a tree measured outside its bark at breast height—a point 4.5 feet above average ground level.
dispersal	The one-way movement of juvenile, sub adult, or adult animals.
distribution	The spatial arrangement of individuals of a species within its range.
dominant tree	A tree whose crown extends above the general level of the stand in which it is growing, thereby getting full sunlight from above and partial sunlight from the sides.
downed log	Any section of the bole or of the thicker branches of a tree laying on the ground, often not rooted and dead.
Distinct Population Segment	A level of classification under the ESA that allows for legal protection of populations which are distinct, relatively reproductively isolated, and representative of a significant evolutionary lineage to the species.

Term	Definition
drainage area	Watershed. Total land area draining to any point in a stream, often displayed and calculated on a map or aerial photo (i.e., a two-dimensional projection).
emergent vegetation	Aquatic plants rooted in the aquatic environment with structural portions and the majority of photosynthesis occurring above the surface of the water.
endangered species	Any plant or animal species in danger of extinction in all or a significant part of its range.
Endangered Species Act (ESA)	Federal act of 1973, as amended, 16 USC Sections 1531–1543; California act of 1984, as amended, California Fish and Game Codes Sections 2050–2098.
entrainment	Mobilization and transport, by flowing water, of sediment or organic debris from the bed or banks of a stream channel.
Equipment Exclusion Zone	The area where heavy equipment associated with timber operations is totally excluded for the protection of water quality, the beneficial uses of water, and/or other forest resources.
Equipment Limitation Zone	The area where heavy equipment associated with timber operations is limited for the protection of water quality, the beneficial uses of water, and/or other forest resources.
estuarine	Of, relating to, or living in an estuary; the brackish area of watercourses and bays subject to both upstream inflow and tidal flow.
Evolutionarily Significant Unit	A designation of the Endangered Species Act. From National Oceanic and Atmospheric Association Technical Memorandum NMFS F/NWC-194: A population must satisfy two criteria to be considered an Evolutionarily Significant Unit: It must be reproductively isolated from other conspecific population units, and It must represent an important component in the evolutionary legacy of the species. Isolation does not have to be absolute, but it must be strong enough to permit evolutionarily important differences to accrue in different population units. The second criterion would be met if the population contributed substantially to the ecological/genetic diversity of the species as a whole.
eutrophication	Characterized by an abundant accumulation of nutrients that support a dense growth of algae and other organisms, the decay of which depletes shallow waters of oxygen in summer.
evapotranspiration	Loss of water from the soil both by evaporation and by transpiration from the growing plants.
existing road	Road which existed prior to a reference construction or maintenance operation. No alteration of the road prism is required in order to use an existing road. Pick-ups can travel on an existing road after brush and rock slides have been cleared.
federally listed	Species formally listed as a threatened or endangered species under the federal ESA designations are made by the USFWS or NMFS.
felling	The cutting down of trees.
fine sediments	Small inorganic particles comprising a stream's substrate, most often considered to be those 2 mm and less, including salt, silt, clay, and sand.
floodplain	The relatively flat land adjacent to a stream channel that is prone to flooding, and which has been developed largely through the deposition of alluvial materials.
foraging	Looking or searching for food.
forb	An herb other than grass.
fry	Life stage of trout and salmon between full absorption of the yolk sac and a somewhat arbitrarily defined fingerling or parr stage.
fuel loading	The amount of combustible material present per unit area, usually expressed in tons per acre.
geographic information system	A computer system capable of storing and manipulating spatial data and producing a variety of maps and analyses. A geographic information system has four major subsystems: data input; data storage and retrieval; data manipulation and analysis; and data reporting.
gravel	Inorganic particles between 2 and 64 mm in diameter.

Term	Definition
green tree	A living and growing tree.
group selection	To establish and maintain multi-storied, uneven-aged stands of redwoods and Douglas-fir by harvesting trees in small (< 2.5 acre) groups.
growth and yield model (*see also* timber model)	A mathematical model used to predict forest growth and production of forest products associated with different silvicultural regimes.
gully	An erosion channel formed by concentrated surface runoff which is generally larger than 1 ft^2 in cross-sectional area (1 foot deep by 1 foot wide). Gullies often form where road surface or ditch runoff flow onto unprotected slopes.
habitat conservation measures	Steps taken to protect resources (especially non-timber resources) that have been identified as sensitive in some areas from adverse effects of various management practices or land use activities. Habitat conservation measures can be applied at many levels: local mappable units, planning watersheds, management units, or projects. These measures are often incorporated into the resource capability models or policy models.
habitat conservation plan (HCP)	A plan submitted to USFWS or NMFS by an applicant seeking an incidental take permit which describes (a) the impacts that will result from taking listed species; (b) the steps the applicant will take to monitor, minimize, and mitigate such impacts; (c) the funding that will be available to implement such steps; (d) the procedures for dealing with unforeseen circumstances; (e) alternatives considered; (f) reasons alternative actions were not proposed; and (g) other measures UWFWS or NMFS may require.
habitat elements	Important components of wildlife habitat, such as snags, large woody debris, hardwoods, streams and riparian areas, wetlands, seeps and springs, meadows, rock outcrops, cliffs, talus slopes, serpentine barrens and other areas with uncommon soil types, burrows, caves, and cavity trees.
habitat fragmentation	The breaking up of habitat into discrete islands through modification or conversion of habitat by management activities.
harass	Defined in regulations implementing the ESA and promulgated by the Department of Interior as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering" (50 CFR §17.3). NMFS has not defined "harass" by regulation.
harm	Defined in regulations implementing the ESA and promulgated by the Department of Interior as a form of take. USFWS defines harm as an act "which actually kills or injures" listed wildlife; harm may include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." (50 CFR §17.3). NMFS defines harm as an act "which actually kills or injures fish or wildlife. Such and act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering" (50 CFR §222.102).
hauling	General term for the transportation of logs from a landing, usually to a mill or shipping point.
headwall	Steep (generally > 50%), planar, or concave slopes at or near the heads of swales, gullies, and Class II and Class III streams.
headwall swale	A concave depression, with convergent slopes generally greater than 50%.
headwaters	The source of a stream or stream system.
heavy equipment	Any equipment larger than standard production 4-wheel drive vehicles that comes in contact with the ground.
helicopter yarding	Use of helicopters to transport logs from where they are felled to a landing.
herbivorous	An animal that primarily consumes plant material.

Term	Definition
heterotrophic	Obtaining nourishment from external organic material; used to describe organisms unable to synthesize organic compounds from inorganic substrates.
high retention selection	To accelerate stand development of large trees and closed canopy by harvesting individual trees and maintaining special habitat elements, such as decadent trees, snags, and downed logs.
hydric	Requiring an abundance of moisture.
hydrology	Scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.
Implementation Agreement	A part of the application for an incidental take permit, which specifies the terms and conditions, resources, schedule of activities, and expectations of the parties to the agreement.
incidental take	The take of a threatened or endangered species that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.
incidental take permit	A permit issued by the USFWS or NMFS to a non-federal entity that allows the incidental take of a threatened or endangered species; requires the permitee to carry out specified actions that minimize and mitigate the impacts of the incidental take to the maximum extent practicable, and in a manner that does not appreciably reduce the likelihood of survival or recovery of the species in the wild.
inner gorge	A geomorphic feature formed by coalescing scars that originate from landslide and erosion processes caused by active stream erosion. Inner gorge is that area of stream bank immediately adjacent to the stream channel. Its side slope is generally over 65% and occurs below the first break in slope above the active stream channel.
insolation	Energy derived by a surface from direct exposure to the sun’s rays.
intermittent stream	A stream that flows only when groundwater levels are adequate to recharge the channel. Typically water flows for the majority of the wet season but surface water is absent during the dry season.
inventory block	A unit of scale that contains multiple planning watersheds and typically represents a region (Albion, Navarro, Rockport, etc.) of the HCP/NCCP plan area. MRC uses inventory blocks in characterizing landscape conditions.
lacustrine	Of, relating to, or living in a lake.
landing	An area where cut trees are gathered for loading to transport out of the forest.
landslide	A general term for a wide variety of processes and landforms involving the downslope movement, under gravity, of soil and rock material. In forested watersheds, landsliding typically occurs when local changes in the soil pore water pressure increase to a degree that the friction between soil particles is inadequate to bind them together.
large woody debris	Any piece(s) of a tree (e.g., dead boles, limbs, and large root mass) on the ground in forest stands or in streams. As defined in MRC’s proposed HPC/HCCP: For terrestrial large woody debris, downed logs or fallen trees greater than 16 in mean diameter and longer than 10 ft. For instream large woody debris, it is any piece of wood functioning for habitat development or stream channel stability in a watercourse.
leave tree	A tree intentionally not harvested during a timber harvesting operation to provide for specific management objectives, such as wildlife structure, recruitment of future snags, seed source for natural vegetation, or minimum basal area standards.
lentic	Living in still waters, such as lakes, ponds, or swamps.
Long-Term Sustained Yield	Estimated timber harvest that can be maintained indefinitely once stands have been converted to a managed state under specific management intensity.
mainline roads	Major arteries for log transportation, generally used at least 3 out of every 5 years.
management prescription	A description of the silviculture, harvest methods, and road and landing construction or reconstruction associated with a stand. Management prescriptions are broader in scope than silvicultural prescriptions.

Term	Definition
mariculture	Marine aquaculture; also called ocean farming.
marsh	Wetlands characterized by seasonally or permanently saturated soils, often with seasonal standing water, vegetated by emergent, herbaceous wetland obligate plants. Marsh types include salt, brackish, freshwater, and alkali.
mass wasting	A general term for the down-slope movement of soil and rock material under the direct influence of gravity.
mesic	Requiring a moderate amount of moisture.
metamorphs	Frogs in the intermediate stages of metamorphosis that no longer respire via gills, and are sexually immature.
microclimate	Localized climate, especially insofar as this differs significantly from the general climate of the region.
minimize	To reduce to the smallest part or proportion possible, e.g., conservation measures for rare plants might minimize impacts by avoiding a plant or by assuring that functional habitat is maintained.
mitigation measures	Modifications of actions that (1) avoid impacts by not taking a certain action or parts of an action; (2) minimize impacts by limiting the degree or magnitude of the action and its implementation; (3) rectify impacts by repairing, rehabilitating, or restoring the affected environment; (4) reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action; or (5) compensate for impacts by replacing or providing substitute resources or environments.
monitoring	The evaluation of management practices in order to determine how well objectives have been met, often involving repeated measures over time.
multi-aged stand	A forest stand that has more than one distinct age class arising from specific disturbance and regeneration events at various times. These stands will normally have multilayered structure. A forest stand that has more than one distinct age class. These stands will normally have multilayered structure.
Maximum Weekly Average Temperature	The maximum of the daily average temperatures, recorded over a moving 7-day period during the period of interest (e.g., the summer).
Maximum Weekly Maximum Temperature	The maximum of the daily maximum temperatures, recorded over a moving 7-day period during the period of interest (e.g., the summer).
NCCP	Natural Community Conservation Plan; a plan authorized under the Natural Community Conservation Planning Act, part of the California Fish and Game Code.
nesting	Activity of birds including the building of a nest, egg laying and incubating, and the raising of nestlings until they have fledged.
nesting platform	Relative to marbled murrelets, any large limb or other structure generally in the upper two-thirds of a tree large enough to hold an egg or nestling, generally at least 6 in. in diameter.
overstory canopy	In a multi-storied stand, that portion of trees forming the upper canopy layer.
parr	Young salmonid, in the stage between alevin and smolt, that has developed distinctive dark parr marks on its sides and is actively feeding in freshwater.
plan area	The land within the boundaries of the MRC property lines at the time of submittal of MRC's proposed HCP/NCCP, exclusive of specific areas.
planning watershed	The contiguous land base and associated drainage system that forms a fourth-order or other watershed, typically less than 10,000 ac (4,046 ha) in size (CalWater 2.2: http://cain.ice.ucdavis.edu/calwater/calwfaq.html).
podzolized	A process of soil formation that develops in humid regions, especially under coniferous or mixed forest, involving principally leaching of the upper layers with accumulation of organic material in lower layers.
pole	A young tree, from the time its lower branches begin to die until the time the rate of crown growth begins to slow and crown expansion is noticeable.

Term	Definition
pool	A substantially concave section of the channel measured along the thalweg where (1) water velocity is minimal during low flow periods but maximum during high flow periods, and (2) water surface elevation is near horizontal during low flow but sloping during high flow.
potentially suitable habitat	Any area that could grow into or otherwise become habitat for a species (e.g., northern spotted owl foraging or nesting/roosting habitat or marbled murrelet habitat).
pre-commercial thinning	The silvicultural treatment of removing some of the trees from a stand composed of trees of less than merchantable size so that remaining trees will grow faster. Felled trees are not harvested for income.
prescription	The assignment of management actions, such as harvesting, planting, thinning, erosion control, and streamside buffers. An appropriate prescription is determined by the management action in relation to vulnerability of a sensitive resource and landowner management objectives.
pygmy forest	Pygmy forests are unique to the Mendocino Coast, California, and are located between Navarro River and Ten-Mile River. They are characterized by highly leached, acid, nutrient poor, and year-round saturated soils. Vegetation is located on old (3^{rd} to 5^{th}) terraces with little nutrient run-off available from upslope. Tree heights remain mostly between 1 to 3 m. Soil is usually covered with lichens, which are rare anywhere else in California. These lichens help prevent erosion.
reach	A length of stream channel exhibiting, on average, uniform hydraulic properties and morphology. Reaches can be divided into 3 geomorphic types based on sediment dynamics: source, transport, and response reaches (see http://www.stream.fs.fed.us/fishxing/publications/PDFs/AOP_PDFs/AppendixA.pdf).
rearing habitat	Areas in rivers or streams where juvenile fish find food and cover in which to live and grow.
recovery plan	A plan developed by a government agency, that if implemented is expected to result in the recovery of a threatened or endangered species to the extent that the species can be de-listed from threatened or endangered status.
redd	A depression in streambed gravel dug by a spawning female salmonid as a nest for her eggs.
reforestation	The natural or artificial restocking of an area with forest trees; most commonly used in reference to artificial stocking.
refugia	Locations and habitats that support vestigial populations of organisms because the remainder of their previous geographic range is inhospitable.
regeneration	The seedlings and saplings existing in a stand, or the act of establishing young trees naturally or artificially.
regime	A detailed description of the sequence of harvests and other treatments that will occur in a forest stand. A regime describes the timing and details of harvests, including residual basal areas and volumes by site class. A set of regimes describe different timing options for a single silvicultural prescription. See also silvicultural system.
rehabilitation	To rehabilitate poorly stocked conifer stands experiencing excessive hardwood competition and allow for site preparation, conifer regeneration, and transition into well-stocked stands of conifers.
reserve	An area of forest land that, by law or policy, is not available for harvesting. Areas of land and water set aside for ecosystem protection, preservation of rare species, wildlife protection etc.
restoration	Return of an ecosystem or habitat to its original community structure, natural complement of species, and natural functions.
riffle	Fast-flowing, shallow segment of a stream where the surface of the water is broken over rocks (e.g., gravel and cobbles) or debris.
rill	A small erosion channel, up to about 1 square foot in cross-sectional area, that typically forms where rainfall and surface runoff is concentrated on fillslopes, cutbanks and ditches. If larger than 1 ft^2 in size, the channel is called a gully.

Term	Definition
riser	A steep ascending (or descending) slope that, together with a flat or gently sloping surface called a tread, makes up the geomorphic feature called a terrace. Also called a scarp.
road prism	The horizontal template of a road that includes the road surface, cutslope, fillslope, and ditch.
Registered Professional Forester	A person who holds a valid license as a professional forester pursuant to Article 3, Section 2, Division 1 of the California Public Resources Code.
salmonid	Any of the family Salmonidae, e.g., salmon and trout.
scarp	Steep cliff face usually formed by erosion.
screen tree	A nearby tree that creates a barrier of protection, e.g. from wind, for an adjacent tree and for wildlife that might be occupying it.
sediment	Particles of rock, soil, and organic material transported by wind or water (such as those deposited in or on stream beds).
sediment budget	A sediment budget is an accounting of the sources and deposition of sediment as it travels from its point of origin to its eventual exit from a drainage basin (Reid and Dunne 1996).
sedimentation	The process of deposition of sediment by gravity from a state of suspension in air or water.
shallow landslide	Shallow landslides, also known as shallow-seated landslides, are areas where surface material (unconsolidated rock colluvium and soil) has moved downslope along a relatively steep, shallow failure surface. The failure surface is generally greater than 65% in steepness and generally less than 10 ft in depth.
silvicultural method	A single scheduled entry into a stand. A group of silvicultural methods make up a silvicultural system. Silvicultural methods include selection, clearcut, commercial thin, rehabilitation, sanitation salvage, no harvest, and alternative prescriptions.
silvicultural prescription	A detailed description of the sequence of treatments that might occur in a forest stand. A prescription is one component of a silvicultural system, or the scheduled entries into a stand, including harvesting, planting, thinning, and controlling brush and other competing species.
silviculture	The science and practice of controlling the establishment, composition, and growth of the vegetation of forest stands. It includes the control of production of stand structures, such as snags and downed logs, in addition to live vegetation.
silvicultural unit	An area within a harvest plan with only 1 type of silviculture that is non-contiguous with other areas of that same type.
single tree selection	To establish and maintain multi-storied, uneven-aged stands of redwoods and Douglas-fir by harvesting individual trees more or less uniformly throughout the stand. Provides space for growth of remaining trees and space for growth of new trees.
site class	Site class reflects the potential productivity of forest stands for present and future timber species growth. Classes range from I to V. A site class of I is the most productive while a site class of V is the least productive. It is important to note that site classes are only applicable to specific regions. A site class of I in the mixed conifer region of the Sierra Nevada, for instance, is not likely to have the same growth potential as a site class of I in the north coast redwood region.
site preparation	Any activity involving mechanical disturbance of soils or burning of vegetation that is performed during or after completion of timber harvesting and is associated with preparation of any portion of a logging area for artificial or natural regeneration.
skid trail	A path created by dragging logs to a landing.
slash	Woody residue left on the ground after trees are felled, or accumulated there as a result of a storm, fire, or silvicultural treatment.
slope stability	The resistance of a natural or artificial slope or other inclined surface to failure by landsliding (mass movement).

Term	Definition
snag	Any standing dead tree greater than 16 in diameter at breast height and taller than 10 ft. A hard snag is composed primarily of sound wood, generally merchantable. A soft snag is composed primarily of wood in advanced stages of decay and deterioration, generally not merchantable.
soil pipe	A pipe-shaped void that may extend for some distance within the shallow subsurface environment as either a continuous feature or as a system of inter-connected features that form extensive, branched networks capable of transporting water and/or sediment.
species of concern	Unofficial status given to a species, subspecies, or distinct population of an animal to recognize and respond to the fact that it is facing serious threats; e.g., has or is experiencing substantial population and/or habitat declines.
sphagnum	Mosses of acidic, wet soils or boggy locations. About 50 species occur in North America.
stand	Stands are contiguous areas within the forest that have similar characteristics for vegetation (species composition and the size and density of trees), and growth potential or site quality (soil type and topographic factors, such as elevation and aspect). Stands are usually the units to which silvicultural prescriptions are applied.
stochastic	Random, uncertain; involving a random variable.
stocking	The measure of occupation by trees in an area of land, as measured by basal area or number of trees per acre.
structure class	Structure classes are a vegetation classification based on a stand's species composition, diameter distribution, and density. Structure classes relate vegetation conditions to forest wildlife species.
substrate	Mineral or organic material that forms the bed of a stream. The substance or nutrient on or in which an organism lives and grows
succession	The dynamic changes by which organisms replace one another over time. Although a continuum of processes, it is often expressed as stages leading to potential natural community or climax. An example is the development of series of plant communities (called seral, or successional, stages) following a major disturbance.
surface erosion	The detachment and transport of soil particles by wind, water, or gravity. Surface erosion can occur as the loss of soil in a uniform layer (sheet erosion), in many rills, or by dry ravel.
suspended sediment	Solids maintained in the water column by the upward components of turbulent currents or by colloidal suspension.
swale	A depression in an unchanneled hillslope where subsurface flow is concentrated. Swales are often sites of accumulation of colluvium and are immediately upslope of headwater streams.
tailout	Where the depth of the pool gradually lessens, literally the tail-end.
take	Under the federal ESA, take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect an animal, or to attempt to engage in any such conduct.
take permit	A permit issued by CDFG under the Natural Communities Conservation Act that allows the take of listed threatened or endangered species, or unlisted species; requires the permitee to carry out specified actions that minimize and mitigate the impacts of the incidental take to the maximum extent practicable, and in a manner that provides for the conservation of the species.
terrain stability unit	Categorization of a land area used in MRC's proposed HCP/NCCP based on terrain similarity, mass wasting potential, and sediment delivery risk.
territory	Area defended by a single owl or a pair of owls against members of the same species, generally during the breeding season.
thalweg	The line connecting the lowest or deepest points along the riverbed, usually identical to the center of the navigation channel. The deepest point of a stream along any channel cross-section.

Term	Definition
timber harvesting plan (THP)	As described in Public Resources Code 4582. A 3-year plan for the harvesting of commercial timberlands that (1) must be prepared by a Registered Professional Forester, (2) must be filed with and approved by the California Department of Forestry, and (3) must contain detailed information about the land to be harvested, the silvicultural methods to be applied, special provisions (if any) to protect unique and sensitive resources in the area, the dates when timber operations will commence and conclude, and any other information that may be required by the State Board of Forestry.
timberland	Land, other than land owned by the federal government, and land designated by the California Board of Forestry as experimental forest land, which is available for, and capable of, growing a crop of trees of any commercial species used to produce lumber and other forest products, including Christmas trees.
Total Maximum Daily Load	A Total Maximum Daily Load describes the amount of a pollutant that a watercourse can receive without violating water quality standards
tractor yarding	Skidding (or transporting) logs by a self-propelled vehicle, generally by dragging the logs with a grapple or chokers.
transition	To develop an uneven-aged stand from an even-aged stand or a stand with unbalanced or irregular stocking. Involves removal of trees individually or in small groups to create a balance of different stand structure and natural reproduction.
turbidity	A measure of water clarity, which may be affected by material in suspension in the water.
understory	The trees and other woody species growing under the canopies of larger adjacent trees and other woody growth.
variable retention	To rotate stands with poorly stocked conifers and relatively high densities of hardwood. The entire stand will be harvested, with dispersed and/or aggregated retention of 10–40% or more of the existing stand. This will allow for vigorous growth of the remaining stand along with pockets of undisturbed trees to provide for ecological functionality, habitat structure, and forest complexity.
viewshed	The landscape that can be directly seen from a viewpoint or along a transportation corridor.
water year	The 12-month period 1 October–30 September of the year in which the period ends.
watershed	A watershed is that part of a landscape that drains to a particular stream, river, or other body of water. If rain falls on saturated soil, it will run off downhill. Runoff from all the hillsides in a watershed eventually will reach the stream or river for which the watershed is named. The boundaries between watersheds are called divides and generally follow ridge crests.
watershed analysis	A structured approach to developing a forest practices plan for a watershed analysis unit based on a biological and physical inventory, which was originally developed by the Washington State Department of Natural Resources.
watershed analysis unit	An area of land where a watershed analysis is being or has been conducted, including, in some cases, multiple planning watersheds.
weir	Fence or enclosure set in a waterway for taking fish or other purposes
wetlands	Wetlands are transitional areas between aquatic and terrestrial habitats in which the soil is usually saturated, either on a permanent or temporary basis.
windthrow	Trees uprooted by the wind.
xeric	Characterized by, relating to, or requiring only a small amount of moisture.
yarding	Transporting logs from the point of felling to a collecting point or landing.

10 LIST OF PREPARERS

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