Appendix V

Science Panel Recommendations

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V. SCIENCE PANEL RECOMMENDATIONS

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1. Q. *What are the necessary components and rationale for a conservation plan? What other options will insure long-term conservation strategies? What adjacent land uses could impact the conservation measures proposed in the MRC HCP/NCCP?*	
A. A conservation plan must address the potential threats to biodiversity and ecological processes. Apart from the HCP/NCCP programs, there are few options for insuring long-term management and conservation of natural resources on private lands. A habitat-based approach to conservation planning would modify many of the current practices of MRC.	A. Our HCP/NCCP proposes habitat-based conservation measures, e.g., for wildlife trees, downed wood, and riparian function, as well as species-specific measures, e.g., for northern spotted owls and marbled murrelets.
B. There is a need to monitor (1) the populations of a few select species that may best represent the species assemblage for a habitat type or (2) species known to be declining or at high risk of regional or global extinction	B. Our HCP/NCCP proposes monitoring for all covered species.
C. Adaptive management should be built into any conservation strategy, as additional species will be listed over time and catastrophic events may alter the landscape.	C. Chapter 13 of our HCP/NCCP describes the proposed monitoring and adaptive management. We have included side boards for the adaptive management to give us economic certainty and to give the agencies the ability to assess potential impacts. Our HCP/NCCP does have provisions to alter or add conservation measures and monitoring, with MRC and agency concurrence. The process for minor modification addresses low impact changes, while the process for major modifications includes an opportunity for public comment on any proposed changes.
D. Appropriate conservation planning should ensure the protection of listed and other vulnerable species and provide for the enhancement and recovery of their populations while integrating, at a landscape level, the land management objectives of various ownerships... In addition, the long-term management plan should be a covenant to the land and not become void when ownership changes.	D. Our HCP/NCCP can only ensure conservation measures on MRC property. Other than that, we can purchase additional lands to include in the HCP/NCCP or encourage other landowners to develop similar plans.
E. An HCP/NCCP should include an articulation of the objectives of the plan; review of applicable laws, regulations, and ordinances; inventory of biological resources; review of the biology and ecology of species and communities; review of the geography,	E. ▪ Chapter 1 gives the purpose and scope of the plan. ▪ Chapter 2 reviews the applicable laws and regulations. ▪ Chapters 3-6 provide species accounts for all the covered species.

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ecology, and land-use history of the planning area; review of management plans of the landowners in the planning area; identification of conflicts between economic management objectives and conservation; identification of opportunities for the protection and enhancement of species and communities; development of management prescriptions to address specific populations of species and communities of special interest; development of a monitoring program and a set of prescribed feedback loops to modify prescriptions and plans if conservation objectives are not being met.	▪ Chapters 1 and 3 provide an overview of the geography, ecology, and historical land use in the planning area. ▪ Chapters 7-12 identify opportunities for the protection and enhancement of species and communities and propose detailed conservation measures. ▪ Chapter 13 proposes a monitoring program and a set of feedback loops to modify conservation measures if objectives are not met.
2. Q. *Is the current list of species and communities addressed by the HCP/NCCP comprehensive enough to achieve the plan's biological goals?*	
A. There are several communities in the MRC plan that need more attention, including fens and bogs, coastal prairie, and coastal scrub. A proactive approach would map these communities, briefly assess their condition, and conduct a survey for rare plants in the appropriate habitats for each community.	A. MRC addresses fens and bogs in our watercourse or wet area protections. Coastal prairie and coastal scrub are not covered communities in this plan.
B. The list of species addressed by the plan is fairly comprehensive and the treatments are often thorough. However, the plan does not present a comprehensive list of plant species based on actual surveys of the property. The current list of plant species is not comprehensive enough to achieve the plan's biological goals.	B. For more recent drafts of our HCP/NCCP, botanists from CDFG and Garcia and Associates have helped MRC develop our covered plant list and our conservation measures for rare plants.
C. MRC should address several vertebrate species more thoroughly in the plan, including the Pacific fisher, the California tiger salamander, and the Pacific giant salamander (now called coastal giant). Two or three invertebrate species may warrant mention in the plan, including the Lotis blue butterfly, Behren's silverspot butterfly, and the California freshwater shrimp.	C. ▪ Conservation measures for old growth, wildlife trees, and LWD will benefit this species. ▪ MRC has revised the boundaries of the adjustment areas since the science panel completed its review of Draft1. In the current draft of the HCP/NCCP, potential habitat for the tiger salamander is not included in plan or adjustment areas. ▪ MRC finds that coastal giant salamanders are relatively common in the plan area and are habitat generalists. As a result, they are not good indicator species for determining impacts of timber operations. ▪ Proposed conservation measures for pygmy forest will protect the Lotis blue butterfly. Dr. Gordon Pratt conducted surveys in summer 2004 with no detections. To avoid take, MRC will seek the technical assistance of USFWS before pursuing any actions that may affect this species. ▪ The proposed covered activities are unlikely to have any impact on Behren's silverspot butterfly as this species occurs in coastal prairie, a community type

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	which the HCP/NCCP does not cover. The primary impacts to the species are commercial and residential development, over grazing, fire exclusion, competition by non-native plants, and trampling by off-road vehicles and horses. ▪ The range of the California freshwater shrimp is not within the plan area or adjustment area. Nevertheless, if it were, the proposed conservation measures for watercourses would provide this species significant protection.
3. Q. *Does the plan address physical properties and processes that shape species and community dynamics?*	
A. We do not feel that physical properties and processes were adequately addressed, although MRC has made a start in this direction. The MRC HCP/NCCP appears to address the standard set of watershed physical processes, but avoids questions pertaining to the role of disturbance, including fires, landslides, and bank erosion in habitat creation. Likewise there is a lack of analysis of habitat-forming processes over large spatial scales.	A. MRC has considered these critiques in preparing subsequent drafts of the HCP/NCCP. Many of the conservation measures address disturbances. Canopy retention in unstable areas will provide wood for recruitment if mass wasting occurs. Conservation measures for basal area and large tree retention also ensure that when stream banks collapse there will be recruitment wood. Retaining wildlife trees and downed wood will create snags and habitat on the forest floor. Changed and unforeseen circumstances will trigger additional conservation measures.
B. The HCP/NCCP would benefit from inclusion of principles of disturbance ecology and larger-scale drivers of physical heterogeneity in river systems. We also suggest that MRC give greater attention to riparian zone protection and roads.	B. MRC has proposed in the current draft a detailed strategy to protect and restore the functions of riparian zones (including wetlands, wet areas, seeps, and springs). We believe the HCP/NCCP sufficiently conserves natural communities, as well as threatened and rare species within the plan area. To consistently mimic natural disturbances would be difficult for a timber management company maintaining an economically sustainable business. MRC has proposed a detailed road management plan which includes ▪ Guidance on road construction and layout. ▪ Objectives and timelines for ▫ Treating controllable erosion. ▫ Monitoring road features. ▫ Evaluating potential hazards. ▫ Prioritizing road restoration treatments.
C. The primary logic for riparian zone protection is to maintain the integrity of the physical and biological riparian environment. This requires a variable distance of streamside buffer, depending on the shape of the land.	C. MRC has variable width “bands” or buffers in the riparian zones based on terrain slope and stability.

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D. An effective conservation plan must anticipate and plan for the consequences of large and infrequent events, such as large storms, floods, and landslides, while considering the shorter-term consequences of intervening conditions.	D. MRC conservation measures for canopy, large tree retention, downed wood, and basal area, in addition to the proposals in Chapter 14, *Changed and Unforeseen Circumstances*, consider large infrequent events as well as current conditions.
E. Roads are generally the most ubiquitous and influential human-made feature affecting physical and biological processes in managed forests. Hence, the discussion of road use and design should be more comprehensive.	E. Appendix E of the HCP/NCCP, drafted after the science panel review, proposes a detailed plan for road management, including construction, reconstruction, maintenance, decommissioning, and guidelines for road use.
4. *Should any species and natural communities be added to the conservation strategies (e.g., species with no special protection status but that could be useful in planning conservation strategies or as monitoring indicators)?*	
A. Some additional species and natural communities that might be addressed are discussed in the science panel's response to Question 2. Terrestrial animal species that might be considered for conservation planning and monitoring, though not necessarily as a covered species, are the red tree vole, the ringtail, the bobcat, and the mountain lion.	A. Unlike the covered species, bobcats and mountain lions are relatively common in the plan area and, therefore, have a low level of concern. Moreover, as "habitat generalists," they are not good indicator species. Land management under the HCP/NCCP and PTEIR will continue to provide viable habitat for all of these species.
B. There are no bats or passerines mentioned in the plan, although MRC is currently conducting point-count surveys for passerines. This is acceptable unless some bat or passerine species show up in the "grouping species process" discussed in Question 6 below. Sensitive bat species are known to occur on adjacent lands (Navarro State Park).	B. FESA and CESA do not list any bats or passerine species occurring in the plan area. If such species appear on future listings, MRC will follow no-take measures with technical assistance from the wildlife agencies. Conservation measures, such as those for old growth and rocky outcrops, while not specifically targeting these species, will benefit them.
5. *Should any species be removed from the HCP/NCCP as highly unlikely to be found in the plan area or affected by the plan?* We do not recommend the removal of any species at this time. The choice of species to be covered by the plan seems logical (albeit incomplete) based either on the current federal and/or state status of the species or the likelihood of impacts on their habitat and associated populations by MRC land management activities.	

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6. *(a) Are there any new or pending taxonomic revisions or other issues that would affect the list of species addressed? (b) What are the most effective ways of grouping species to assist in designing, managing, or monitoring conservation strategies?* A. None are currently known. B. There are several ways to group species that might be useful. One logical approach would start by grouping species into habitat guilds by the major habitat types they depend on. This habitat-based approach can be further refined to a "focal species approach," where managers identify, for each major habitat type, groups of species whose vulnerability can be attributed to a common cause, such as loss of area or fragmentation of a particular habitat type or alteration of a disturbance regime. Species in each group then can be ranked in terms of their vulnerability to those threats. For each group the focal species are the ones most demanding for the attribute that defines that group. They serve as the umbrella species for that group. The aquatic species may not be effectively grouped and probably require monitoring (and adaptive management) on a species-by-species basis.	A. No response is required. B. MRC concluded that it was not possible to efficiently group species for monitoring. The plan proposes monitoring for specific species and habitat. Northern spotted owls, marbled murrelets, Point Arena mountain beaver, and salmon and frogs in the streams can be used as umbrella species to monitor habitat and estimate community health.
7. *Do current data-gathering methodologies provide a mechanism to develop biological and physical information as sufficient scientific foundation for conservation planning?* A. For the most part, the methods used to measure the habitat components in the plan are well described and the metrics chosen are appropriate. However, the lack of a well-defined botanical survey protocol presents a serious problem for the development of this HCP/NCCP. B. For most other species, the data gathering methods appear to be well described. However, we provide a number of suggestions concerning definitions and methodology, for example making clearer the definition of old-growth trees for each species earlier in the HCP/NCCP, referring to the literature for the specific field methods that will be used to monitor populations of plants and amphibians, and describing how it will be decided whether portions of a LACMA will need "improving" for marbled murrelet habitat.	A. MRC subsequently retained a botanical consultant to develop the conservation and monitoring plan for rare plants. B. Old growth definitions have been revised. Chapter 13, *Monitoring and Adaptive Management*, refers to the literature as much as possible. Any improvement of LACMA will be done in a very conservative approach with agency approval.

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C. We also have some concerns about the treatment of Class III streams and the proposed watershed analysis, described in our detailed comments in this report. Additional data gathering on terrestrial ecological processes is also needed.	C. In subsequent drafts of the HCP/NCCP, MRC addressed these concerns of the Science Panel.
▪ Make clearer the definition of old-growth trees for each species of conifer and deciduous trees earlier in the HCP/NCCP document so that when the retention of old-growth trees is discussed in the conservation measures for Class I and Large Class II AMZs, readers will know what is being referred to.	▪ MRC has made this change.
▪ Define what a "screen tree" is when discussing the retention of screen trees around individual old growth trees.	▪ MRC has made this change.
▪ Make clear that not all the characteristics described for old-growth trees are needed to define a tree as old growth, for example, Douglas-fir trees often have little or no moss since they grow on drier sites, and old-growth redwood trees often have little moss.	▪ MRC has made this change.
▪ If rare plant surveys are planned, refer to the literature and methods that will be used to conduct these surveys.	▪ MRC has made this change.
▪ Refer to the literature for the specific field methods that will be used to monitor populations of red-legged frogs, foothill yellow-legged frogs, and coastal tailed frogs.	▪ Sections 13.5.2 through 13.5.4 propose monitoring for red-legged frogs and coastal tailed frogs. Experts in the field identified and, in some cases, developed the methodologies. Since the Science Panel review, MRC, in consultation with the wildlife agencies, has decided not to cover the foothill yellow legged frog (see section 7.4).
▪ Specify targets or a percentage in the methods used to describe the densities of egg masses that would indicate a significant decline of foothill yellow-legged frogs. Specify how an egg-to-metamorph survival ratio will be calculated for the foothill yellow-legged frog, when the survey method indicates that the survey is complete after the first metamorph is observed within each stream index reach.	▪ MRC will survey 10 streams per planning watershed as detailed in section 13.5.4.
▪ For the coastal tailed frog surveys, describe in more detail how data will be gathered to describe their distribution—how many streams will be surveyed? How will the stream indexes to be surveyed be defined? What percentage of streams or stream reaches will be surveyed?	▪ MRC will make decisions on improving marbled murrelet habitat within LACMA only with agency consultation and concurrence.
▪ Describe how it will be decided whether portions of a LACMA will need "improving" for marbled murrelet habitat.	▪ MRC changed the definition to ±45 degrees after consultation with the wildlife agencies
▪ Change the definition of a potential murrelet nesting platform from "nearly horizontal" to ±45 degrees; murrelets are not limited to nesting on perfectly horizontal limbs.	
▪ Describe the methods for the collection of all canopy closure data.	▪ Refer to Appendix U, *Inventory Strategy*, and Appendix G, *Watershed Analysis Protocols*.
▪ The definitions of murrelet habitat types (High, Medium, and Low) should perhaps be	▪ For factors, MRC uses: (a) number of potential murrelet trees within 100 ft of each other; (b)

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converted into trees/acre so that the metric is more clearly standardized.	proximity of these murrelet trees to the coast; (c) and position of these murrelet trees on a slope. ▪ MRC re-worked this section to calculate the number of trees within 100 ft of each other per habitat zone.
▪ Better describe how the percent of ground cover disruption will be calculated in order to determine if rare plant surveys will be done prior to the management activity-taking place. For aquatic organisms, we recommend determination of their distributions and abundance, tracking their changes through time (and space), and relating these changes to environmental conditions.	▪ MRC completely re-worked the plant conservation measures and monitoring.
▪ (a) We have some concerns about the treatment of Class III streams. On page 37 of the Management Plan, the table estimates 720 miles of Class III streams, whereas on page 5-40, the area in Class III buffers, assuming a 25-foot buffer on each side of stream was 9732 acres, which translates to 1606 miles of Class III stream. This buffer area also translates into 4.2% of the total ownership. (b) We could not find in the documents a discussion of the criteria by which the head of a Class III stream was determined. At Caspar Creek, Class III streams often begin in areas having a drainage area of 3 to 5 acres. (c) Pipe flow is the dominant mechanism of water delivery in these small watersheds.	▪ (a)The buffer is 25 ft for slopes <30% and 50 ft for slopes >30%. There was a difference in the data gathered for the Management Plan (2000) and for Draft 1 of the HCP/NCCP. (b) The definition of Class III covers the criteria for determining the head of a stream, i.e., where a channel that can transport sediment to a higher order water course no longer exists. (c) We have included conservation measures for soil pipes
D. Open channel surface flow generally occurs as a discontinuous gully formed by collapse of piping channels. The drainage area at the upper location of Class III channels depends on the "maturity" of the piping tunnels, with mature piping development resulting in Class III streams occurring in smaller drainage areas than recently developing piping networks. The important point is that water and sediment are being transported down slope by both classic open channels and by piping. If headwater-piping networks are disturbed and collapsed by heavy equipment, large increases in sediment delivery would result. In this terrain, the definition of a Class III (provided in Table 5-1) should be modified to read, "Shows capability of transporting sediment ... timber operations, whether by surface channel or pipe flow." One could argue that substantial protection is needed in the swale immediately above the channel head, because the channel head could migrate upslope dramatically, with commensurate increases in sediment transport, if subsurface pipes are collapsed by heavy equipment.	D. The combined conservation measures for Class III streams, TSUs, and soil pipes afford adequate protection for these areas.

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E. (i) There is an inconsistency in the stated size of Class III buffers. Page 5-40 uses a 25-foot buffer on either side of the stream, whereas page 5-2 states a no-harvest zone within 10 feet of all Class I, II, and III streams, and page 5-4 indicates no inner or middle AMZ Band and a 25-foot AMZ for Class IIIs on slopes <30% and 50 feet on slopes >30%. (ii)There also needs to be some consideration of buffers and equipment exclusions in areas up-swale from the top of the designated Class III. (iii) Regarding the watershed analysis, page 29 of the Management Plan states that intensive field watershed analysis will be completed on all 303d listed watersheds (70% of ownership) by the end of 2001. We find little reference to the result of this analysis in the documents that we received.	E. (i) MRC corrected the inconsistency pointed out. (ii) The conservation measures for soil pipes and TSUs cover these concerns. (iii) MRC has included the requested data as well as the watershed analysis documents.
F. The information developed from these analyses would have been useful to the Science Advisors. As mentioned above, the HCP contains numerous methods for data collection on small-scale attributes of hill slopes and rivers. This is the conventional approach contained within "watershed analysis" which forms the basis of MRC's approach. The problem with relying solely on a watershed analysis (WFPB 1997) is that it has somewhat failed in its applications across the region. From all of the various small-scale data on substrate sizes, pools, logs, fine sediment, bank erosion, etc., it is hard to put humpty dumpty (i.e., the ecosystem) back together again. Nevertheless, this is the conventional approach and MRC should not be faulted for incorporating it into their plan. However, if they conducted a review of the scientific merits of certain types of analyses (i.e., an epistemological analysis of the various watershed disciplines—see Benda et al. 2002) this limitation might become more apparent and could motivate some larger-scale analysis of landscape controls on riverine ecosystems (see response to Question 1 above) in addition to providing further defensibility regarding recognition of the scientific limitations of any HCP/NCCP. Additional data gathering on terrestrial ecological processes is also needed. Systematic study of fire history would provide important information necessary for the development of strategies for the maintenance of some plant communities. No mention is made of any collection or use of climatic data. Incorporating the existing network of relevant weather stations and adding new stations if needed could provide useful information to better understand future fluctuations in species population levels as well as patterns of forest growth.	F. Collecting fire and climatic data would be optimal; however, MRC has limited resources and has chosen to use the resources where there are more pressing needs. For this reason, we did not include outcomes and assessments from the 2008 Mendocino Lightning Complex fires in our HCP/NCCP. We do have 10 rain gages located throughout our property; however, the data from these gages is being collected independent of the HCP/NCCP.

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8. Is there a body of scientific information sufficient to provide a foundation for conservation planning?	
A. Components with reasonably complete information include large woody debris recruitment processes, mass wasting and erosion processes, road inventory data, mapping of the different stream classes, and the amounts and distribution of particular habitat types including mature and old-growth coniferous forests, deciduous forests, and riparian communities. However, there appears to be considerable uncertainty regarding the distribution and amounts of Type II old growth.	A. MRC cannot easily define Type II old growth from aerial photos; positive identification requires field visits. When foresters encounter these stands for the first time, their locations are recorded. About 20 years into the HCP/NCCP, MRC will have a clearer picture of the amount of Type II stands on our covered lands as we make harvest decisions on all available stands.
B. These stands could be more abundant on the ownership than recognized, and could be important for many species. Unless it appears in other portions of the document that we did not have access to, there seem to be large information gaps regarding the presence, amounts, and distribution of unique habitat types, including near coastal communities (coastal prairie, coastal scrub), bogs, fens, wetlands, vernal pool, major rock outcrops, and chaparral plant communities.	B. MRC conserves all Type II stands and uses silviculture to enhance old-growth qualities of a stand. The HCP/NCCP does not cover coastal prairie and coastal scrub, both of which are very limited on MRC land. MRC does provide specific conservation measures for wet features (bogs, fens, wetlands, and vernal pools); When they occur, MRC maps them and records them in our GIS database. MRC has also recorded the few major rock outcrops in the plan area. Chaparral, as a climax community (not a brushy successional stage in the life of a forest) does not occur in the plan area.
C. From a species perspective, sufficient survey information and presence/absence data appears to be available for the northern spotted owl and foothill yellow-legged frog. As recognized in the plan, more information on the presence, distribution and habitat use of the Point Arena mountain beaver, red-legged frog, coastal tailed frog, and marbled murrelet needs to be collected. The distributions of the red-legged frog and coastal tailed frog are largely unknown	C. (i) During the development of the HCP/NCCP, MRC has collected additional data on the Point Arena mountain beaver; however, there are a very limited number of burrow systems on our land. We will continue to collect data as THPs are developed for an area. (ii) Since the science panel reviewed Draft 1, MRC has implemented presence surveys for red-legged frogs and coastal tailed frogs. (iii) We have chosen not to cover foothill yellow legged frogs. (iv) We realize that data needs to be collected on marbled murrelets; however, they are known to exist in a very limited portion of the plan area. We will complete surveys as we encounter potential habitat during THPs and assess the likelihood of marbled murrelets occurring at a site. Since 1994, ground detections of marbled murrelets generally have been limited to the Lower Alder Creek area. Ground surveys will be ongoing; we will focus radar surveys on following population trends in Lower Alder Creek.
D. (i) The plan needs to better define the species of rare plant that may be present in the unique communities that exist on the ownership and conduct surveys to describe their distribution, abundance, and habitat	D. (i) MRC will conduct surveys when there is a proposed disturbance to a site. Employing both large scale plant surveys and project specific surveys is financially unfeasible. (ii) For Draft 3, we have added discussions on

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associations. (ii) Regarding watershed processes, we believe sufficient scientific understanding exists for providing a general foundation for conservation planning. We recommend that MRC address several key issues, including scientific certainty/uncertainty over a range of scales, dynamics of landscapes (i.e., disturbance ecology); and large-scale sources of physical heterogeneity and biological productivity and diversity. (iii) Other gaps in information involve insufficient knowledge of the fire history of the area and other components of the disturbance regime.	QA and QC. We have added a discussion on QA/QC to Chapter 13, *Monitoring and Adaptive Management.* (iii) For Draft 5, we have added information related to fire frequency and disturbance regime, as well as information on the Mendocino Lightning Complex of 2008, including fire intensity, acres burned, and number of fires.
9. *Are there other data sources or articles pertaining to the biological resources of the plan area that MRC should consider during planning and analysis?*	
We suggest several additional data sources, including information on the experimental research in Caspar Creek (Jackson Demonstration State Forest) and work published by the Redwood Sciences Lab and the Pacific Southwest Research Station. The HCP/NCCP needs to make better use of existing technology to map the presence, distribution, and abundance of the community types present on the ownership. In addition, literature pertaining to the survey methodologies for particular species needs to better referenced. Appropriate technology for mapping vegetation includes low-elevation aerial photography and Landsat imagery. It might be useful to examine the Wieslander (1935) vegetation maps to determine the potential locations of unique habitats and plant communities.	These are just a few of the additional sources MRC used for Draft 5 (see HCP/NCCP References for full details): ▪ Cafferata, P. H., and T. E. Spittler. 1998. Logging impacts of the 1970s vs. the 1990s in the Caspar Creek watershed. ▪ CDFG (California Department of Fish and Game). 1996c. 1996 Wildlife monitoring on Jackson Demonstration State Forest. ▪ Lisle, T. E., and R. E. Eads. 1991. Methods to measure sedimentation of spawning gravels. ▪ Lisle, T. E., and S. Hilton. 1991. Fine sediment in pools: an index of how sediment is affecting a stream channel. ▪ Welsh, H. H., Jr., and A. J. Lind. 1991. The structure of the herpetofaunal assemblage in the Douglas-fir/hardwood forests of northwestern California and southwestern Oregon. ▪ Welsh, H. H., Jr., A. J. Lind, L. M. Ollivier, and D. L. Waters. 1992. Habitat associations of the southern Olympic salamander *Rhyacotriton variegatus* in northwestern California. ▪ Welsh, H. H., Jr., A. J. Lind, L. M. Ollivier, and D. L. Waters. 1993. A hierarchical analysis of the habitat associations of the coastal tailed frog (*Ascaphus truei*) in the mixed coniferous/hardwood forests of northwestern California. ▪ Zielinski, William J., Kucera, Thomas, E., Barrett, Reginald, H. 1995a. Current distribution of the fisher, Martes pennanti, in California. ▪ Aerial photography, going back to the 1960s, stored at MRC. ▪ Published photos showing forest conditions back to the early 1900s. ▪ General Land Office (GLO) maps describing forest conditions in the 1800s.

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10. What gaps in existing information create the greatest uncertainties for planning, analyzing, managing, and monitoring conservation strategies in this setting? This question is largely addressed in our response to Question 9.	
11. What are the most effective methods for addressing these information gaps? The most effective methods for addressing information gaps in the distribution and amounts of certain plant communities (outlined in our response to Question 9) would be the uses of technology such as low-elevation aerial photography and Landsat imagery across the ownership. Effective methods for addressing the information gaps in the distribution and abundance of particular species (see responses to Questions 2 and 10) would be the planning and implementation of survey protocols already available in the literature for these species. We recommend a change in the underlying approach to field studies, including rejecting the primacy of the "watershed analysis" approach to the study of watersheds and focusing on broader-scale processes.	Refer to the responses in #2 and #9, above. MRC decided to stay with watershed analysis rather than start a new process and possibly preclude data already recorded. Watershed analysis addresses the geologic variability within our major watersheds. Landscape planning directs our forest operations across the plan area. Both in combination will model habitat characteristics for the entire plan area over an 80-year horizon, without downplaying location variations.
12. Are habitat suitability models or other models recommended for predicting species ranges where distribution data is sparse? Spatially explicit habitat-suitability models developed with the use of geographic information systems are proving very useful in conservation planning, especially for wide-ranging animals. These models can be based either on empirical data or on natural-history information from the technical literature or expert opinion. Because the development of spatially explicit habitat-suitability models is time-consuming, we would not expect new models to be developed and validated by MRC for the HCP/NCCP. However, we strongly recommend that MRC search the literature to find models for sensitive animal species (e.g., Pacific fisher) that are known to occur or may occur in the region, and apply them to the planning area.	MRC searched the scientific literature for applicable models. We investigated the use of two specific models for northern spotted owls (Zabel et al. 2003) and fisher (Freel 1991). Unfortunately, applying these models in the plan proved difficult. Research for the owl model (Zabel et al. 2003) was conducted in a different bioregion, where nesting characteristics differed from those in the redwood region. Likewise, the fisher model was built for USFWS and does not use the same parameter scale that MRC uses. In the USFWS model, for example, the minimum stand size for fisher is 60 acres; very few of MRC stands are that large. Moreover, our use of uneven-aged silviculture makes it difficult to apply models built around even-aged techniques.
13. Are there physical process models recommended for predicting relationships between physical and biological communities? There is a paucity of physical models that predict relationships between physical watershed conditions and in-stream biological communities, and a distinct lack of models for predicting channel, floodplain, and valley morphology given inputs of water,	

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sediment, and wood. We recommend an epistemological analysis of what is known and not known about watershed processes.	
14. *If models are used, what standards for formatting, creating parameters, testing, or monitoring can you recommend?*	
The only (physical) model described in the Plan is SHALSTAB, which is used for predicting locations and relative likelihood of shallow land sliding in steep and convergent zones of hill slopes. SHALSTAB predictions need to be tested using landslide inventories over decades. We were unable to find sufficient details to determine how the predicted landslide risk was generated. Regarding models of surface erosion, it is stated, "surface erosion estimates will be developed by use of a surface erosion model." Unfortunately, there is no description of that model. With respect to long-term channel monitoring, it is useful to select appropriate monitoring periods based on the timing of geomorphically significant events (large storms, wet years, etc.) rather than on pre-selected years.	MRC has described the surface erosion model in Appendix G, *Watershed Analysis: Background and Methods.* We will examine habitat change due to stochastic events in the focus watershed studies.
15. *What basic tenets of landscape management are pertinent to conservation planning in this area and how should these tenets be translated into measurable standards and guidelines for landscape management design?*	
A. By appealing to well-accepted planning principles, decisions can be reasonably defensible despite limited data. The conservation planning principles developed by the Scientific Review Panel (SRP) for the NCCP program are: 1. Conserve target species throughout the planning area. 2. Opt for larger reserves. 3. Keep reserve areas close to one another. 4. Keep habitat contiguous. 5. Link reserves via corridors. 6. Keep reserves diverse. 7. Protect reserves from encroachment. 8. Maintain natural processes. (An 8th principle, well supported in the ecological literature, was added for the Southern Orange County NCCP.)	A. MRC will conserve covered species throughout the plan area. We have chosen not to follow the reserve philosophy of other NCCPs, since we are not permanently eliminating any habitat. MRC believes that our management approach is preferable to a standard reserve that, in effect, is created to mitigate impacts from development. Our reserves are diverse, including pygmy, oak woodland, Type I and II old growth, riparian areas, and easements. Our HCP/NCCP allows for sustainable forest management that includes necessary maintenance and restoration.
B. Because the MRC HCP/NCCP is based more on maintaining the suitability of the landscape matrix ("the working forest") rather than a network of reserves to accomplish its conservation goals, the SRP planning principles (i.e., not including #8) are	B. Implementing a prescribed fire plan is problematic: 1. There is potential liability for broadcast burns, since a large portion of the plan area is near residential areas. 2. Using fire in multi-aged timber management may

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generally less relevant than, for instance, in coastal southern California, where the NCCP program was initiated. Nevertheless, the principles still apply, albeit in modified form. Principle #8 is one we address most extensively in this report. Maintaining (or mimicking) natural processes, such as fire and hydrologic regimes within a historic range of variability, is fundamental to sustaining biodiversity across the ownership.	retard stands by burning the advanced regeneration. As part of our conservation strategies for riparian communities, closed cone forests, oak woodlands, and Type I and II old growth, MRC will consult with the wildlife agencies on any restorative burns in the plan area.
16. *What theoretical or empirical support is available for designing necessary and sufficient biological core area, linkages, wildlife/fish movement corridors or other aspects of design?* See our answer to #17.	
17. *Are explicit reserves or buffers recommended and is existing data sufficient for their design and implementation?* A. There is abundant theoretical and empirical support for the efficacy of well-designed reserves in maintaining biodiversity. Reserves are especially important for species and other resources sensitive to human exploitation, persecution, or harassment. The role of reserves becomes somewhat less critical as the surrounding landscape matrix becomes more suitable for the native species. However, there are still species so sensitive to human activities (e.g., even to the presence of recreationists) that refugia secure from human access are recommended. Specific reserves have been designated in some cases (e.g., old-growth redwood) on MRC land and should be designated in other cases for the protection for listed plant species and plant communities of special interest (e.g., serpentine balds). It would be also appropriate to select and set aside future "old growth" areas for each of the natural plant communities in the conservation planning area to serve as refugia for species requiring these habitats.	A. MRC has designated specific conservation measures for pygmy forest and oak woodlands, although these natural communities are very limited on our land. We encourage future old growth indirectly through our conservation measures for watercourses as well as our management of Type II stands, core areas for northern spotted owls, and habitat recruitment stands (MHRS) for marbled murrelets.
B. For salmon and other anadromous species, the requirement of stream habitat connectivity is critical. Explicit dimensions for riparian buffers and the types of harvest activities that can occur within them are outlined in the HCP/NCCP. The size of the buffers in the plan is substantially smaller than that considered adequate to protect anadromous habitat in the Northwest Forest Plan. Insufficient information exists to know how these particular widths and the management activities prescribed in	B. MRC has included our rationale for salmon in Chapter 10, *Conservation Measures for Fish and Wildlife*, and for wetlands, bogs, and seeps in Chapter 8, *Conservation Measures for Aquatic Habitat*. As mentioned earlier, we have specific conservation measures for unique habitats, such as pygmy forest, and potential or occupied marbled murrelet trees. Also, the science panel concluded that the AMZ band widths appear sufficient for Class I, Large Class II, and Small Class II watercourses (see Science Panel comment #25C).

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each band within the buffers will affect fish and other riparian and stream-related species and in-stream processes. This is also true for the buffers specified for wetlands, bogs, seeps, and other unique communities. Reserves and buffers should also be established in the case of known nesting trees used by marbled murrelets. Buffer designs for the Point Arena mountain beaver appear to be a best-guess approach due to a lack of specific information. A substantial number of studies have been completed on the northern spotted owl. Since the plan will collect demographic information on a large sample of pairs each year over time, the effects of the owl reserves designed to protect breeding pairs can be assessed.	
18. *How can MRC arrive at conservation strategies which are functional across multiple environmental gradients (e.g. topographic, climatic, and vegetational considerations)?*	
By using a habitat-based approach to conservation planning, conservation strategies can be derived that are functional across multiple environmental gradients. The protection of plant communities and their natural variation (due to position in relation to the coast, topographic, climatic, and elevation factors) can be provided by accurately mapping and documenting the distribution and abundance of these communities. Since protection is designed to occur across the MRC landscape, the natural variation of these communities associated with environmental factors will likely be incorporated into the conservation strategy. For the rare plant communities that may make up a small proportion of the MRC landscape, accurate mapping of these communities appears to be needed.	MRC maps different natural communities (pygmy forest, oak woodlands) by community type and composition; we have also begun recording rare plant occurrences. As other sensitive habitats are encountered (old growth, wet areas, rocky outcrops) we map these as well and record their location and characteristics in our database.
19. *Does existing information reveal specific geographic locations or landscape positions that are critical for landscape design (e.g. biodiversity "hotspots", crucial linkages, rare microhabitats, refugia, genetically unique population areas)? If not, how should that information be collected and inventoried?*	
Hotspots and other areas of concentrated biodiversity value can only be identified on the basis of accurate map-based (e.g., GIS) information. The maps we were provided did not contain any biological information; hence, they are inadequate for the identification of hotspots. Maps are essential for the identification of biodiversity hotspots, crucial linkages, rare microhabitats, refugia, and genetically	MRC has chosen to rely on ground field identification of "hotspots:" and areas of biodiversity value during THP preparation. At that time, we identify, for example, concentrations of snags and wildlife trees, as well as rocky outcrops and wet areas. MRC has mapped natural communities in Appendix B, *HCP/NCCP Atlas* (MAPS 8A-C).

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unique populations. We recommend that the plant communities on the ownership be mapped and their distribution and amounts described, including those rare plant communities that make up a small proportion of the MRC landscape. Then, a more detailed assessment of potential biodiversity hotspots, rare microhabitats, and refugia could be made. From an aquatic perspective, the term "biological hotspots" refers to habitat-forming processes and habitat development that is non-uniformly distributed across the landscape at scales larger than simply pools, riffles, and logjams. Hotspots might include unconstrained valley segments, canyon-floodplain transitions, upstream or downstream of large landslides, and near certain tributary confluences. Additionally, watershed disturbances can contribute to the formation and maintenance of biological hotspots preferentially at those locations.	MRC acknowledges that large-scale disturbances (anthropogenic and natural) often lead to the formation of habitats that are not uniformly distributed throughout a landscape. We monitor these habitats in conjunction with other programs (such as THPs and owl surveys) and protect them with aquatic or terrestrial conservation measures. The stochastic nature of these habitat-forming processes makes conservation planning difficult. MRC applies protections when habitat is identified and assessed.
20. *How can the plan address unique areas that are significant in a broader regional context?*	
The biological and aquatic-habitat hotspots referred to above qualify as areas significant in a broader regional context. It is important to determine whether the MRC property contains unique areas or areas that are common throughout the region. This requires an analysis that considers a geographic area substantially beyond the boundaries of the MRC ownership. The concept of regional context should eventually include assessing the demographic contributions of populations of rare or sensitive species on MRC land to regional populations or metapopulations. Species requiring such regional-scale analysis include the northern spotted owl, marbled murrelet, red-legged frog, foothill yellow-legged frog, coastal tailed frog, Pacific fisher and other species covered by the plan or suggested to be covered.	Chapter 3, *Environment and Habitat*, does address the plan area within a regional context. In addition, the conservation measures and collected data for northern spotted owls does take into consideration "off property" owl territories and "nearest neighbor distances."
21. *How can long-term processes or cycles (e.g., population dynamics, disturbance cycles, ecological migration) be effectively addressed?*	
A. Long-term processes are difficult to predict and to plan for, yet intelligent consideration of their roles in the ecosystem is probably crucial to the long-term success of a conservation plan. A longer-term perspective in the HCP/NCCP, even if mostly qualitative, would aid in placing bounds on landscape and riverscape dynamics over multiple decades. A 40-year record of rainfall, streamflow, and sediment transport is available from Caspar	A. Chapter 14, Changed and Unforeseen Circumstances, examines the impact of changing events upon the landscape, including "unprecedented events."

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Creek. Studies at Caspar Creek have produced a good understanding of the effect of logging on hydrologic processes in second-growth coastal redwood and fir forests. MRC has used the research from Caspar Creek to develop much of the discussion of hydrologic processes presented in the HCP/NCCP. Still, a 40-year climate and hydrologic record, though rare, represents a short window into variability that can be expected during the life of the HCP/NCCP. Fortunately, research and monitoring is expected to continue at Caspar Creek for the duration of the HCP/NCCP, which will provide a context to responses of the MRC landscape to climatic and hydrologic stresses. The plan should assume that unprecedented events are likely to occur.	
B. From the perspective of maintaining terrestrial ecological diversity, perhaps the best strategy for dealing with the long-term processes and cycles is to maintain a diverse landscape in terms of successional stages of each of the natural vegetation types, within a historic or natural range of variability.	B. MRC uses various silvicultures from selective harvest to variable retention and high retention harvests.
C. Fire and floods play a major role in the ecology of the redwood region. Most of the listed plant species in the region are in the herbaceous understory and many are dependent on disturbance events.	C. Our ability to re-introduce fire is limited, as we indicated in our response to Question 15. We have planned for routine floods in the conservation measures and for large floods in Chapter 14, *Changed and Unforeseen Circumstances*.
D. Logging operations do not mimic natural disturbances such as fire precisely and, in some cases create habitat for invasive exotics which outcompete native early-successional species.	D. Section 9.7 of the HCP/NCCP addresses goals, objectives, and conservation measures for invasive exotics.
E. Also needed is a robust adaptive management strategy that is flexible and contains strong feedback loops to managers.	E. Chapter 13, *Monitoring and Adaptive Management*, does provide for management feedback, while balancing our own need for economic certainty with the need of the wildlife agencies to assess impacts. Major modifications to the HCP/NCCP will adhere to a standard process agreed upon by the wildlife agencies.
22. *How could climatic variation affect this landscape ecosystem and the target species? How can these effects be addressed (e.g., plant populations, higher intensity weather events, frequency of events, etc)?*	
Watershed-scale stochastic simulation models could be constructed and the climate probability	MRC has a redwood clonal program, through which we locate and reproduce redwood cultivars adapted to a variety

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distributions could be altered to reflect the predictions coming from global climate models. Several models suggest this area of California will most likely experience increased temperature and decreased precipitation. This change could have a major impact on the redwood forest. One strategy to address this issue would be to begin now to identify redwood trees growing on the drier sites on the property and initiate a program of seed orchards or cloning to provide a supply of these more drought-adapted genotypes for replanting in the more eastern stands. A combination of stump sprouts from existing trees and planted seedlings from drought-adapted genotypes might provide a means of maintaining the redwood habitat in areas further from the coast. Very little is known about the biology and ecology of many of the listed plant species, so it is not possible to make suggestion for management of these species in relation to climate change. The higher intensity of weather events and the frequency of these events have already been incorporated into the redesign of stream crossing and the replacement of culverts. A monitoring of high-intensity weather events could provide a better database for the prediction of future of stream discharge	of climatic conditions. We plant these climate-adapted redwoods in areas where the parent tree thrived to determine the effect of climate change. Chapter 14 describes climate-change strategies for other species.
23. How should the plan address exotic species?	
A. At a minimum, those exotic species that may affect the viability of the species covered by the plan should be addressed. Changes in the presence and distribution of these exotic species over time could indicate potential problems. Exotic animal species also pose a threat to native biodiversity. An aggressive program of the control of exotic predators, such as bullfrogs, needs to be developed as a part of the plan. Populations of some native corvids (crows, ravens, Steller's jay) have increased substantially over the last few decades due to human urbanization (e.g., campground development) and other factors.	A. The HCP/NCCP proposes controls for bull frogs (C§10.2.2.3-6 and C§10.2.2.3-7) and barred owls (section 10.3.1.2.5).
B. These increases have likely had a large negative impact on marbled murrelet nesting success in some areas. The cost to collect information on problematic exotics should be minimal if the data are collected simultaneously with the monitoring effort for the species covered by the plan.	B. MRC will limit human activity in Lower Alder Creek.
24. What monitoring actions are necessary and sufficient to evaluate the plan's effectiveness in meeting the conservation objectives?	

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MRC's monitoring and adaptive management strategy is one of the most comprehensive and detailed we have seen in a NCCP/ HCP. To make the monitoring program even more defensible, the strategy should outline the specific kinds of monitoring that will take place, clearly state what the objectives are for each kind of monitoring, discuss the assumptions of the monitoring plan, define what assumptions will be tested over time using the adaptive management approach, clearly state definitions of terms to avoid confusion, explain how the data will be collected, explain the specific sampling and survey methods used for the monitoring and adaptive feed-back mechanisms, define clearly what thresholds or relative changes in parameters will be used to trigger changes in management direction, and outline the interactions that will take place with the agencies over time.	MRC revised Chapter 13, *Monitoring and Adaptive Management*, to include some of these recommendations, as well as recommendations of the wildlife agencies.
25. *Are the management actions proposed sufficient to meet the plan's conservation objectives?*	
A. The proposed management actions are not adequate for the sensitive plants and plant communities. In the MRC presentation to our team, a plan for conversion of a portion of the broadleaf upland forest to conifer forest was discussed. This plan should be included in chapter 5, so that it can be critically reviewed. Conversion to conifer forest could endanger some populations of sensitive species. More specific information is needed on the current distribution of the plant species in order to evaluate the proposed management actions. Prescribed fire may be a management action necessary to maintain some of the areas of chaparral, pygmy forest, and bishop pine forest.	A. In subsequent drafts, MRC developed an entire chapter devoted to rare plants—Chapter 11, *Conservation Measures for Rare Plants*. We propose to restore the conifer-to-hardwood ratio in upland broad leaved communities to its proportionality prior to forest management. In addition, we will not attempt to convert forest land unsuitable for growing conifers or land which could potentially grow conifers, as indicated in Chapter 9, *Conservation Measures for Terrestrial Habitat.* Our plan allows MRC to work with the wildlife agencies to institute prescribed burning for maintenance of some natural communities. In an effort to re-construct earlier forest conditions, MRC researched aerial photos stored in our vault, published photos, GLO records, and anecdotes from individuals alive in the early 20th century. Refer to our response to Question 9. We also examined pre-European evidence, such as stumps and old trails. Visits to nearby preserves, like Hendy Woods, Montgomery Woods, Armstrong Woods, and Mailliard Reserve, reinforced our photographic and written evidence. From all this data, we concluded that currently there is a greater hardwood-to-conifer ratio in our plan area than existed before European intervention. Tanoak, in particular, has proliferated. We cannot determine the exact composition of these early forests since slight variations in site conditions can favor one species over another. Consequently, we have built into our conservation measures safeguards to ensure that hardwoods will remain throughout the plan area.

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B. One aspect of the proposed management actions that concerns us is the potential impact of group selection as a silvicultural technique on the extent and distribution of "edge" and "interior" habitats in the north coast forest type. If a two-acre "checkerboard" of group selection openings develops over the forest landscape as a result of the application of group selection, forest-interior habitats may be reduced to a non-functional size for some interior species.	B. Group selection is only one of our silvicultural choices. In such cases, prescribed groups are rarely larger than 2 acres. Conservation measures for AMZs, northern spotted owls, marbled murrelets, and TSUs, for example, will retain large forest blocks that provide interior habitat. This will prevent a "checkerboard pattern" across the forest landscape in which small stands are adjacent to large openings.
C. Regarding aquatic resources, although the AMZ band widths appear sufficient for Class I, Large Class II, and Small Class II watercourses, the AMZ widths proposed for Class III watercourses appear minimal and may not be effective in reaching their objectives.	C. In subsequent drafts of the HCP/NCCP, MRC and the wildlife agencies bolstered the effectiveness of the aquatic conservation measures, particularly with regard to seeps, springs, soil pipes, and harvest within Class III AMZ.
D. The conservation measures for the marbled murrelet are problematic and probably insufficient. Similarly, the management objectives for protection of northern spotted owl pairs may not sustain the population.	D. MRC and the wildlife agencies do not believe the protection measures proposed in the current draft are problematic or insufficient for either the northern spotted owl or the marbled murrelet. The conservation measures for marbled murrelets and northern spotted owls have changed since the Science Panel reviewed early drafts of our HCP/NCCP. For example, the draft reviewed by the Science Panel did not include barred owl measures.
26. *Does the HCP/NCCP appropriately provide a framework for adaptive management within the plan area? What specific management principles or hypotheses are most important to test in the adaptive management program?*	
A. In order to test specific management principles or hypotheses with regard to sensitive plant distributions and the impacts of invasive exotics, baseline data need to be collected as a basis for comparison with management treatments applied in an adaptive management program.	A. Collection of baseline data on plants is cost prohibitive. MRC has chosen to survey for rare plants on a project basis. If we identify rare plant occurrences, we will implement our rare plant conservation measures, which include provisions for "invasive exotics."
B. Otherwise, we are impressed with the framework built for adaptive management. The timeline and details provided are well thought out. Among the most important hypotheses to test in the adaptive management program are those that relate to changes in the reproductive rate of species and/or population sizes/densities. A general concern with adaptive management relates to the long-term institutional will to carry it out.	B. As a requirement of the HCP/NCCP, MRC must initiate a monitoring and adaptive management program and persist in its execution.

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27. Which species, habitat, and ecosystem indicators can monitor species viability and other ecological characteristics important to the NCCP? Are the proposed species, habitat, and ecosystem indicators adequate to meet this objective? If not, what other species, habitat and ecosystem indicators should be considered?	
A greater range of indicators of the structure, function, and composition of the ecosystems on MRC property should be considered. The animal species chosen are appropriate (albeit possibly incomplete) and the protocols for monitoring their habitat conditions are well justified (see our response to Questions 2 and 24 for additional species and indicators to consider). A similar program needs to be developed for the plants and plant communities. It would be useful to monitor climatic condition and the impacts of wild and prescribed fire on the various plant communities and habitats. Landscape-level indicators should also be added.	In the current draft of the HCP/NCCP, Chapter 13, *Monitoring and Adaptive Management*, contains sections on *Monitoring Rare Plants* and *Monitoring Natural Communities*.
28. What are the indicators that should trigger a change in management strategy?	
Indicators (or indications) that should be considered include the collapse of a population of a rare or listed species; a significant change in climate that appears to be changing the vegetative mosaic; major invasion of exotic species; emergence of new plant pathogens and/or insects; extensive stand-replacing wildfire; and collapse in the lumber market that could essentially terminate timber harvesting for 10 years or more. As noted in our response to Question 26, a change in a particular demographic parameter for a sensitive species would be an obvious indicator for triggering a change in a management. For ecological processes, those indicators that are most closely tied to the life history and viability of species covered in the HCP would be the most appropriate to monitor and trigger a change in management strategy (e.g., stream temperatures for salmon).	MRC has proposed contingency strategies for northern spotted owls should their numbers fall below objectives. Chapter 14, Changed and Unforeseen Circumstances, address significant and unexpected changes in climate, as well as invasion of exotic species, emergence of new pathogens, stand-replacing fires, and a collapse of the lumber market. MRC will monitor whether harvests fall (a) below 37% of average allowable harvest for the year or (b) below 75% of average allowable harvest for the year (Tables 13-7 and 13-8).
29. Does the HCP/NCCP have sufficient scientific information to identify biological and physical variability (and/or central tendencies or mean values) for monitoring species or ecosystem processes?	
The limitations of the watershed analysis approach should be recognized. We encourage MRC to pursue questions and answers pertaining to spatial heterogeneity and temporal variability over broad	Because of limited monitoring resources, MRC does not propose to ask or answer these specific questions. However, through watershed analysis and tracking of larger scale disturbances (mainly outside of the HCP/NCCP and within

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spatial and temporal scales. The plan has done a reasonably good job of reviewing the known scientific information on the species and communities (with exceptions regarding plants, as noted). The sampling intensity for most species and processes (number of sites, streams, and/or watersheds) is impressive, as is the planned frequency of data collection.	our GIS), MRC may be able to make rough "cause and effect" correlations in the future.
30. *Are the proposed monitoring protocols sufficient to detect changes in species populations or processes?*	
A. In general, the proposed monitoring protocols are sufficient to detect changes in sensitive animal populations (there are no protocols described for plant inventory work or for monitoring plants.	A. Chapter 11, *Conservation Measures for Rare Plants*, and Chapter 13, *Monitoring and Adaptive Management*, propose protocols to detect changes in sensitive animal and plant populations.
B. The monitoring protocols are perhaps minimally adequate to detect changes in processes. The amount of change detected before a management strategy is modified may need to be re-examined and clarified. Regarding riparian and stream monitoring procedures, it is not clear how the described measurements will be used and how they are related to changes in species populations or hydrologic processes. Since most measurements are to be made over several decades, with intervening years having no measurements, consistency of procedure is a serious challenge. For a number of the variables being measured, there is a lengthy lag between cause and effect.	B. Focus watersheds will have more frequent annual monitoring. MRC will use the lessons learned from this monitoring in other watersheds. MRC will develop, in consultation with the wildlife agencies, a QA/QC program that will ensure consistency of data, even if methods changes. As in all our programs, we are balancing the need for monitoring and adaptive management against our ability to operate as a sustainable business. Operation of a sustainable business is what makes our various conservation programs possible. For Draft 5, MRC and the agencies have agreed to increase the long-term channel monitoring reaches from 40 to 60 and have shortened the time lag between monitoring.
31. *Does the science panel have any additional advice?*	
Despite our criticisms of portions of the draft HCP/NCCP, the plan has many strengths and good ideas. Given the overarching objectives of limiting human disturbance in the area covered by the plan and steadily increasing the amount of old forest over time, there is little doubt that many aspects of terrestrial and riverine ecosystems will be on upward trajectories.	