Chapter 7

Planning for Conservation

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7 PLANNING FOR CONSERVATION

7.1 Introduction

In part, Chapter 7 is an overview of the planning resources that underpin the goals, objectives, and conservation measures in Chapters 8 through 11. It is also a bit of a catchall for other relevant but diverse topics surrounding the MRC planning process. Sub-sections address the MRC management plan and its relationship to the HCP/NCCP; management tools such as our inventory database, landscape model, wildlife tree database, and GIS; feedback on MRC conservation proposals from the wildlife agencies, a science panel, and the general public; conservation prototypes and how they relate to the MRC conservation plan; organizational structures, as well as pacing and funding for HCP/NCCP implementation.

7.2 General Management Plan

MRC produced our first management plan in August 2000 to articulate corporate purpose, policies, plans, and goals. Such a plan was also one of the basic requirements for certification by the Forest Stewardship Council (FSC), a recognition that MRC sought virtually from our inception (section 2.5.3). Included in its 56-pages are specific strategies to restore MRC forests and inventory targets for that restoration. The management plan cites aquatic strategies for large woody debris; stream temperature; canopy and shade; coarse and fine sediment; water flow; nutrients; and barriers to migration. Likewise there are terrestrial strategies for snags; downed logs; mature conifer forest; old growth trees; hardwoods; unique habitats; and habitat connectivity.

While the management plan only summarizes, it does anticipate many of the conservation issues tackled in detail in over 1500 pages of our HCP/NCCP. Still, the management plan does focus on all MRC forest lands, not simply the lands covered by the HCP/NCCP, and concerns itself with business goals as well as forest management. There are provisions in the management plan which are not in the HCP/NCCP; some of these provisions include policies on public access, fire prevention, as well as community and employee relations. Over the course of a decade, many things change. In July 2010, MRC updated our management plan[1] to reflect how we ourselves have changed and grown as a company. Once the wildlife agencies approve our HCP/NCCP, the management plan will make direct reference to it as a core document for long-term MRC operations.

7.3 Planning Tools

Table 7-1 shows planning tools that MRC used to develop our HCP/NCCP or that will play a role in HCP/NCCP implementation. We use the word *tool* in the broadest sense, i.e., something (data, software, process, resource, evaluation) that facilitates the possibility or effectiveness of an action. Some of the individual tools are already integrated into an existing process; for example, data collected from watershed analysis and road inventory become part of our GIS database. Other tools, like focus watersheds, are in the early stages of planning and design themselves and will develop concurrently with HCP/NCCP implementation. Still others, such as additional conservation easements, may or may not be exercised during the 80-year course of our HCP/NCCP. In the subsections that follow, we expand discussion on each of these tools.

[1] Available at http://www.mrc.com/Reports-ManagementPlan.aspx (accessed 02/14/2011)

Table 7-1 Planning and Analysis Tools for the HCP/NCCP

Planning and Analysis Tools for the HCP/NCCP			
Planning Tool	**General Purpose**	**Potential Problems Addressed**	**Use in HCP/NCCP Design or Implementation**
Application Software			
Forest Inventory Database	• Store data on stands, e.g., acres, vegetation types, unique features, and harvest timing. • Capture information on stand structures that equate to habitat for covered species. • Classify stands by vegetation type, e.g., old growth and pygmy forest. • Provide input data for the landscape model.	• Identify areas which may be below habitat thresholds for covered species.	• Model current northern spotted owl habitat. • Estimate old growth trees, snags, and LWD in the plan area, as well as riparian conditions. • Assess spotted owl habitat by inventory block and by PTHP to ensure compliance with HCP/NCCP objectives.
Landscape Model	• Forecast harvests, tree growth, and wildlife habitat with the growth simulator, CRYPTOS. • Provide data to develop conservation measures for habitat and natural communities in the plan area.	• Identify stands that are near or below target thresholds for spotted owl habitat.	• Assess stands available for harvest based on ▫ Amount of available habitat for covered species. ▫ Amount of timber in stand. ▫ Types of trees available for harvest. ▪ Predict future amount of available habitat for covered species.
California Wildlife Habitat Relationships (CWHR) Database[2]	• Store life history, geographic range, habitat relationships, and management information on 694 species of amphibians, reptiles, birds, and mammals in California. • Provide information from recognized professionals on California's wildlife, including to timber landowners and managers.	• Determine gaps in regional distribution of covered species and areas of low abundance.	• Corroborate information on distribution of covered species.

[2]Available at http://www.dfg.ca.gov/biogeodata/cwhr/ (accessed 02/14/2011)

Planning and Analysis Tools for the HCP/NCCP			
Planning Tool	**General Purpose**	**Potential Problems Addressed**	**Use in HCP/NCCP Design or Implementation**
Wildlife Tree Database	• Store information on trees important to covered species, especially northern spotted owls and marbled murrelets.	• Detect trends in wildlife and recruitment tree density.	• Ensure PTHPs comply with HCP/NCCP requirements for recruiting and retaining wildlife trees. • Provide compliance reporting data on an annual basis.
Geographic Information System (GIS)	• Create digital maps of the plan area, including locations of harvests, watercourses, roads, habitat areas, and covered species, as well as property boundaries of adjacent landowners.	• Identify ▫ Mass wasting areas. ▫ Habitat fragmentation due to roads. ▫ Occurrences of covered species.	• Ensure PTHPs comply with HCP/NCCP conservation measures for northern spotted owls, marbled murrelets, and Point Arena mountain beaver.
Road Network			
Road Inventory	• Provide information on road ▫ Location. ▫ Mileage. ▫ Condition. ▫ Status (e.g., decommissioned).	• Identify road problems. • Prioritize repairs.	• Re-inventory and reassess road work for volume of sediment targeted and controlled. • Set long-term targets for sediment control in order to prioritize work.
Watershed Analysis Modules			
Watershed Analysis	• Provide information on streams critical to aquatic and amphibian species. • Determine the need for LWD in streams. • Reduce sediment from roads and mass wasting. • Contribute to conservation measures for aquatic, wetland, and riparian habitat, e.g., protections for flood-prone zones, stream-bank stability, and equipment exclusion zones.	• Identify problems related to mass wasting, sediment input, LWD deficiencies, and road conditions.	• Assess and re-assess watershed conditions across the plan area.

Planning and Analysis Tools for the HCP/NCCP			
Planning Tool	**General Purpose**	**Potential Problems Addressed**	**Use in HCP/NCCP Design or Implementation**
Watershed Analysis—Module 1 Mass Wasting Inventory	• Provide information on mass wasting events and their potential or real impact on aquatic and amphibian species. • Contribute to conservation measures for sediment reduction.	• Identify potential for slope failure and sediment delivery to streams.	• Assess and re-assess mass wasting conditions across the plan area.
Watershed Analysis—Module 2 Surface and Point Source Erosion Inventory	• Provide information on surface source point erosion, as well as its potential or real impact on aquatic and amphibian species. • Improve and protect water quality and aquatic habitat.	• Identify ongoing and potential sediment delivery to streams, including road erosion hazards.	• Assess and re-assess surface point source erosion across the plan area.
Watershed Analysis—Module 3 Hydrology	• Analyze flow regimes to reduce impacts to aquatic species and habitat.	• Identify frequency and magnitude of floods that change flows, cause erosion, and transport sediment.	• Assess and re-assess flood and flow conditions which affect sediment transport and cause erosion across the plan area.
Watershed Analysis—Module 4 Riparian Function	• Assess ▫ Potential of streams to recruit LWD. ▫ Primary characteristics that forest harvest can impact, e.g., canopy, stream temperature, LWD, and sediment filtering.	• Identify deteriorating conditions in riparian areas.	• Assess and re-assess riparian conditions which affect sediment transport and cause erosion.
Watershed Analysis—Module 5 Stream Channel Condition	• Evaluate morphological conditions of stream channels. • Assess aquatic habitat quality.	• Identify stream channels which lack structural features important to salmonid habitat.	• Assess and re-assess stream channel conditions.

Planning and Analysis Tools for the HCP/NCCP			
Planning Tool	**General Purpose**	**Potential Problems Addressed**	**Use in HCP/NCCP Design or Implementation**
Watershed Analysis—Module 6 Fish Habitat Assessment	• Assess ▫ Major drainages to determine habitat quality for different life stages of salmonids. ▫ Salmonid vulnerability or response to changes in sediment, heat, or wood input.	• Identify changes to quality or structure of aquatic habitat.	• Assess and re-assess fish habitat conditions.
Watershed Analysis—Module 7 Amphibian Distribution	• Determine amphibian species present in Class II streams and other aquatic habitats (wetlands, wet meadows, seeps, springs, and ponds).	• Identify changes in amphibian distribution in response to land management, habitat degradation, or habitat improvement.	• Monitor distribution and abundance of covered amphibians to ▫ Ensure compliance with HCP/NCCP objectives. ▫ Determine effectiveness of HCP/NCCP conservation measures.
Watershed Analysis—Module 8 Synthesis	• Summarize information on sediment inputs, aquatic habitat, and water quality.	• Identify hill-slope hazards to aquatic resources.	• Assess and re-assess sediment inputs, aquatic habitat, and water quality.
Aquatic Habitat			
Long Term Channel Surveys	• Evaluate trends in LWD, shade, and sediment within Class I watercourses throughout the plan area.	• Identify reaches of watercourses which may be changing or unstable due to sediment loads or a lack of LWD.	• Evaluate the effectiveness of AMZ conservation measures and trends in habitat quality.
Stream Temperature Surveys	• Evaluate trends and temperatures annually throughout Class I and Class II watercourses within the plan area.	• Identify streams or reaches of streams where temperatures may threaten aquatic species.	• Evaluate the effectiveness of AMZ conservation measures.

Planning and Analysis Tools for the HCP/NCCP			
Planning Tool	**General Purpose**	**Potential Problems Addressed**	**Use in HCP/NCCP Design or Implementation**
Focus Watersheds	• Monitor specific watersheds to determine link between conservation measures and habitat or species response.	• Adjust, as needed, conservation measures to improve a negative or off-target response.	• Monitor effectiveness of HCP/NCCP conservation measures in meeting specific objectives. • Determine any need for adaptive management to adjust aquatic conservation measures.
Aquatic Species			
Fish Distribution and Abundance Surveys	• Evaluate distribution and abundance of salmonids throughout Class I streams in the plan area. • Monitor trends and evaluate the status of salmonids.	• Identify changes in fish distribution and abundance in response to land management, habitat degradation, or habitat improvement.	• Monitor distribution and abundance of covered salmonids to ▫ Ensure compliance with HCP/NCCP objectives. ▫ Determine effectiveness of HCP/NCCP conservation measures.
Monitoring and Adaptive Management			
Monitoring Programs	• Evaluate the effectiveness of HCP/NCCP conservation measures. • Adjust conservation measures to improve effectiveness.	• Assess whether HCP/NCCP conservation measures, followed to their full extent, provide the expected outcome. • Implement changes to conservation measures based on assessments. • Identify new and ongoing threats to covered species and their habitat.	• Implement contingency measures or adaptive management, if MRC does not meet HCP/NCCP objectives. • Address ongoing public and agency concerns about the HCP/NCCP conservation measures.
Other Resources			
Conservation Easements[3]	• Protect unique habitat in the plan area, e.g. old growth stands, oak woodlands, and pygmy forest. • Protect potential marbled murrelet habitat.	• Consider creating conservation easements to protect significant habitat in the plan area for aquatic and terrestrial species.	• Negotiate with the wildlife agencies on potential conservation easements.

[3] The Nature Conservancy defines a conservation easement as "a voluntary, legally binding agreement that limits certain types of uses or prevents development from taking place on a piece of property now and in the future, while protecting the property's ecological or open-space values." Refer to http://www.nature.org/ (accessed 12/16/2009). Prior to HCP/NCCP approval, MRC has conveyed the conservation easements of Comptche Hill to the Pacific Forest Trust; the Willow Creek Seed Orchard Tract and the Willow Creek Northern Tract to the Sonoma County Agricultural Preservation and Open Space (SCAPOS) District; as well as a scenic easement along Highway 128 adjacent to the Navarro River Redwoods State Park to Save the Redwoods League. These easements encompass a total of 314 ac preserved as forever wild. The easements are generally older, denser forests which will grow to late seral conditions over the term of the plan. The Navarro River Redwoods easement is connected to the Navarro River Redwoods State Park.

Planning and Analysis Tools for the HCP/NCCP			
Planning Tool	**General Purpose**	**Potential Problems Addressed**	**Use in HCP/NCCP Design or Implementation**
Science Panel Recommendations	• Assist with the identification of habitat protection measures.	• Identify threats to covered species and their habitat.	• Consult with science panel members, as warranted, on ongoing HCP/NCCP issues.
Agency and Public Review of HCP/NCCP	• Provide critical review of HCP/NCCP.	• Identify errors, shortcomings, and unaddressed issues in the HCP/NCCP and suggest alternative solutions.	• Refine and polish the HCP/NCCP based on the reviews of the wildlife agencies and participating residents of Mendocino County.

7.4 Planning at the Landscape Level

MRC is approaching solutions and recommendations for conservation not simply at the project level but at the landscape level. Obtaining solid baseline information about a large forested landscape can be a daunting task. In general, we face this challenge with computer software, including an inventory database, a landscape model, a wildlife tree database, and a geographical information system.

7.4.1 Inventory database

MRC divides the 213,244 ac of the plan area into 9 geographic units called inventory blocks. Inventory blocks are further sub-divided into planning watersheds that are between 3000 to 10,000 ac in size. A watershed analysis unit (WAU) is usually, but not always, contained within a single inventory block and includes one or more planning watersheds. MRC assesses management results at the inventory block, planning watershed, and WAU levels.

No matter what the higher level of assessment, the base unit of forest management is the stand. A stand is the smallest geographic unit in the plan area that is harvested, grown, and reported. Stand sizes range from less than 1 ac to 100 ac or more; generally upslope stands average 20 ac in size while stands in Aquatic Management Zones (AMZ) average 3 ac. Each stand can be harvested as a unit, with its own set of stewardship objectives. Stands must have similar vegetation types throughout. Using aerial photos, MRC assigns each stand a vegetation label. The vegetation label, or strata, is the basis for a sampling system used to acquire vegetation data. Plots are established in a stand and spaced uniformly as a grid (see Appendix U, section U.2, *Sampling Method*). For each plot, we record tree species, size, and age, as well as unique features, such as downed logs, snags, and woodrat nests.

All sampled data is input into a relational database that drives our landscape model, described in sub-section 7.4.2. This database is the source of other management reports, including HCP/NCCP reports. Requests for database information are in the form of *queries* or stylized questions. The flexibility of the *query language* allows MRC to tailor reports to the requests of the wildlife agencies. An agency, for example, might request a report, by planning watershed, on all upslope LWD that is greater than 16 in. dbh or a report, by basin, on all Class I and Class II AMZ acres.

Our inventory database contributes to the conservation of our natural communities and covered species by

- Sharpening our understanding of current conditions and habitat on our land.
- Providing input for computer software to model the impacts of proposed management strategies.

7.4.2 Landscape model

7.4.2.1 Growth simulation

At the core of our landscape planning is computer software to forecast harvests, tree growth, habitat acreage, and other factors important to management decision making. MRC uses a growth simulator based on CRYPTOS, a widely-used growth model in the redwood region. The model *grows* and *harvests* trees in computer simulations. Using information from the inventory database, the model simulates growth and harvest conditions given certain management criteria and constraints, such as management goals; silvicultural methods; harvest frequency; and retention of individual trees with desirable features for wildlife. Modeled growth varies by tree species, site class, tree age, and stand density. MRC has over 250 permanent plots—a subset of all inventory plots—which are used in CRYPTOS growth projections.

7.4.2.2 Projecting wildlife habitat and conserving natural communities

With our landscape model, MRC tracks the current status of our forests and predicts future conditions. Conditions can include not only timber volumes, but wildlife habitat. The landscape model, for example, can track and predict the development of northern spotted owl habitat over time and across MRC forests. It can also track the growth of AMZ stands, including canopy development and LWD recruitment potential, which indirectly impact covered species like the salmonids. All projections of our landscape model are based on structure classes in our inventory database. With a crosswalk that maps the names of different structure classes to the same habitat type, MRC can use other structure classes in our projections, such as the California Wildlife Habitat Relationships (CWHR).

Landscapes, of course, may encompass several different habitats, particularly at the watershed level. This is definitely true of the MRC plan area. For this large land base, MRC depends on the landscape model not only to manage timber production and forecast habitat, but to provide effective conservation of its various natural communities. Since MRC classifies stands by vegetation, we can track old growth stands, pygmy forest, grasslands, and other natural communities within our land.

MRC does not use the landscape model to design the road network; the landscape model works with stands and tree lists, not roads. However, adjustment of stand boundaries for new roads may trigger an adjustment in the net acres that the landscape model uses for its projected yields. Roads reduce the amount of productive ground for growing timber. By the same token, decommissioning roads can increase the amount of productive ground for growing timber. Moreover, many of the decommissioned roads are within sensitive AMZ locations, where forest canopy is essential.

7.4.2.3 Landscape model and the HCP/NCCP

Our landscape model can produce predictions for very long-range forecasts. In fact, it produced an 80-year planning horizon for our HCP/NCCP. Although we can model for extended periods of time, we are always prepared to test a scenario's predictions and re-forecast, particularly based on the results of monitoring or adaptive management. In fact, the landscape model is just one part of a more comprehensive landscape plan. Computer modeling, combined with professional forestry experience, scientific consultation, and research, directs MRC toward our corporate mission, including the goals and objectives of our HCP/NCCP.

The landscape model, however, has been a key part not only of the HCP/NCCP but of the PTEIR/EIS as well. Sections 2.7.1 and 2.7.2 discuss the nature of these documents and the agencies overseeing them. The wildlife agencies in conjunction with Stillwater Sciences prepared the PTEIR/EIS. For their analysis and at their specific direction, MRC modeled landscape conditions, for example, the projected spotted owl habitat in the plan area during Year 40 and Year 75 of HCP/NCCP implementation (Table 10-10). The modeling process itself is time-consuming. As development of the HCP/NCCP stretched out over time, all projections became a moving target. For the PTEIR/EIS, the wildlife agencies agreed to freeze the landscape model data at 2008.

The selection of this date turned out to be auspicious. On the evening of June 20, 2008 and the early hours of June 21, Mendocino County experienced an estimated 129 small lightning fires which, in some cases, combined into larger fires (section 1.18). While the fires burned over about 22,000 ac on MRC land, it was primarily an understory fire. Our inventory analyst re-stratified about 4000 ac with new timber types as a result of the fire. In 2008, we logged 7157 ac (Table 7-

2). Then, along with most companies around the world, MRC went through an economic crisis in 2009. Our work force was temporarily reduced by about 65%. That year, we logged even less—1740 ac. Consequently, the period from 2008 through 2009 had little impact on timber inventory in the plan area.

Nevertheless, in the interest of transparency, we state that in those instances in which we have provided projections about acreage in the plan as of 2010, the projections are based on data from 2008 and growth simulation through 2008 (e.g., Table 3-17). This keeps the projections in the HCP/NCCP and the PTEIR/EIS in synch.

7.4.3 Wildlife tree database

The landscape model does not distinguish structural elements, such as platforms and cavities; however, MRC counts trees that have these characteristics for our wildlife tree database. Although only about 20% of MRC timberland is currently represented in the database, foresters continue to submit information as they mark wildlife trees for PTHP operations.

As part of our wildlife tree strategy, MRC staff will gradually survey our landscape to assess the number of snags, old growth trees, wildlife trees, and recruitment trees (section 9.2.2.1.1). If an area is deficient in wildlife trees, snags, or old growth trees, we will retain additional recruitment trees. On a parallel course, our inventory staff will record similar data as they cruise un-harvested stands and even when they make a second entry into harvested stands. This inventory data will track long-term trends of snags, old growth trees, wildlife trees, and recruitment trees on our landscape. As part of a feedback loop, this data will help us determine if changes need to be made in our forest management. Inventory cruises provide a powerful tool to track rare and important habitat elements on our landscape and inform our overall wildlife strategy.

7.4.4 Geographical information system (GIS)

At one time, timber companies, like everyone else, used paper maps. A GIS is a higher order, digital map that allows us to both map geographic data and analyze features at specific locations. Field data from road inventory, watershed analysis, and biological surveys are all linked to our GIS. This allows MRC to produce maps in our *HCP/NCCP Atlas* with spatially-accurate representations of roads (MAPS 14A-C); watercourses (MAPS 3A-C); cores areas of northern spotted owls (MAPS 15A-M) and coho salmon (MAPS 26A-C); management units for red-legged frogs (MAPS 27A-C); water drafting sites (MAPS 22A-C), and other features.

7.4.4.1 Roads and conservation planning

Roads play an important role not only in timberland management but in conservation planning. MRC could not feasibly manage our timberland if large forested areas were left without roads. The increased cost of helicopter yarding would be prohibitive.[4] However, from a conservation perspective, roads can fragment habitat, disrupt migration corridors, disturb sensitive native species, and create new opportunities for invasive species.

MRC inherited a road network from the previous land owners, who primarily used tractor yarding. Tractor yarding requires more roads near sensitive stream bottoms than cable yarding. MRC is moving more and more to cable yarding. The amount of cable logging will vary by year. In 2007, cable logging accounted for 2974 ac or 58% of our timber volume; in 2008, it was 2654

[4] In small areas, MRC does use helicopter yarding if a road cannot be built or if the cost of helicopter yarding is roughly equivalent to the cost of building a road.

ac or 47% of our timber volume (Table 7-2). In 2009, harvest operations were very limited due to the global economic recession; the total volume harvested was about 13.4 mmbf.

Table 7-2 MRC Harvests for 2007 through 2009

MRC Harvest			
Logging Method	Volume (mmbf)	Acres	Percent
2007			
Tractor	14,391.43	3116	40%
Cable	20,790.72	2974	58%
Helicopter	853.20	184	2%
2008			
Tractor	20,337.82	4503	53%
Cable	18,031.41	2654	47%
Helicopter			0%
2009			
Tractor	6161.17	950	46%
Cable	7241.97	790	54%
Helicopter			0%
2010			
Tractor	20094.76	3726	59%
Cable	19462.44	2585	41%
Helicopter			0%

Through new systematic road design, MRC intends to allow necessary access to our timber stands but with minimal impact on biological resources. We accomplish good, deliberate road design by

- Building new roads along ridge tops to accommodate cable yarding as opposed to tractor yarding.
- Abandoning unnecessary roads, including those along watercourses that increase the risk of sediment delivery.
- Designing, constructing, and maintaining road systems to specific standards spelled out in Appendix E, *Road, Landing, and Skid Trail Standards*.

As of 1st quarter 2011, MRC has completed 90% of our road inventory in the plan area and updated our GIS with road data. We will complete the pending road inventory for the Gualala River (7900 ac) and Alder Creek/Schooner Gulch (13,300 ac) WAUs by end of 2012, as Table 7-3 shows.

Table 7-3 MRC Road Inventory

MRC Road Inventory and GIS Road Updates		
Watershed Analysis Unit	Completion	Scheduled
Albion	1999	
Noyo	2000	
Garcia	1998	
Hollow Tree Creeks	2003	
Navarro River	2002	

MRC Road Inventory and GIS Road Updates		
Watershed Analysis Unit	Completion	Scheduled
Upper Russian River	2003	
Gualala River		2012
Big River	2009	
Cottaneva Creek	2004	
Rockport	2009	
Greenwood Creek	2003	
Elk Creek	2008	
Alder Creek/Schooner Gulch		2012

Since 1998, MRC has decommissioned over 112 miles of roads. Historic roads which are no longer in use account for another 18.1 miles. Decommissioned and historic roads represent about 6% of the MRC road network. We cannot predict the miles of decommissioned roads during the term of our HCP/NCCP. Currently, we are developing a computer program to track the mileage of roads updated to the standards outlined in Appendix E. Under the HCP/NCCP, we will bring all roads in the plan area up to these standards. By decommissioning roads and applying road standards, MRC expects a decrease in road density and an increase in acreage remote from roads.

Re-designing and decommissioning roads and crossings will improve conditions for our covered species and natural communities by

- Reducing sediment delivery.
- Reducing the hydrological connectivity of roads.[5]
- Removing artificial barriers to aquatic migration.
- Reducing habitat fragmentation.
- Controlling disturbance.

Appendix E (*Road, Landing, and Skid Trail Standards*) and Appendix F (*Road Inventory Protocol*) detail our road management prescriptions. Conservation measures in Chapters 8, 10, and 11 limit road construction, use, and alignments.

7.4.4.2 Road updates in GIS

MRC does not use our GIS to plan roads; however, information on new roads or abandoned roads impacts the output from GIS. A Registered Professional Forester (RPF), for example, determines when a new road needs to be built and provides the location in a PTHP. Along with the road location, the RPF includes any additional road attributes, such as culverts and rocked fords. Later our Road Inventory Supervisor or a forester determines the GPS coordinates for the new road and passes these along to our GIS department. Once these coordinates are entered in the GIS database, the new road can appear on updated maps and be part of management analyses.

7.4.5 Watershed analysis

In Chapter 3, *Environment and Habitat*, we introduced the subject of watershed analysis as an important source of information about the baseline condition of the plan area. As we said earlier, one of the outcomes of a watershed analysis is a resource assessment report which is divided into modules (section 3.3.4). In the sub-sections that follow, we describe the intent of these modules,

[5] Hydrological connectivity of roads refers to the transport of water, sediment, and organisms from roads to watercourses.

the nature of our initial watershed analysis, use of the analysis results, and the process for updating the analysis. To see specific methods from completed watershed analyses, refer to Appendix G (G.3.3.1-2 stream canopy; G. 3.4.1-2 stream channel conditions; G.3.5.1-2 fish habitat).

7.4.5.1 Watershed analysis modules

7.4.5.1.1 Mass wasting

The intent of this assessment is to

- Identify the types of mass wasting active in the watershed through a landslide inventory.
- Identify the link between mass wasting and management activities.
- Partition the plan area into zones of relative mass wasting potential (i.e., terrain stability units) based on the likelihood of future mass wasting and sediment delivery to stream channels.
- Quantify sediment input to watercourses from mass wasting.

7.4.5.1.2 Surface and point source erosion

The intent of this assessment is to

- Examine past and present sediment delivery from roads and skid trails in the plan area.
- Provide a hazard assessment of the potential for surface and point source erosion to deliver sediment to watercourses in the future.

MRC assesses road erosion hazards and sediment delivery to develop conservation measures and prioritize restoration that will minimize future sediment inputs from the road network. With our road analysis, MRC also looks at site-specific information generated from the road inventory, such as culvert sizing or diversion potential. Using this information, we prioritize sediment control for individual sites on roads. In the initial watershed analysis, this module may not have input data from the MRC road inventory. However, once a road inventory is complete in a watershed, MRC will update this module to reflect the latest information.

Skid trail evaluation provides context for past, present, and future sediment delivery at watershed scale. MRC will develop information, when needed, on controllable erosion from skid trails and consider this data for our hazard assessment of surface and point source erosion.

7.4.5.1.3 Hydrology

The intent of this assessment is to

- Provide a hydrologic record for the watershed.
- Analyze the frequency of stream flow or precipitation in the watershed.

The hydrology module will show the magnitude of storms and when they occur. Large storms precipitate erosion, sediment transport, or windthrow that impact the habitat conditions for aquatic species.

7.4.5.1.4 Riparian function

The intent of this assessment is to analyze the main riparian processes that forest harvest can affect, namely

- Potential of the riparian stand to recruit large woody debris (LWD) to the stream channel.

- Canopy closure and stream temperature.

In assessing LWD potential, we evaluate short-term LWD recruitment, meaning the next 2-3 decades. An assessment shows current conditions of riparian stands for generating LWD for stream habitat or stream channel stability. It presents field observations of current LWD levels in stream channels and indicates the ability of a riparian stand to recruit LWD in relation to channel sensitivity to LWD. This determines current instream needs for LWD.

An assessment of riparian function also presents canopy closure for perennial streams within a watershed. MRC analyzes all available stream temperatures for a watershed and examines the relationship between stream temperature and canopy closure. We do not explicitly measure other functions of streamside forests, such as nutrient dynamics and climate moderation, although these along with canopy closure and stream temperature are probably highly correlated with LWD recruitment potential.

7.4.5.1.5 Stream channel condition

The intent of this assessment is to

- Determine the existing channel conditions.
- Identify the sensitivity of channels to wood and sediment.

MRC evaluates the morphologic condition of a channel; this evaluation weighs the input of sediment, wood, and water against the ability of a channel to either transport or store these inputs. Stream channel conditions represent the strongest link between forest practices and aquatic habitat. Changes in channel condition typically reflect changes to aquatic habitat. MRC uses this evaluation, therefore, as a bridge between the hillslope processes and the resources affected by those processes. However, due to lag effects, legacy effects, non-timber stressors, lack of controls, and high natural variability, MRC may have difficulty establishing exact relationships between processes and resources.

7.4.5.1.6 Fish habitat assessment

The intent of this assessment is to

- Identify current fish distributions and habitat conditions.
- Present the quality of habitat for anadromous spawning, summer rearing, and over-wintering.

From this information, MRC can evaluate how vulnerable the habitat of anadromous salmonid may be to changes in sediment, heat, or wood input. This assessment also provides the distribution of anadromous species and their life stages, plus compilation of current knowledge on the status of anadromous species in a watershed.

7.4.5.1.7 Amphibian distribution

The intent of this assessment is to

- Improve information on the distribution of covered amphibian species within MRC watersheds.
- Provide a compilation of recent monitoring or studies about covered amphibians within each watershed analysis unit.

7.4.5.1.8 Synthesis[6]

The intent of the synthesis module is to

- Identify interactions between hillslope hazards and aquatic resources.
- Summarize information on sediment inputs, aquatic habitat, and water quality.

MRC synthesizes data from a watershed analysis unit and a CalWater planning watershed. Synthesis on a smaller scale will occur if unique circumstances warrant (e.g., there are odd-shaped property boundaries or unique habitat conditions). If we can hypothesize links between hillslope conditions (road, skid trails, mass wasting, and riparian areas) and aquatic habitat or water quality issues, we will be better prepared to prescribe conservation measures and address unique watershed needs. Up until now, MRC has not completed the synthesis module in the majority of our watershed analyses; however, we will include it in all future analyses.

7.4.5.1.9 Sediment inputs or budget

Within the synthesis, the intent of this assessment is to summarize information on sediment inputs from mass wasting as well as surface and point source erosion.

Our goal is to determine the magnitude or relative concern, both spatially and temporally, of sediment input processes. When the output or storage of sediment is also an issue, a full sediment budget[7] may be warranted.

DEFINITION

A **sediment budget** is a conceptual and quantitative model of sediment transport from origin to exit; it summarizes inputs, changes in sediment storage, and outputs to give an indication of balance or imbalance.

Ratings of aquatic habitat

MRC has developed ratings for aquatic habitat conditions relevant to LWD, shade, and life stages of anadromous salmonids. The synthesis module summarizes and interprets these ratings in relation to each other and within the context of other synthesis components of sediment input and water quality.

7.4.5.1.10 Water quality

A watershed analysis generates water quality information relating to aquatic habitat, including stream temperature; composition of streambed sediment; streambed permeability; and sediment inputs from hillslope processes. Throughout a watershed analysis, MRC uses these parameters to address beneficial uses of water as it relates to aquatic habitat. The synthesis module may summarize additional water quality observations from long-term channel monitoring and focus watershed studies, such as suspended sediment, turbidity, nutrients, pH, conductivity, or dissolved oxygen. In addition, the synthesis module will consider water quality within the context of other synthesis components of aquatic habitat conditions and sediment input.

[6] The synthesis module presented here differs from the protocols in the Washington Watershed Analysis manual (Version 4.0, Washington Forest Practices). The intent is similar; the approach differs.

[7] See Reid and Dunn (1996) for further discussion on sediment budgets.

7.4.5.2 Initial watershed analysis for our HCP/NCCP

As of 1st quarter 2011, MRC has conducted watershed analyses on approximately 90% of our land. We will complete the pending analyses for Cottaneva Creek (10,000 ac) and Alder Creek/Schooner Gulch (13,300 ac) by 2013, as Table 7-4 shows.

Table 7-4 2009 Update on MRC Watershed Analysis

MRC Watershed Analysis			
Watershed Analysis Unit	Includes	Completed	Scheduled
Albion	Big Salmon Creek, Caspar Creek and Little River	1999	
Noyo		2000	
Garcia		1998	
Hollow Tree Creeks	Hollow Tree, Mill Creek, Low Gap, Jack of Heart Creeks	2004	
Navarro River		2003	
Upper Russian River	Ackerman Creek, Jack Smith Creek	2005	
Gualala River		2003	
Big River		2003	
Cottaneva Creek		2004	
Rockport	Juan Creek, Hardy Creek, Howard Creek		2011
Greenwood Creek		2004	
Elk Creek		2009	
Alder Creek/Schooner Gulch	Alder, Mallo Pass, Brush, and Point Arena Creeks, and Schooner Gulch		2013

Our initial watershed analysis focused on conservation of anadromous habitat. Nevertheless, our evaluation of canopy retention, sediment inputs, and disturbance of non-fish-bearing watercourses provided information for informed decisions on covered amphibian species as well. In subsequent watershed analyses, we will focus on both salmonids and amphibians.

Up until now, MRC has performed watershed analyses as *in-house* assessments, with little or no input from the wildlife agencies. For the 2 pending analyses, MRC will follow methods employed in our watershed analysis report for Elk Creek. MRC believes these are currently the best methods; moreover, these methods are consistent with earlier watershed analyses. Within the first year of the initiation of our HCP/NCCP, MRC will meet with the wildlife agencies to evaluate our watershed analysis protocols and focus on plan objectives.

MRC will consider the following conservation measures or restoration actions in initial watershed analysis under our HCP/NCCP:

- Prioritization of road upgrades and controllable erosion repair.
- Placement of LWD for instream needs, including amount, location, and timing of LWD.
- Conservation of unique aquatic habitat features (e.g., channel migration zones).
- Monitoring of unique conditions in a watershed.

7.4.5.3 Watershed analysis updates or re-visits

MRC will re-visit watershed analysis, in its entirety, approximately every 20 years. There will be a total of 4 watershed analyses per watershed analysis unit—1 initial watershed analysis and 3 re-visits over the life of our HCP/NCCP. When proposing new methods, MRC will ensure their comparability with previous watershed analyses.

MRC chose a recurrence interval of 20 years because most of the processes in watershed analysis vary over relatively long time frames. During each re-visit of watershed analysis, we will incorporate information from other monitoring programs with shorter recurrence intervals to allow for a proper assessment of HCP/NCCP goals and objectives. Moreover, we may modify methods and recurrence intervals of watershed analysis and other monitoring programs through adaptive management. Modifications may also arise from recommendations in academic or governmental reports, such as the CDFG Coastal Watershed Assessment Program and the Pacific Northwest Aquatic Monitoring Partnership.[8]

MRC will provide the agencies our module methods, hypotheses to be tested, and our level of sampling. In consultation with the wildlife agencies, MRC may adapt priorities for road repair, determine new restoration actions, and alter monitoring or conservation measures through watershed analysis. Conservation measures revised through monitoring efforts, such as watershed analysis, will provide the same protection as standard HCP conservation measures. This includes conservation measures with limits of allowable change as described in Chapter 13, *Monitoring and Adaptive Management*.

MRC may update watershed analysis components at any time as information on aquatic species, habitat conditions, and the effects of management are identified. We can perform this update through individual modules or through technical reports on specific conservation measures, restoration, or monitoring. MRC will notify the wildlife agencies when an update occurs and give them the opportunity to review methods and objectives. The following situations can affect a watershed analysis update:

- Development of new analytical techniques or research that may improve interpretations of existing information.
- Significant storms (>25-year flood) that trigger significant watershed changes.
- Earthquake activity that triggers large volumes of sediment input from mass wasting.
- Social or regulatory changes requiring updated analysis.

[8] See http://coastalwatersheds.ca.gov/ and http://www.pnamp.org (both accessed 02/14/2011).

7.4.5.4 Future use of watershed analysis

Initial watershed analysis will provide baseline conditions of MRC watersheds and classification of features in those watersheds, including terrain stability, LWD demand, and road inventory. Future watershed analyses will update past information and provide accumulated results within watersheds. MRC will compare past results of watershed analyses and interpret individual monitoring programs within each watershed analysis unit. In consultation with the wildlife agencies, we will develop a Quality Assurance/Quality Control (QA/QC) program to ensure comparable results between watershed analyses. MRC will kick-off discussions with the wildlife agencies about our QA/QC program within 3 years of the issuance of our ITP. With agency concurrence, we will implement the QA/QC program within 5 years of ITP receipt.

7.4.6 Environmental gradients and habitat diversity

The plan area is a working forest, covering a variety of environmental gradients and forest habitats which our HCP/NCCP will protect and maintain. The 7 non-contiguous inventory blocks which make up the plan area (Table 1-5) span a distance of about 70 miles north to south and about 25 miles east to west. They include both coastal and inland areas with elevations ranging from 0-2772 ft. While the coast range generally follows a southeast to northwest trend, the mountainous terrain is broken by many streams and rivers creating slopes with all aspects. For the most part, the large river systems move from east to west, creating north and south aspects. Slopes in the rugged terrain vary from large, flat ridges to shear rock cliffs. Overall, the terrain is relatively gentle on ridgetops and river bottoms, which are usually less than 500 ft wide, but steep everywhere else, resulting in an average slope of about 50%.

The diverse habitat and natural communities of the plan area provide an opportunity for species to re-distribute as environmental dynamics change. Chapter 14 addresses fire, climate change, earthquakes, invasive species, and other environmental changes. The intent of our conservation measures is to prevent or ameliorate the adverse effects of changed circumstances for covered species. MRC will follow guidelines proposed by state or federal agencies, for example, to prevent, quarantine, and treat pathogens and pests. However, if a water-borne pathogen does infect a watershed, MRC will not draft water there or remove logs from Class I and Class II watercourses without the approval of the wildlife agencies (14.9.3.2). Likewise, in the event of an intense and large fire, MRC will restore damaged red-legged frog breeding sites or create new sites in adjacent, unaffected areas within the same planning watershed (14.3.7.2). Following a mass wasting event, MRC will conduct a rare plant survey prior to any operations, protect any rare plants discovered, and replant the affected areas with conifers (14.7.3.1). These are just 3 of dozens of measures, outlined in Chapter 14, to respond to changed circumstances.

7.5 Feedback on MRC Conservation Proposals

7.5.1 Wildlife agencies

MRC would be remiss if we did not acknowledge the role of the wildlife agencies in the entire HCP/NCCP process. Some of the technical team representatives from CDFG, NMFS, and USFWS have remained on the project since 2002, again bringing continuity and team-building to a very long process. Throughout this process of planning and development, MRC has met with agency representatives at the technical and policy levels dozens of times, in the woods and at MRC or agency offices. In addition hundreds of phone calls and emails have passed between us. All this interaction has led to many changes in our original proposals, as we have negotiated issues large and small. Each draft of our HCP/NCCP was subjected to a detailed review by the wildlife agencies. Using a review form, the agencies could pinpoint their comments to subsections of chapters, and even paragraphs, lines, and individual words. MRC responded to

these comments in meetings, email, and phone conversations. As a result of this scrutiny, MRC re-thought, re-worded, re-organized, and, in some instances, re-designed our HCP/NCCP.

7.5.2 Science panel

The purpose of a scientific review is to assist the wildlife agencies and MRC in the development of a well-founded HCP/NCCP by recommending (1) management principles and conservation goals; (2) principles of design that address the needs of species, landscapes, ecosystems, and ecological processes; and (3) scientifically sound conservation measures. To achieve this task, MRC convened a science panel very early in our plan development. Facilitated by Greg Giusti of the University of California Cooperative Extension, the panel consisted of

- Reed Noss, PhD (University of Central Florida).
- Lee Benda, PhD (Lee Benda and Associates).
- Tom Hamer (Hamer Environmental).
- Joe McBride, PhD (University of California -Berkeley).
- Terry Roelofs, PhD (Humboldt State University).
- Teresa Sholars, PhD (College of the Redwoods).
- Bob Ziemer, PhD (Humboldt State University).

The science panel held a workshop in Ukiah, CA on May 23-24, 2003. Following the workshop, the science panel toured portions of MRC forests. Later they reviewed the conservation measures and monitoring proposals in the initial draft of our HCP/NCCP. In August 2003, the science panel responded in a written report to questions prepared by MRC and the wildlife agencies. Because our HCP/NCCP has subsequently undergone considerable revisions based on agency reviews, the science panel comments are not always germane to the current draft of our HCP/NCCP. In Appendix V, however, we have provided a summary of the science panel's recommendations and an indication of how MRC has used these early critiques and recommendations in re-thinking and revising our proposed conservation measures. Some of the panel's comments suggested

- Employing a consultant botanist.
- Developing a comprehensive list of covered plant species based on actual surveys of the plan area.
- Revising and clarifying our old-growth definitions.
- Bolstering conservation measures for seeps, springs, wet areas, and wetlands.
- Adding conservation measures to address soil pipes.

7.5.3 General public

In June 2002, the wildlife agencies conducted 3 public scoping meetings in Santa Rosa, Ukiah, and Fort Bragg to discuss our HCP/NCCP process and solicit public comments and concerns for PTEIR/EIS consideration. Based on questions at the meetings and comments submitted in writing, MRC held several stakeholder outreach workshops the following September to discuss key identified topics in depth. Those topics were (1) HCP/NCCP Development and Approval Process (September 24); (2) HCP/NCCP Implementation and Monitoring (September 25); (3) Understanding the MRC Landscape Model (September 27); and (4) Existing Biological and Hydrological Conditions of MRC Lands (September 30). Additional outreach meetings will occur with the release in 2011 of the public draft of our HCP/NCCP. MRC will provide an overview of the plan area, the organization of our HCP/NCCP, and key elements of the plan strategy, such as stratified conservation measures and monitoring, to assist the public in their evaluation.

In the final version of the PTEIR/EIS, the wildlife agencies will provide written responses to issues raised by the public during a 90-day comment period. In addition, MRC may revise our HCP/NCCP based on these public comments and agency responses.

7.6 Prototypical Conservation Strategies in Relation to MRC Plan

7.6.1 Strategic conservation prototypes

Achieving conservation goals may require several different strategies, applied either separately or in conjunction with one another.

- *Fine filter strategy*

  At one extreme is the "fine filter" strategy that focuses on habitat needs of particular species. Such a selective focus may not adequately conserve the biodiversity in a plan area.

- *Coarse filter strategy*

  At the opposite extreme is the "coarse filter" strategy that primarily provides for ecological preserves. Unfortunately, some species may still fall through the "holes," especially if the preserves do not encompass all the habitats within a plan area or if the preserves are unduly small. Moreover, because the goal of the *coarse filter strategy* is to manage areas for biodiversity, its application may be inimical to other land uses.

- *Mesofilter strategy*

  As a mediatory approach, Malcolm L. Hunter suggests a "mesofilter" strategy:

  > The key idea of mesofilter conservation is that most ecosystems contain certain features that are central to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (Hunter 2005, p. 1026).

According to Hunter, examples of mesofilter conservation are conserving deadwood in a managed forest; conserving springs, pools, and other small wetlands; and maintaining critical processes in ecosystems, such as low intensity ground fires and periodic flooding. Mesofilter conservation benefits species that may be overlooked in fine filter strategies, like invertebrates, fungi, and non-vascular plants.

In proposing a *mesofilter strategy*, plan proponents must decide which habitat features and processes are significant to a conservation goal. The basis for such a decision might be known habitat needs of certain species or conditions and ranges of natural variability (Landres et al. 1999). The underlying premise for this strategy is that by approximating past conditions, the plan proponents can predict and reduce impacts to current ecosystems and species. If the proposed land management approximates the conditions under which a biological community evolved, the risk to the component species is minimal.

7.6.2 MRC conservation strategy

MRC is proposing a combination of the *fine, coarse,* and *mesofilter* strategies. Our *fine filter strategy* focuses on target species, i.e., the covered species listed in Chapter 1, *Purpose and Scope of the Plan*. In a very limited application of a *coarse filter strategy*, MRC is setting aside Type I old growth stands. In addition, our designation of LACMA, AMZs, and stable core areas for northern spotted owls mimic *preserves.* Finally, in conserving biodiversity through conservation

standards for snags, downed wood, wildlife trees, old-growth trees, hardwoods, and other natural communities, MRC comes close to a *mesofilter strategy*. Admittedly, though, the natural ranges of variability for many of the habitat elements and stages in the plan area are scientifically unclear.

Most NCCPs establish permanent habitat preserves to offset development in other areas of an owner's property. Our plan area is a working forest. MRC will manage the majority of the plan area with uneven-aged management, as discussed in our Timber Management Plan. This technique will result in forest-type conditions more conducive to native flora and fauna during the 80-year term of our HCP/NCCP. Likewise, our conservation measures impact every acre of our landscape. Separate preserves, on the other hand, will only play a minor role in our HCP/NCCP and our forest management.

7.7 Setting Goals and Objectives for our HCP/NCCP

7.7.1 Overview

Goals are guiding principles; objectives are measurable targets to achieve goals. MRC goals and objectives are the performance criteria for the conservation measures detailed in Chapters 8 through 11. With these objectives, MRC can evaluate the effectiveness of our conservation measures. In comparing results against targets, we will distinguish, wherever possible, management impacts from background variation[9] or land use not related to our HCP/NCCP.

MRC based the goals and objectives of our HCP/NCCP on our current information about environmental conditions on our land and our current knowledge of what is optimal for each covered species. These goals and objectives also comply with requirements for the HCP and NCCP programs as well as for beneficial uses of water (Table 2-4). MRC consulted frequently with the wildlife agencies and with both the North Coast Regional Water Quality Control Board and California Geological Survey. Beginning in 2002, we drafted proposals that the agencies reviewed and discussed with us in meetings both at agency and MRC offices. Our overall intent was to provide mitigation and conservation of the covered species, habitat, and natural communities. The bases for our proposals were scientific research as well as results from long-term monitoring of our forestlands. We have, for example, 18 years of data on northern spotted owls on our land; with this information, we propose to increase their current population by increasing nesting/roosting habitat. The California Geologic Survey and CAL FIRE also participated in review of our HCP/NCCP drafts.

The majority of our objectives propose measurement at the source of an environmental condition. Separating management impacts under our HCP/NCCP from past effects, non-management factors, or other background variation is often difficult. For example, you can more conclusively determine that sediment is from a road if you actually observe it entering a watercourse from a road. On the other hand, cumulative effects—i.e., the collective response from multiple environmental stressors—are best measured at a landscape scale or, in the case of aquatic habitat, downstream from the source of stress. MRC recognizes, however, the limitations of taking observations at a distance from a source; these cases require careful interpretation.

7.7.2 Objectives of the RWQCB

As we stated in section 2.6.4, the Water Quality Control Plan for the North Coast Region, also known as the *Basin Plan*, identifies beneficial uses of water in the North Coast Region and describes problems with surface and ground water. The *Basin Plan* further defines water quality

[9] Background variation is change in environmental conditions not including variation due to management activities.

objectives to protect beneficial uses of water. In the *Basin Plan* are various pollution categories. The most relevant categories for the plan area are sediment and temperature pollution. Table 7-5 shows the *Basin Plan* objectives for sediment and temperature, along with the parameters that MRC will monitor to demonstrate that we are meeting these objectives.

Table 7-5 Basin Plan Objectives and Monitoring Parameters

Basin Plan Objective	Description	HCP/NCCP Monitoring Parameters
suspended material	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.	Turbidity and suspended sediment rating curves within focus watersheds
settleable material	Waters shall not contain substances in concentrations that result in deposition that causes nuisance or adversely affects beneficial uses.	Permeability observations, bulk gravel samples, V-star
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.	Suspended sediment loads within focus watersheds
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.	Turbidity rating curves within focus watersheds and grab samples across the plan area
temperature	The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water board that such alteration in temperature does not adversely affect beneficial uses.	Target temperature values by species

7.7.3 Objectives for instream habitat

Past habitat conditions, time lags in sediment transport, sediment storage, and stochastic hydrologic events all create a dynamic environment. MRC can reasonably hypothesize, however, that instream habitat conditions will improve with our increased focus on conservation and management. Quantifying and sequencing that improvement is problematic and can actually lead to inaccurate projections. Nonetheless, MRC has provided objectives that measure stream habitat and water quality conditions; these measurements should be interpreted with caution. Where specific numerical targets are provided, MRC expects a range of values approaching targets to indicate success for our conservation approach.

7.7.4 Objectives for instream sediment

Some important indications of stream habitat and water quality are residual pool volumes, permeability of stream gravels, percent of particles <0.85 mm and <6.4 mm, V-star, suspended sediment, and turbidity. Of these measurements, MRC only has quantified targets for stream gravel permeability, percent of particles <0.85 mm and <6.4 mm, and V-star. With decreased sediment inputs, MRC expects residual pool depths to increase, as well as the depth variability of longitudinal profiles. This increase will be in conjunction with increased LWD. Fewer pools will

be subject to aggradation or filling, and LWD will create greater scour. The rating curve between suspended sediments and stream flow will decrease, as will the curve between turbidity and streamflow. The rate and magnitude of these changes, though, is uncertain. Interpreting instream sediment conditions requires an understanding of instream LWD levels and upslope conditions influencing sediment inputs. Evaluations of sediment budgets and LWD loading within focus watersheds will help MRC interpret instream sediment conditions.

7.7.5 Objectives for riparian areas

MRC has quantified instream riparian objectives by providing ideal trajectories of long-term trends. We expect lower temperatures of stream water due to our riparian conservation measures. As a result, we quantify a temperature threshold that we think the stream will trend toward. However, we do not quantify the amount of temperature change in the stream water or the timing of that change. In interpreting stream temperature, one must investigate instream conditions as well as shade, air temperature, proximity to ocean, location in the stream network, and other factors that might affect change. In some circumstances, it may be physically impossible for a stream to reach a temperature target. For example, the riparian area of Ackerman Creek, near Ukiah, is dominated by oak woodlands. Typically summer air temperatures are greater than 100^{o} F in this area. Achieving an established target without considering Ackerman Creek's inherent limitations is unlikely.

7.7.6 Objectives for aquatic species

MRC designed our objectives for aquatic species to

- Protect locations where covered species currently exist, e.g., by treating watercourses where coastal tailed frogs are present as Large Class II watercourses; by protecting documented breeding sites for red-legged frogs; and by implementing AMZ measures whenever covered salmonids are present.
- Provide for a net increase in the amount and enhancement of existing habitat, e.g., by implementing measures for potential breeding sites of red-legged frogs and by implementing AMZ measures for all watercourses and aquatic features regardless of species presence.

We have concluded that these measures will protect covered species where they now occur and protect all aquatic habitat throughout the plan area to which these species might expand.

7.7.7 Objectives for terrestrial habitat

Throughout the term of our HCP/NCCP, MRC will maintain the current acreages of Type I old-growth forest and rocky outcrops. The basis of our acreage estimates is field reconnaissance and forester mapping for Type I old-growth forest and aerial photos for rocky outcrops.

For hardwood species, there will be specific retention requirements in all harvest areas. Moreover, MRC has identified stands that likely will remain as hardwood-dominated stands, regardless of any management actions. MRC will not convert these to timber production. In managed stands, MRC will maintain a minimum density of snags, wildlife trees, and downed logs per acre to balance conservation goals with sustainable harvest. All of these objectives provide for the protection of both rare habitat elements and important habitat types. MRC biologists believe this strategy will allow habitat components to persist on the landscape in various stages—similar to natural processes.

7.7.8 Objectives for terrestrial wildlife species

MRC designed our objectives for terrestrial species to

- Protect locations where covered species currently exist, e.g., cores areas of northern spotted owls and the Lower Alder Creek Management Area (LACMA).
- Provide for a net increase in the amount and enhancement of existing habitat, e.g., increase nesting/roosting habitat for northern spotted owls (O§10.3.1.2-5 and O§10.3.1.2-6), accelerate growth of murrelet habitat within LACMA, and increase habitat for Point Arena mountain beaver (O§10.3.3.2-1 and O§10.3.3.2-2).
- Provide, if possible, for an increase in the population of the covered species on our forestlands, e.g., increase the population of northern spotted owls according to the proposed population objectives (O§10.3.1.2-1 and O§10.3.1.2-2).
- Protect existing habitat for covered terrestrial species.

These measures will protect covered species on our forestlands and, in some cases, increase their numbers. Although we may grow habitat, we recognize that other factors may limit population growth of the covered species. For example, a sparse ocean food base may limit the population of marbled murrelets. Nevertheless, we will continue to grow requisite habitat.

7.7.9 Objectives for rare plants

MRC designed our rare plant objectives to

- Conserve natural communities, habitats, and covered plants in the plan area.
- Contribute to the recovery of listed plants in the plan area.
- Manage and conserve covered plants.

These objectives are implemented through management categories which rank plants according to their statewide rarity and threat status.

7.7.10 Objectives for natural communities

Our goal is to maintain, conserve, restore, and enhance our natural communities while conducting sustainable forest management. This goal applies to all our natural communities, with one exception—the upland broadleaved community. MRC believes that the upland broadleaved community is currently much larger now than in the past. Historic clearcuts of coniferous forest have allowed the broadleaved community to thrive and spread. Through sustainable forestry, MRC proposes to restore the broadleaved community to a distribution and density that we believe is more reflective of its *natural* distribution and density within the North Coast coniferous community.

7.7.11 Objectives for biodiversity

Although MRC has not proposed objectives or conservation measures specifically for biodiversity, the sum of all our conservation measures and objectives will promote biodiversity. Improving cold water habitat for salmonids, for example, will benefit other species that depend on it. Conserving rare plants adds to species diversity across our landscape. MRC policies for wildlife trees, hardwoods, and old growth retention will benefit species other than those covered in our HCP/NCCP.

7.7.12 Summary of goals and objectives

Table 7-6 provides a summary of all the goals and objectives that MRC is proposing in our HCP/NCCP. Each goal and objective has a unique number. Goals are preceded by the letter G and objectives by O. Following this designation is the section number in which the item appears as well as a sequential number indicating its location. For example, in the number O§10.3.2-1, O indicates this is an objective, 10.3.2 indicates the section within our HCP/NCCP where the objective is located, and 1 indicates it is the first objective in that section. For explanatory notes,

footnotes, and cross-references attached to a goal or objective, refer to its relevant section number in Chapters 8-11.

Table 7-6 Summary of MRC Goals and Objectives

Summary of MRC Goals and Objectives	
AQUATIC HABITAT	
Riparian Function	
G§8.2.2-1	Conserve and develop streamside stands with large, dense conifer species to (1) increase riparian function; (2) create and enhance habitat for covered anadromous salmonid and amphibian species; and (3) protect beneficial uses of water.
Riparian Stands	
O§8.2.2-1	Develop and maintain Class I and Large Class II AMZs based on targets for basal area and size distribution (see Table 8-5 through Table 8-7 and Appendix U, *Inventory Strategy*).
O§8.2.2-2	Achieve, per planning watershed, at least 70% canopy averaged across the entire Class I and Large Class II AMZ. ▪ More than 75% of the stands sampled during timber inventories will meet this canopy requirement within 30 years of HCP/NCCP initiation. ▪ More than 90% of the stands sampled during timber inventories will meet this canopy requirement within 70 years of HCP/NCCP initiation (Table 8-3).
O§8.2.2-3	Manage for a mix of tree species in the AMZs that closely resembles the following conditions: ▪ More than 45% of vegetation strata in riparian stands will be conifer/hardwood or conifer-dominated 40 years after HCP/NCCP initiation. ▪ More than 90% of vegetation strata in riparian stands will be conifer/hardwood or conifer-dominated 70 years after HCP/NCCP initiation.
Instream Conditions	
O§8.2.2-4	Increase the amount of instream LWD to improve the quality of aquatic habitat in Class I and Class II watercourses (see Appendix S, *Targets for LWD and Effective Shade*).
O§8.2.2-5	Increase pool frequency, residual pool depth, or residual pool volumes as measured at the stream reach scale through LWD recruitment (see Appendix S, *Targets for LWD and Effective Shade*).
O§8.2.2-6	Decrease summer water temperatures, where possible, to manage for temperatures at or below MWMT targets for covered species (see the *Water Quality Control Plan for the North Coast Region*, i.e., the Basin Plan).
O§8.2.2-7	Achieve *on-target* ratings for both stream shade and LWD at the planning watershed scale (see Appendix S, *Targets for LWD and Effective Shade*).
Sediment Input	

Summary of MRC Goals and Objectives

G§8.3.2-1	Reduce sediment delivery from forest management to (1) promote high quality habitat for covered anadromous salmonid and amphibian species and (2) protect other beneficial uses of water.
Mass Wasting Unrelated to Roads	
O§8.3.2-1	Reduce, by year 40 of the HCP/NCCP, sediment delivery from mass wasting unrelated to roads by at least 10% of the rate (tons/mi^2/year) determined in the initial watershed analyses or established in TMDL load allocation reductions.
O§8.3.2-2	Reduce, within the 80-year timeframe of the HCP/NCCP, sediment delivery from mass wasting unrelated to roads by at least 20% of the rate (tons/mi^2/year) determined in the initial watershed analyses or established in TMDL load allocation reductions.
Road, Skid Trail, and Landing	
O§8.3.2-3	Reduce, by year 40 of the HCP/NCCP, sediment delivery from mass wasting related to roads by at least 30% of the rate (tons/mi^2/year) determined in the initial watershed analyses or established in TMDL load allocation reductions.
O§8.3.2-4	Reduce, within the 80-year timeframe of the HCP/NCCP, sediment delivery from mass wasting related to roads by at least 60% of the rate (tons/mi^2/year) determined in the initial watershed analyses or established in TMDL load allocation reductions.
O§8.3.2-5	Upgrade, within the first 30 years of the HCP/NCCP, the road network in the plan area to the standards specified in Appendix E, *Roads, Landings, and Skid Trails;* complete upgrades to the road network in coho "core" areas within the first 20 of those 30 years.
O§8.3.2-6	Control 1,302,000 yd^3 of controllable erosion within the first 30 years of the HCP/NCCP. **NOTE** The total amount of controllable erosion may change due to road inventory updates and weather.
O§8.3.2-7	Reduce point source erosion from roads, skid trails, or landings and sediment delivery associated with surface erosion by 50% within the first 30 years of the HCP/NCCP (i.e., from 4000 to 2000 yd^3 per mi^2 per year) and 70% within the initial 70 years of the HCP/NCCP (i.e., from 4000 to 1200 yd^3 per mi^2 per year).
Instream Sediment	

Summary of MRC Goals and Objectives

O§8.3.2-8 Demonstrate an improving trend in the following parameters over the life of the HCP/NCCP based on MRC conducting (a) watershed analyses at least every 20 years, (b) long-term channel monitoring every 10 years, and (c) focus watershed studies every 3-5 years:

- Quality of stream gravel as measured by increased permeability and percent of fine particles < 0.85 mm.
- Stream-reach complexity as measured by residual pool depths and standard deviation of residual pool depths within long-term stream monitoring reaches.
- Proportion of fine sediment in pools (V-star).
- Decreased sediment inputs to the sediment budget for focus watersheds.

NOTE

1. MRC has not set benchmarks for instream sediment objectives since rarely do management activities unambiguously or expressly impact instream habitat conditions.
2. Stream gravel permeability will approximate, on average, 10,000 cm/hr across stream reaches.
3. The percent of fine material < 0.85 mm, recovered from dry sieve techniques, will approximate, on average, < 7% across stream reaches.
4. The fraction of pool volume filled with fine sediment should average ≤ 0.21 across stream reaches.

O§8.3.2-9 Demonstrate an improving trend in the turbidity and suspended sediment.

Hydrologic Change

G§8.4.1-1 Limit the adverse impact of hydrologic change on covered anadromous salmonid and amphibian species or on beneficial uses of water.

O§8.4.1-1 Reduce hydrologic change by maintaining at least 50% canopy cover, averaged across CalWater planning watersheds in the plan area.

O§8.4.1-2 Minimize hydrologic connectivity of road systems to watercourses as outlined in Appendix E, *Roads, Landings, and Skid Trails* by upgrading, within the first 30 years of the HCP/NCCP, the MRC road network to these standards.

O§8.4.1-3 Maintain, during water drafting, equivalent temperatures downstream and upstream and limit the reduction of the wetted width of the 1st downstream riffle as well as pool volume.

TERRESTRIAL HABITAT

Snags, Downed Wood, and Wildlife Trees

G§9.2.2-1 Retain and recruit snags in managed stands and downed wood on the forest floor.

G§9.2.2-2 Retain all wildlife trees.

G§9.2.2-3 Manage wildlife trees and downed wood so that they

- Are well distributed across the forest—in both riparian and upslope areas, in groups and singly.
- Exist in sufficient quantity and quality across the forest.

Summary of MRC Goals and Objectives

O§9.2.2-1	Retain in Class I and Large Class II AMZ at least ▪ 1 hard snag or recruitment tree *on average per acre* that is ≥16 in. dbh and ≥ 30 ft tall. ▪ 2 hard snags or recruitment trees o*n average per acre* that are ≥24 in. dbh and ≥ 40 ft tall. ▪ 1 wildlife tree or recruitment tree *on average per acre* that is ≥ 16 in. dbh and ≥ 30 ft tall. ▪ 6 hard logs *on average* per acre that are (a) ≥16 in. average diameter, (b) ≥6 ft long, and (c) derived from at least 3 trees.
O§9.2.2-2	Retain in general forested areas at least ▪ 1 hard snag or recruitment tree *on average per acre* that is ≥16 in. dbh and ≥ 30 ft tall. ▪ 1 hard snag or recruitment tree *on average per acre* that is ≥24 in. dbh and ≥ 40 ft tall. ▪ 1 wildlife tree or recruitment tree *on average per acre* that is ≥ 16 in. dbh and ≥ 30 ft tall. ▪ 5 hard logs *on average per acre* that are (a) ≥16 in. average diameter, (b)≥ 6 ft long, and (c) derived from at least 3 trees.
Hardwoods	
G§9.3.2-1	Restore stands that historically were dominated by conifers.
G§9.3.2-2	Exclude harvests from Class I hardwood stands.
G§9.3.2-3	Maintain patches dominated by early seral hardwoods in variable retention units.
G§9.3.2-4	Provide representative samples of early seral hardwood stands throughout the plan area.
O§9.3.2-1	Retain, after harvest**,** 15 ft^2/ac of hardwoods > 6 in. dbh, if such hardwoods comprised at least 15 ft^2/ac of the total basal area of a silvicultural unit prior to harvest.
O§9.3.2-2	Prohibit treatment of hardwoods > 6 in. dbh if such hardwoods comprise less than 15 ft^2/ac of the total basal area of a silvicultural unit prior to harvest.
O§9.3.2-3	Maintain true oak stands.
O§9.3.2-4	Retain hardwood components of riparian stands (AMZs) unless the riparian stand has been identified for conversion to conifer.
O§9.3.2-5	Retain hardwood areas within variable retention units.
O§9.3.2-6	Harvest in representative sample areas only to maintain the relative proportion of hardwoods to conifers.
O§9.3.2-7	Designate 1487 ac as representative sample areas for early seral hardwood stands (Appendix B, *HCP/NCCP Atlas*, MAPS 4A-C).
Old Growth	

Summary of MRC Goals and Objectives

G§9.4.2-1	Preserve and enhance the character and function of old growth and late-successional forests in the plan area.
G§9.4.2-2	Promote the development of mature and late-successional forest.
G§9.4.2-3	Protect the remaining old-growth trees and forest in the plan area.
O§9.4.2-1	Maintain 101 ac of Type I old growth currently identified in the plan area, as well as any new Type-I old-growth stands later discovered in the plan area, in order to retain their stand acreage and enhance stand function.
O§9.4.2-2	Maintain 520 ac of Type II stands currently identified in the plan area, as well as any new Type II stands later discovered in the plan area in order to retain their stand acreage and enhance stand function.
O§9.4.2-3	Increase acreage of mature and late successional forest within AMZ and LACMA (see M§13.9.2.2-1, M§13.5.1.2-2, M§13.5.1.1-1, M§13.5.1.1-2).
Rocky Outcrops	
G§9.5.2-1	Retain and preserve known rocky outcrops in the plan area.
G§9.5.2-2	Minimize disturbance of rocky outcrops.
G§9.5.2-3	Avoid adverse impacts to sensitive species that may inhabit or use rocky outcrops for reproduction, cover, or foraging, particularly the peregrine falcon.
O§9.5.2-1	Preserve and maintain 3 rocky outcrops comprising 63 ac (20 ha) across 3 planning watersheds.
Common Natural Communities	
G§9.6.1.2-1	Maintain existing natural communities.
O§9.6.1.2-1	Regenerate harvested conifer forest with a mix of conifer species similar to the harvested stand.
O§9.6.1.2-2	Maintain various successional stages of coastal forest, including Type I and Type II old-growth stands as well as representative hardwood forests.
O§9.6.1.2-3	Maintain existing stand dominance of native conifers other than redwood and Douglas fir where this occurs.
Uncommon Natural Communities	
G§9.6.2.2-1	Maintain existing natural communities.
O§9.6.2.2-1	Reintroduce and manage ecological processes or surrogates after obtaining approval of the wildlife agencies.
O§9.6.2.2-2	Conserve 3274 ac of uncommon natural communities by limiting MRC activities within them: • 135 ac of pygmy forest. • 319 ac of Bishop pine. • 1084 ac of oak woodlands. • 1669 ac of grasslands. • 67 ac of salt marsh.

Summary of MRC Goals and Objectives

O§9.6.2.2-3 Control any species which the wildlife agencies and MRC designate as an exotic invasive.

Invasive Species

G§9.7.2-1 Reduce the adverse ecological effects of invasive species in the plan area in order to enhance natural communities and protect covered species.

O§9.7.2-1 Eradicate or reduce the cover, biomass, and distribution of target, non-native invasive plants, such as jubata grass, broom, and eucalyptus, in the plan area through an Invasive Plant Control Program (IPCP).

O§9.7.2-2 Reduce the number and distribution of non-native, invasive animals, such as bullfrogs, if they threaten the ecological balance in natural communities or the populations of covered species.

O§9.7.2-3 Implement, with external or MRC funding and with the cooperation of the wildlife agencies as well as other land agencies, control programs for existing and newly discovered invasive species which benefit the region.

FISH AND WILDLIFE

Coho Salmon

G§10.2.1.2-1 Maintain and improve anadromous salmonid distribution throughout the plan area.

G§10.2.1.2-2 Maintain and improve aquatic habitat.

Major Drainage Basins

O§10.2.1.2-1 Maintain presence of

- Steelhead in 100% of the ASMB where baseline data and new information indicate their presence.
- Coho salmon in 100% of ASMB, where baseline data and new information indicate their presence.

NOTE
MRC considers anadromous salmonid species *present* if we detect them once during 3 annual consecutive surveys in a basin. We will consider that basin able to *support* the new species only if we detect them on 2 or more occasions in a continuous 6-year time period.

Distribution

O§10.2.1.2-2 Maintain steelhead in 90% of sampling sites throughout the plan area, where baseline data and new information indicates their presence.

O§10.2.1.2-3 Maintain coho salmon in 85% of sampling sites throughout the plan area, where baseline data and new information indicates their presence.

NOTE
MRC set objectives for coho salmon and steelhead distribution at less than 100% to account for natural variations in flow and temporary barriers, such as log jams, which may impede accessibility. When we detect new fish species in a sampling site, we will consider that sampling site able to support the new species only if we detect them on 2 or more occasions in a continuous 6-year time period.

Chinook Salmon Monitoring Reaches

Summary of MRC Goals and Objectives

OS10.2.1.2-4	Maintain Chinook salmon in the Chinook Salmon Monitoring Reaches (CSMR) currently identified for annual monitoring: Hollow Tree Creek and North Fork Noyo River (see *HCP/NCCP Atlas*, MAPS 3A-3C).
Red-legged Frogs	
G§10.2.2.2-1	Manage for well distributed meta-populations (i.e., partially isolated sub-populations) of red-legged frogs.
G§10.2.2.2-2	Maintain and manage red-legged frog habitats for native species.
Distribution	
O§10.2.2.2-1	Establish the baseline distribution of both potential and documented red-legged frog breeding sites by Year 2 of HCP/NCCP implementation.
Occupancy	
O§10.2.2.2-2	Maintain red-legged frogs in 100% of the red-legged frog management units (RLFMU), where baseline surveys and new surveys indicate their presence. **NOTE** MRC considers red-legged frogs *present* if we detect them once during 3 annual consecutive surveys. Since red-legged frogs live approximately 6 years, this survey period covers about half their life expectancy.
Habitat	
O§10.2.2.2-3	Maintain habitat quality (e.g., maximum depth and surface area) at 90% of potential breeding sites identified during distribution surveys, including water drafting sites. **NOTE** MRC set habitat objectives at less than 100% to account for the temporary nature of some sites; for example, pools upstream of log jams may dissipate after the log jam shifts.
O§10.2.2.2-4	Create amphibian habitat when constructing new water drafting ponds in the course of covered activities.
Coastal Tailed Frogs	
G§10.2.3.2-1	Maintain or enhance baseline distribution of larval coastal tailed frogs.
Distribution	
O§10.2.3.2-1	Establish a baseline distribution of larval coastal tailed frogs by Year 2 of HCP/NCCP implementation.
O§10.2.3.2-2	Maintain larval coastal tailed frogs in 95% of sites where either the baseline distribution survey, incidental observation, or a new survey indicates their presence. **NOTE** MRC set the distribution objective at less than 100% to account for sampling error.
Northern Spotted Owls	
G§10.3.1.2-1	Contribute to overall population increases and species recovery in northern California.
G§10.3.1.2-2	Maintain well-distributed and productive owl populations in the plan area.

Summary of MRC Goals and Objectives

G§10.3.1.2-3	Increase the owl nesting/roosting habitat by allowing a larger proportion of stands to progress and persist to a point where they have characteristics suitable for owl nesting and roosting.
Population Objective 1	
O§10.3.1.2-1	Maintain at least 28 Level-1 territories and 67 Level-2 territories during the first 60 years of the HCP/NCCP.
Population Objective 2	
O§10.3.1.2-2	Increase to 34 Level-1 territories and 80 Level-2 territories by Year 75 of the HCP/NCCP.
Distribution Objective 1	
O§10.3.1.2-3	Achieve by Year 40 of the HCP/NCCP a distribution of spotted owl territories in each inventory block that is proportionate to its potential nesting/roosting habitat, i.e., an inventory block with 10% of the total potential nesting/roosting habitat in the plan area should have at least 10% of the Level-1 and Level-2 territories specified in the population objectives (see Table 10-7).
Distribution Objective 2	
O§10.3.1.2-4	Achieve by Year 75 of the HCP/NCCP a distribution of spotted owl territories in each inventory block that exceeds *Distribution Objective 1* by 20% (see Table 10-7).
Habitat Objective 1	
O§10.3.1.2-5	Achieve by Year 40 of the HCP/NCCP a landscape configuration in which 23% of all potential habitat is nesting/roosting habitat, while still maintaining separate objectives for each inventory block (Table 10-10).
Habitat Objective 2	
O§10.3.1.2-6	Achieve by Year 75 of the HCP/NCCP a landscape configuration in which 25% of all potential habitat and 25% of each inventory block are nesting/roosting habitat (Table 10-10).
Marbled Murrelets	
G§10.3.2.2-1	Protect the murrelet population and its habitat in Lower Alder Creek.
G§10.3.2.2-2	Protect and increase potential murrelet habitat across the plan area.
O§10.3.2.2-1	Retain permanently all trees defined as primary murrelet habitat trees.
O§10.3.2.2-2	Retain permanently all sites occupied by marbled murrelets.
O§10.3.2.2-3	Maintain murrelet presence in the Navarro River watershed and in drainages in which, in the future, MRC biologists detect murrelets.
O§10.3.2.2-4	Provide opportunities for the wildlife agencies to analyze or purchase conservation easements in 6 MRC areas compatible for development of murrelet habitat and for murrelet colonization.
O§10.3.2.2-5	Maintain a stable or increasing (i.e. non-declining) number of murrelet radar detections at LACMA.
Point Arena Mountain Beaver	

Summary of MRC Goals and Objectives

G§10.3.3.2-1	Maintain or increase the population of Point Arena mountain beaver by increasing the amount and quality of their current habitat in the plan area.
O§10.3.3.2-1	Maintain or enhance at least 85% of the known burrow systems of Point Arena mountain beaver in the plan area (i.e., 12 of 14).
O§10.3.3.2-2	Create at least 1 site of potential habitat for each active burrow system when harvest occurs within the assessment area for Point Arena Mountain Beaver.
	COVERED RARE PLANTS
G§11.2-1	Conserve the natural communities, habitats, and occurrences of covered rare plant species found in the plan area.
G§11.2-2	Contribute to the recovery of covered rare plant species in the plan area that are listed as *threatened* or *endangered* by CDFG or USFWS.
G§11.2-3	Manage and conserve rare plant species that are not listed as *threatened* or *endangered* so that listing remains unnecessary.
Management Category 1 (MC1)	
O§11.2-1	Maintain all covered rare plant occurrences in the plan area at stable-to-increasing levels of abundance and distribution (i.e., occurrence trend is stable-to-increasing).
O§11.2-2	Avoid or minimize mortality of individual plants.
O§11.2-3	Minimize direct and indirect adverse impacts to occurrences, such as ground disturbances, accelerated erosion, accelerated sedimentation, fuel spills, slash deposition, and increases in number or cover of invasive pest plants.
O§11.2-4	Retain existing site conditions of importance to covered rare plants, such as microclimatic factors (sun/shade levels, humidity); soil factors (soil structure, soil moisture regime, soil compaction level); local hydrology; ground disturbance levels; and plant species composition of the community and habitat.
Management Category 2 (MC2)	
O§11.2-5	Maintain a stable-to-increasing number of occurrences in each inventory block where the covered species is known (i.e., species trend is stable-to-increasing).
O§11.2-6	Maintain, on average, stable-to-increasing levels of abundance and distribution for the covered species throughout its range in the plan area (i.e., species trend is stable-to-increasing).
O§11.2-7	Minimize mortality of individual plants
O§11.2-8	Reduce direct and indirect adverse impacts, such as ground disturbances, accelerated erosion, accelerated sedimentation, fuel spills, slash deposition, and increases in number or cover of invasive pest plants.
O§11.2-9	Minimize changes in site conditions of importance to rare plants, such as microclimatic factors (sun/shade levels, humidity); soil factors (soil structure, soil moisture regime, soil compaction level); local hydrology; ground disturbance levels; and plant species composition of the community and habitat.
Management Category 3 (MC3)	

Summary of MRC Goals and Objectives

O§11.2-10	Maintain stable-to-increasing levels of abundance and distribution within all inventory blocks where the covered species is found (i.e., species trend is stable-to-increasing).
O§11.2-11	Reduce mortality of individual rare plants, as feasible.
O§11.2-12	Reduce, as feasible, direct and indirect adverse impacts, such as ground disturbance, accelerated erosion, accelerated sedimentation, fuel spills, slash deposition, and increases in number or cover of invasive pest plants.
O§11.2-13	Minimize, as feasible, changes in site conditions of importance to rare plants, such as microclimatic factors (sun/shade levels, humidity); soil factors (soil moisture regime, soil compaction level); local hydrology; ground disturbance levels; and plant species composition of the community and habitat.
Management Category 4 (MC4)	
O§11.2-14	Maintain number and size of occurrences in the plan area so that the species continues to qualify for its current S rank or an S rank that denotes greater abundance (see section 11.5.1).
O§11.2-15	Reduce mortality of individual rare plants, as feasible.
O§11.2-16	Maintain stable-to-increasing occurrences in the plan area, mainly through community-based conservation measures.

7.8 Proposing Conservation Measures to Meet Goals and Objectives

In Chapters 8 through 11, we propose conservation measures for aquatic habitat, terrestrial habitat, and covered species. In a few cases, we also provide *alternatives* to proposed conservation measures.

DEFINITION

A **conservation measure** is one or more proposed prescriptions to avoid, minimize, or otherwise mitigate adverse impacts to covered species or to protect, restore, or enhance habitat for these species.

An **alternative conservation measure** is an equivalent measure for a specified context that (a) meets or exceeds the protections of a conservation measure that would normally be implemented; and (b) has the approval of the wildlife agencies.

MRC is proposing very little direct management of covered species, such as translocation. Instead, we will cooperate with the wildlife agencies on management efforts to enhance the habitat and status of covered species in the plan area and in the region. Throughout the drafting of our HCP/NCCP, MRC has reached agreement with the wildlife agencies on each conservation measure, as well as any limits of deviation that should apply (e.g., C§8.3.3.1.2-9 through C§8.3.3.1.2-11). *Appendix W* contains a summary of all the proposed conservation measures.

7.9 Organizational Structure for HCP/NCCP Implementation

MRC will implement our HCP/NCCP through the covered activities described in section 1.14. While these covered activities will usually occur during harvest operations within PTHPs, some, such as habitat improvement and covered species monitoring, will occur outside PTHPs.

7.9.1 Operations and monitoring coordinators

MRC will ensure that all our employees and contractors learn the applicable conservation measures for their job duties. In carrying out this responsibility, we will assign 2 persons to oversee implementation of our HCP/NCCP.

- An HCP/NCCP operations coordinator will review PTHPs for conformance to the plan and consult with the wildlife agencies on operational issues. In the first 3 years of HCP/NCCP implementation, the operations coordinator will review up to 25 PTHPs, starting with all PTHPs with active operations in the initial year of our HCP/NCCP (if 25 or less). The operations coordinator will continue to review PTHPs until 25 have been reviewed, or 3 years have elapsed, whichever comes first.

- An HCP/NCCP monitoring coordinator will oversee requisite monitoring, ensure its completion, distribute reports to the wildlife agencies, and consult with them on monitoring issues.

Both the operations and monitoring coordinators will prepare an annual report that summarizes post-harvest compliance and identifies those issues which MRC will address with additional effort and training.

7.9.2 Foresters

MRC foresters will be the primary implementers of our HCP/NCCP. They will prepare PTHPs in accordance with our HCP/NCCP, the PTEIR, and the Forest Practice Rules. In addition, they will supervise PTHP operations as well as other management activities on our land, such as road maintenance and vegetation management. When necessary, MRC will contract with a professional geologist to review proposed operations or to complete a geological review for watershed analysis.

7.9.3 Forest science staff

Even prior to HCP/NCCP implementation, biologists in our Forest Science Department have performed some tasks which our HCP/NCCP monitoring programs will require. These tasks include monitoring of northern spotted owls, LACMA, and stream channel conditions, as well as surveying for Point Arena mountain beaver. Since 2006, MRC has posted our monitoring results on the MRC website.[10]

7.9.4 Road, inventory, and GIS staff

MRC has a dedicated crew to do road inventory, along with analysts for our timber inventory database, landscape model, and GIS. Each of these organizational areas will provide essential data for HCP/NCCP implementation.

[10] http://www.mrc.com/Monitoring-Overview.aspx (accessed 02/14/2011)

7.10 Implementation Pacing and Funding

7.10.1 Concurrency of conservation, mitigation, and routine operations

Conservation and mitigation under our HCP/NCCP will proceed concurrently with routine MRC operations and timber harvests. Foresters, for example, will incorporate appropriate conservation measures into their PTHPs and conduct operations in accordance with HCP/NCCP time frames established in Chapters 8–11 and Appendix E, *Road, Landing, and Skid Trail Standards*. Those time frames ensure that MRC implements key conservation measures in proportion to impacts to covered species from covered activities.

As the impacts from covered activities increase, the conservation effort intensifies. In other words, as timber harvest and other covered activities increase on a per acre basis, the implementation of conservation measures will increase in direct proportion, on an acre-per-acre basis. In years of reduced harvest, implementation of the conservation measures will outpace the impacts of covered activities. In this sense, there will be "rough proportionality" between conservation efforts and level of impacts. This will ensure that conservation and mitigation are not "catch up" efforts as the term of the plan draws to a close.

The number of acres on which MRC implements conservation and mitigation each year will meet or exceed the number of acres on which we conduct timber harvest and other covered activities. MRC will include in each annual report the number of acres on which timber harvest occurs and the number of acres on which we implemented conservation measures, as well as other conservation efforts. Data for the new report (see section D.9) will include

- Levels of impact.
    - Volume harvested.
    - Acres harvested.
    - Miles of new road construction.
    - Number of new stream crossing by stream class.
- Measurable conservation efforts.
    - Annual growth of trees (comparable to volume harvested).
    - Acres retained in core areas of northern spotted owls.
    - Acres retained in uncommon natural communities, e.g., pygmy forest.
    - Number of old growth trees retained.
    - Number of wildlife trees retained.
    - AMZ acres retained.
    - Volume of controlled sediment.
    - Dollars spent on controlling sediment.
    - Number of trees planted.
    - Acres preserved in Lower Alder Creek Management Area (LACMA).
    - Acres maintained in Murrelet Habitat Recruitment Stands (MHRS).
    - LWD added to streams.
    - Miles of road decommissioned or abandoned.
    - Miles of road upgraded to HCP standards.
    - Number of fish passage barriers removed and miles of stream opened.

7.10.2 Sample annual budget for HCP/NCCP implementation

Before January 30th of each year, MRC will submit to the wildlife agencies an annual budget approved by our Board of Directors. This budget will authorize sufficient expenditure funds for the current year to carry out MRC commitments under federal and state permits and under our HCP/NCCP. In addition, the president of MRC will deliver to the wildlife agencies a letter verifying that MRC has established an accounting reserve or maintained an adequate amount to implement measures included in the operating program. HCP/NCCP implementation will impose costs beyond normal MRC operating costs for that year. MRC will also provide a report from an independent auditor confirming that MRC has established or maintained such reserve. The amount of the accounting reserve will reflect the amount shown in the annual budget, but in no event will the amount be less than $2,000,000. Details about the accounting reserve are in Appendix A (*Implementating Agreement*, section A.8.1, "Primary Funding and Demonstration of Availability"). MRC will adjust the amount of the accounting reserve each year based on the Consumer Price Index published by the Bureau of Labor Statistics of the United States Department of Labor (San Francisco-Oakland-San Jose, CA). The amount will be increased or decreased in proportion to the extent of lands added or deleted in accordance with section 1.12 of our HCP/NCCP.

Table 7-7 shows a sample MRC budget for the initial year of HCP/NCCP implementation. We estimated the budget numbers based on existing budgets for MRC departments, plus additional costs for monitoring and implementation in the plan area. Our estimate excludes annual capital and logging costs. As part of our ongoing forest management, we have already implemented over half of the requirements of our HCP/NCCP. Consequently, we calculated that HCP/NCCP implementation will exceed our current costs by 40%. The sample budget below reflects this increase. The actual amount allocated to each program cited will depend on economic conditions within MRC and the timber industry at the time of HCP/NCCP commencement. The global financial crisis that began in 2008 and may persist for several years has made budget projections much less predictable for the entire business community.

Table 7-7 Sample Budget for Initial Year of HCP/NCCP Implementation

Program	US$
Terrestrial Wildlife	**$170,000**
Aquatic Wildlife	**$95,000**
Sediment Control/Road work	**$260,000**
Forestry	**$370,000**
Administration	**$840,000**
Inventory	**$75,000**
GIS	**$30,000**
Total	**$1,840,000**