MENDOCINO REDWOOD COMPANY, LLC

Management Plan

August 2015

The complete text of this report and additional information about Mendocino Redwood Company may be found on our website: **www.mrc.com**

If you would like to give feedback to Mendocino Redwood Company on any aspect of this plan, please contact us via the contact form available on the website.

Rev 004

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Our Purpose

Mendocino Redwood Company was formed with the idea that it is possible to manage a large block of productive forestland utilizing high standards of environmental stewardship and at the same time to operate as a successful business.

To us, managing forestland with a high degree of environmental stewardship means that, as each decade of MRC management passes:

1. The inventory of redwood, Douglas-fir, and other conifer trees on our property will improve.
2. The habitat available to land-based species will improve.
3. The habitat available to aquatic-based species will improve.
4. The species composition present on our land will begin to more closely resemble the composition of forestlands and wildlife before commercial timber harvest removal.

Operating as a successful business means:

5. Being a business that people will want to work for.
6. Being a business that the community is proud of.
7. Being a business that is known for producing quality products and keeping its word.
8. Being a business that earns a return on the capital invested in the business over time.

Introduction

Operational Policies

- Supplement the California Forest Practice Rules
- Provide internal guidance for areas where MRC will operate with a higher degree of environmental sensitivity or urgency than is currently required by law
- Implement an operating policy that is followed in nearly all situations unless forest conditions are unique or pose a threat to safety, warranting a deviation from policy. Deviations from policy must be approved by the Director of Stewardship and President.
- Provide unambiguous and measurable expectations.

The Mendocino Redwood Company, LLC (MRC) began operations on June 30, 1998 with the purchase of 232,000 acres of timberland in California (since 1998, approximately 3,000 acres were sold in conservation purchases resulting in approximately 228,000 acres of timberland). The purpose of the company, presented on the previous page, was written in October of 1998 with input from many employees. This Management Plan has been completed to provide details on where we are today with our purpose, policies, plans, and targets. It is meant to give employees, neighbors, regulators, and other interested members of our larger community a concise, "user-friendly" summary of where we are going and how we will monitor progress. The current version of the management plan was updated in August of 2015.

Each of the eight components of the company's purpose is explored in a separate section. These sections contain data tables, operational policies, plans, and targets. MRC's intent is to restore and maintain forestlands for long-term ecological, social, and economic vitality. In addition to its own internal monitoring, MRC certified in accordance with the standards of the Forest Stewardship Council's Forest Management Certification requirements[1]. As more research and information becomes available we will continue to publish updates to this Management Plan.

Operational Targets

- Developed to be consistent with the components of our purpose
- Monitored to measure progress
- Used in recognizing and rewarding employees
- Verifiable by outside organizations

[1] RA-FM/COC-000128

1. Inventory of Conifer Trees

"The inventory of redwood, Douglas-fir, and other conifer trees on our property will improve."

Introduction: The Mendocino Redwood Company owns 228,852[2] acres of land in California: 219,997 in Mendocino County and 8,855 acres in Sonoma County. (See Map on page 5) Approximately 98% of our lands are forested. The balance is covered with grass, water, brush, or other non-timber vegetation. These forests include a variety of conifer and hardwood species as shown by sustainability units in the chart below. Sustainability units are used to better define and understand trends in our forest management and forestlands. We have divided MRC's ownership into 17 'Sustainability Units'.

Number of Trees
Estimate of Trees Greater Than 8" DBH* (as of 12/1/14)

Su	Total Acres	Total Trees	Redwood	Douglas-fir	Other Conifer	Tanoak	Madrone	Other Hardwood
Albion	16,269	1,720,912	835,427	317,868	50,178	438,248	50,137	29,053
Alder Cr	10,642	1,924,586	412,455	426,157	4,363	887,992	162,953	30,666
Annapolis	7,044	1,085,700	174,880	237,119	1,552	560,989	36,747	74,413
Big River North	9,036	1,071,135	380,908	203,122	15,517	439,039	21,453	11,098
Big River South	17,700	2,225,989	689,962	476,316	2,127	944,826	61,142	51,616
Elk Cr	14,075	2,136,511	772,739	485,725	31,615	717,805	115,233	13,393
Garcia River	15,634	2,840,561	861,459	534,794	104,459	1,032,179	166,092	141,579
Greenwood Cr	9,882	1,745,631	519,888	409,767	22,536	727,001	37,520	28,918
Hollow Tree	21,046	4,174,140	655,111	1,212,006	325	2,023,764	242,585	40,349
North Navarro East	13,139	1,765,275	573,184	406,858	974	717,924	45,701	20,634
North Navarro West	9,811	1,240,462	499,687	203,419	18,526	444,112	41,963	32,754
Noyo	19,346	2,578,878	943,790	399,346	37	1,149,594	71,579	14,532
Rockport Coastal	18,138	2,407,952	851,541	504,444	38,015	933,697	68,574	11,681
South Navarro East	17,713	2,452,261	631,516	669,194	17,120	874,105	208,587	51,739
South Navarro West	14,577	2,058,135	796,740	309,016	90,545	775,791	33,235	52,807
Ukiah	12,989	1,458,610	265,290	466,758	1,571	531,686	110,175	83,131
Willow Cr	1,811	230,633	83,467	30,138	-	89,592	1,876	25,560
Total	228,852	33,117,370	9,948,046	7,292,048	399,458	13,288,341	1,475,554	713,924

* DBH = diameter at breast height, approximately 4.5 ft. off the ground.

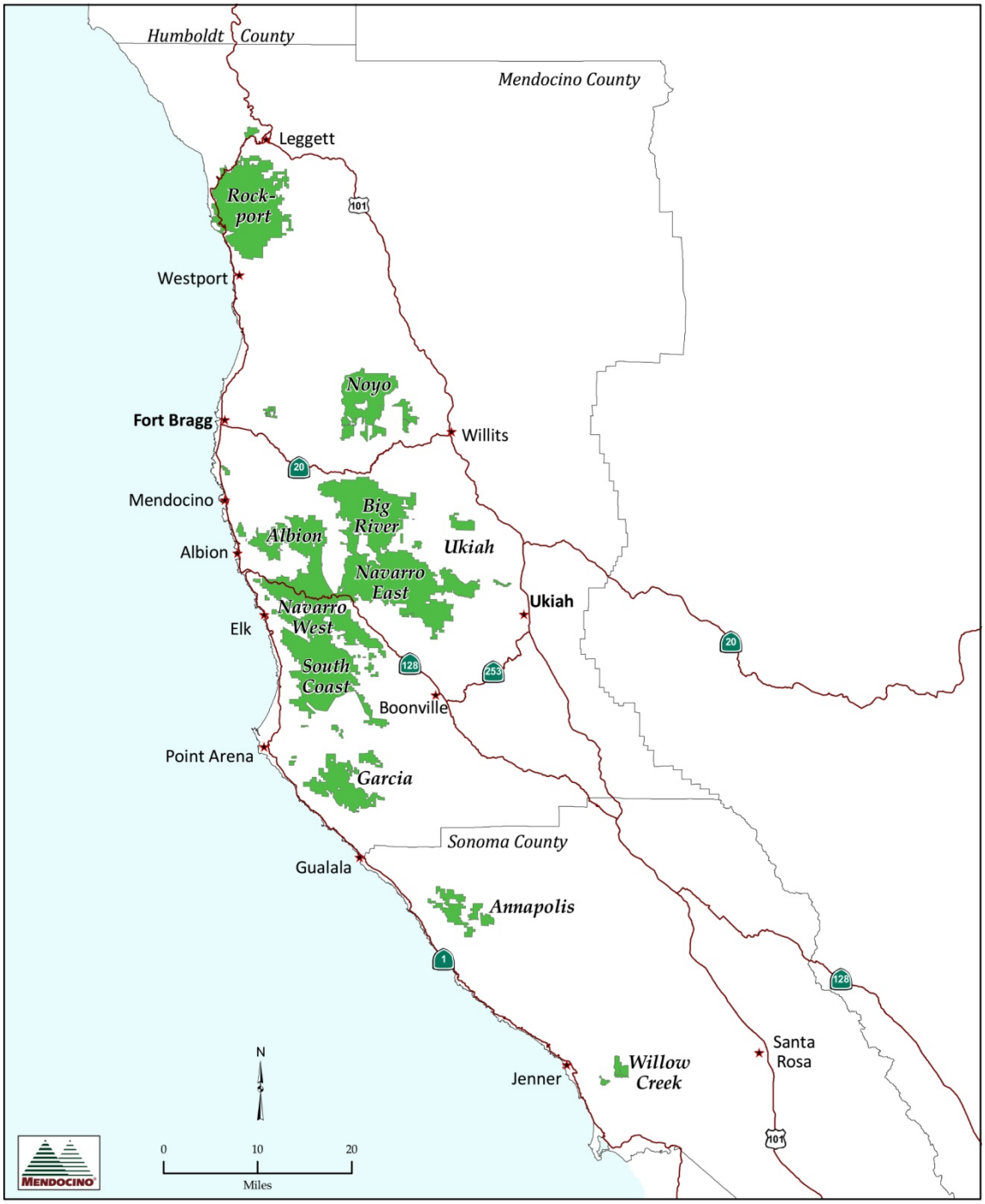
History: Prior to the 1850s, MRC forestlands were largely untouched late successional redwood and Douglas-fir mixed forests supporting communities of Native Americans (such as the Pomo, Yuki, Cahto, Wilaki, and Sinkyone). The grounding of the trading ship, *Frolic*, in 1850 led to discovery of these lands by white settlers from San Francisco. A sawmill, constructed in 1852 at Big River, was the beginning of the redwood lumber industry on the Mendocino Coast of California.

[2] Note all acreages in this document are taken from our MRC base GIS layer. Areas of landscape features are approximate and total and area acreages may differ due to differences in sources of MRC base layers as well as rounding error.

Companies such as Union Lumber, Albion Lumber, Mendocino Lumber, Rockport Redwood, Cottoneva Lumber, Rockport Redwood, and Southern Pacific Land were some of the early owners of what now comprise MRC forestlands. Harvesting started at the mouths of watersheds and progressed up-stream and up-slope to the ridgelines. Initial logging activities generally consisted of a regimen of burn, clearcut, and burn again, followed by logs being dragged downhill by oxen and steam donkeys to the nearest stream. Logs were transported to mills via the river systems. Later entries into these forests, and forests further inland, were commonly accomplished with steam donkeys (steam driven cable machines), and railroads. During the 1940s, crawler tractors and trucks replaced the railroads. Clearcutting continued to be a common harvest method. In response to tax laws in the 1940s and 1950s, many stands were managed to remove 70% of the stocking, typically the larger, healthier trees. Subsequent owners managed the lands to maximize fiber output and the success of their mill investments. As a result of this ownership history and harvesting methods, a significant portion of the MRC acreage is at reduced levels of conifer stocking with trees in smaller diameter size classes.

Mendocino Redwood Company forestlands are indicated by green areas on the map.

Mendocino Redwood Company Vicinity
&
Inventory Block Locations



1) Inventory Target

MRC's objective is to reverse this historical trend and improve the quantity and quality of redwood, Douglas-fir, and other conifer trees on these forestlands.

The predicted future inventory is based on estimates of conifer growth which average from 3% to 5% per year, depending on area. This increase in inventory is achieved over time by growing more each year than we harvest. The following chart shows the results of modeled simulation of the growth of conifer inventory by decade. These model projections are based on empirical data from the redwood region calibrated to MRC lands and use conservative growth estimates.

MRC Inventory Target
Redwood, Douglas-fir and other Conifers - Board Feet*

		Currennt	By End of 5th Decade	By End of 10th Decade
	2000	2014	2060	2100
Total Redwood, Douglas-fir, and other Conifer Inventory				
Total Inventory 10" dbh and greater trees (billions of board feet)	2.30	3.40	4.60	5.70
Inventory per Acre 10" dbh and greater trees (thousand board feet per acre)	9.9	14.9	20.1	24.7

* A Board Foot is approximately 1 foot by 1 foot by 1 inch of wood, a common term used to determine the volume in the trunk of a tree; it is systematically adjusted during tree measuring (scaling) for flare and bark.

2) Total Inventory

MRC needs accurate estimates of total inventory and growth to determine harvest levels and to plan silvicultural (planting, thinning and vegetation control) activities. The current inventory data for the MRC acreage is based on collection activities over the past twelve years. During this time, a variety of techniques have been used to increase the level of accuracy in the sustainability units on the property. These have included vegetative typing by foresters, stand-specific ground-based cruises, and aerial photo interpretation by inventory specialists and foresters.

MRC has classified our forestland into stands that represent similar vegetative types, topography, sensitivity attributes (riparian areas, endangered species occurrence, etc), and regulatory considerations. Generally, the minimum size or mapping unit for a stand is 20 acres, unless the stand has a particular sensitivity (such as watercourses) or a sharp contrast in vegetation. Limited areas with very sharp contrasts in vegetation or management sensitivity can result in stands less than 20 acres. In order to better define and understand trends in our forest management and forestlands, we have divided MRC's ownership into 17 'Sustainability

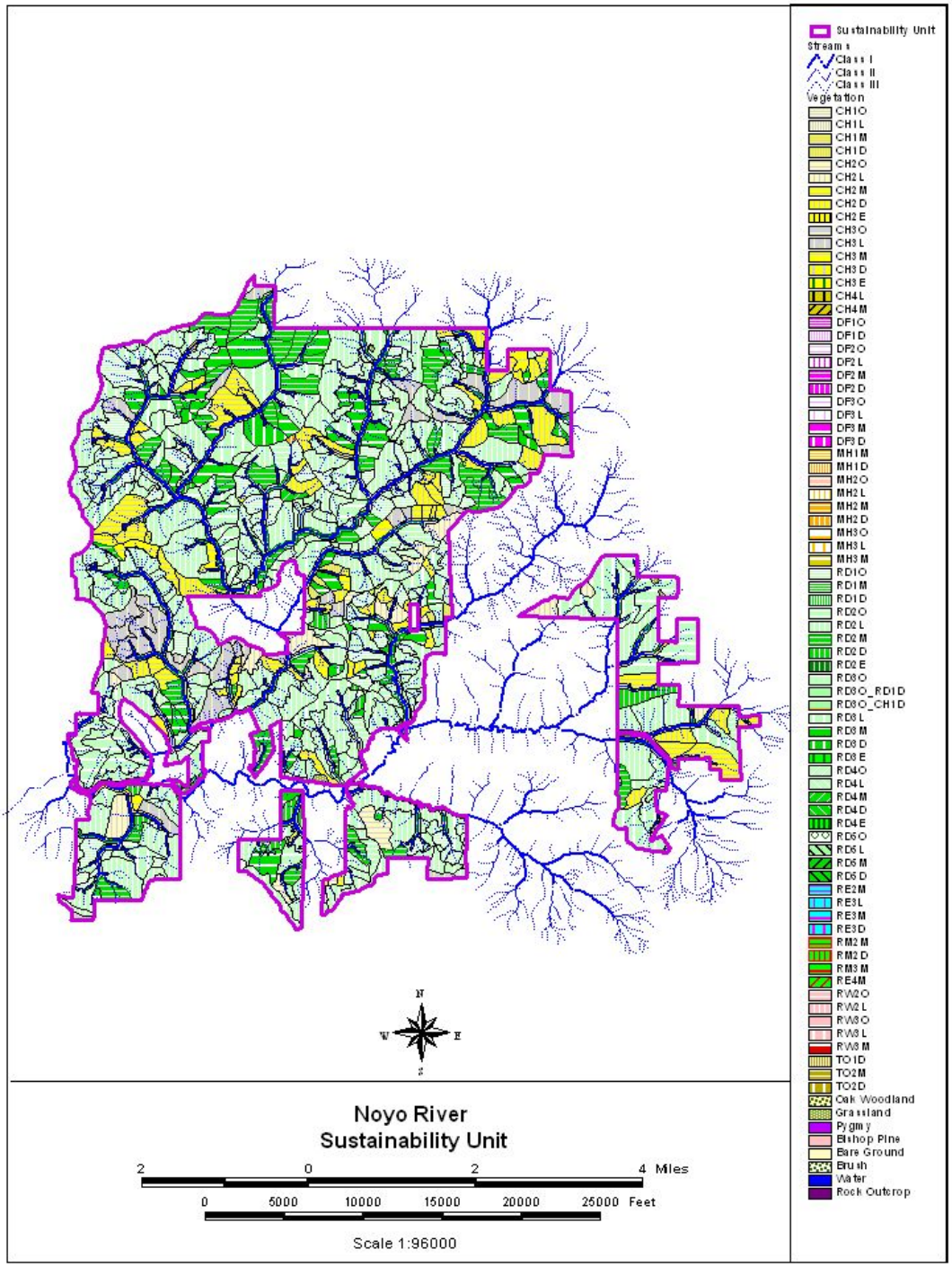
Units'. The Sustainability Units share common histories, have similar environmental variables, are affected by similar social concerns, and are watershed-based. Sustainability Units and the stands contained within them are the basis for assessing forest inventory, growth, and harvest. Field inventory plots (numbering over 21,000) are used to determine timber volume estimates by vegetation types over the 17 sustainability units across the ownership. The level of resolution and accuracy of MRC's inventory continues to improve. Inventory foresters collect data on each inventory plot that includes: tree species, diameter, and height; downed logs; wildlife trees and snags; and old growth trees. Inventory foresters have also established separate growth plots to calibrate conifer growth assumptions across the forestlands, these plots are discussed in item 4 (Tree Growth) on page 5.

3) Landscape Planning

MRC has implemented a method of inventory calculation and monitoring that further increases the precision of total inventory numbers and the ability to plan for cumulative harvest impacts across the landscape. The focal units are the 17 Sustainability Units depicted on the maps in Appendix A. Focusing on these Sustainability Units facilitates the creation of landscape-wide planning and monitoring. This "Landscape Planning" will incorporate numerous factors to determine harvest effects on growth, forest structure, and biodiversity.

The Landscape Planning methodology divides each Sustainability Unit into stands (as describe previously). All are mapped and each stand acquires data, also known as stand attributes. This data includes recent harvest and management history, wildlife and aquatic features, and whether a stand has a high community value. Measurements of tree characteristics and general forest structure are taken in a large sample of stands to provide confidence in the total inventory at the Sustainability Unit level. This inventory system has been in place since 2001. As an example, on page 8, there is a map that demonstrates how one planning watershed, Redwood Creek in the Noyo, is divided into stands and stand data layers. Explanations for the vegetation classifications are in Appendix A.

Map of Noyo Sustainability Unit with various vegetative strata.



4) Tree Growth

Growth of the forest is estimated by measuring and calculating the growth of new trees in harvest areas, the growth of new trees in non-harvested areas, and measuring and estimating the diameter and height growth on existing trees. Growth estimates take into account tree species, individual tree conditions, competition, harvest and other kinds of tree mortality. Projections of growth are also based on soil quality, temperature, moisture, slope, and elevation.

The model CRYPTOS (Cooperative Redwood Yield Research Project), developed by the Redwood Yield Cooperative of the University of California, is used to simulate growth across MRC forestlands, to help determine appropriate harvest levels, and to update annual inventory. Growth data in this model was originally obtained from plots installed across the redwood region from 1930 to 1980. MRC is in the process of further calibrating the CRYPTOS model with data gathered from over 200 permanent growth plots in various watershed areas across its ownership. These plots provide the ability to better represent actual growth conditions on MRC lands.

Growth varies widely by stand. Young stands with small trees may not have any measurable board foot volume, and although they may be growing rapidly, show zero volume growth until they reach a size where board foot calculations can be completed. Stands that have trees that are 25 to 50 years old may be growing in excess of 10%. Growth rates slow as trees approach maturity. Estimates of total growth for the ownership are weighted averages of growth rates for individual stands.

Conifer growth estimates for MRC forests show the total conifer tree inventory growing at an average annual rate of 3.8% per year or an average of 103 mmbf/year (before harvest) over the next five years. MRC harvests a third to a half of this growth on an annual basis. We expect to continue to refine our estimates of both conifer and hardwood growth through ongoing measurement of the permanent growth plots.

Total MRC Lands - Average Conifer Growth Estimate Next 5 Years

	Volume	% of Inventory
Conifers	103 million Bf/year	3.8%
Per Acre Average	444 Bf/acre/year	

5) Harvest Levels

As the forest grows into stands with larger conifers and a ratio of conifer-to-hardwood which is more representative of a mature conifer forest, our forest management will shift into mostly uneven-aged management techniques (i.e. selection). Also, as growth and conifer inventory increase, we will increase our harvest over time proportionally (always harvesting less than we grow until stands reach maturity).

Harvest Policy

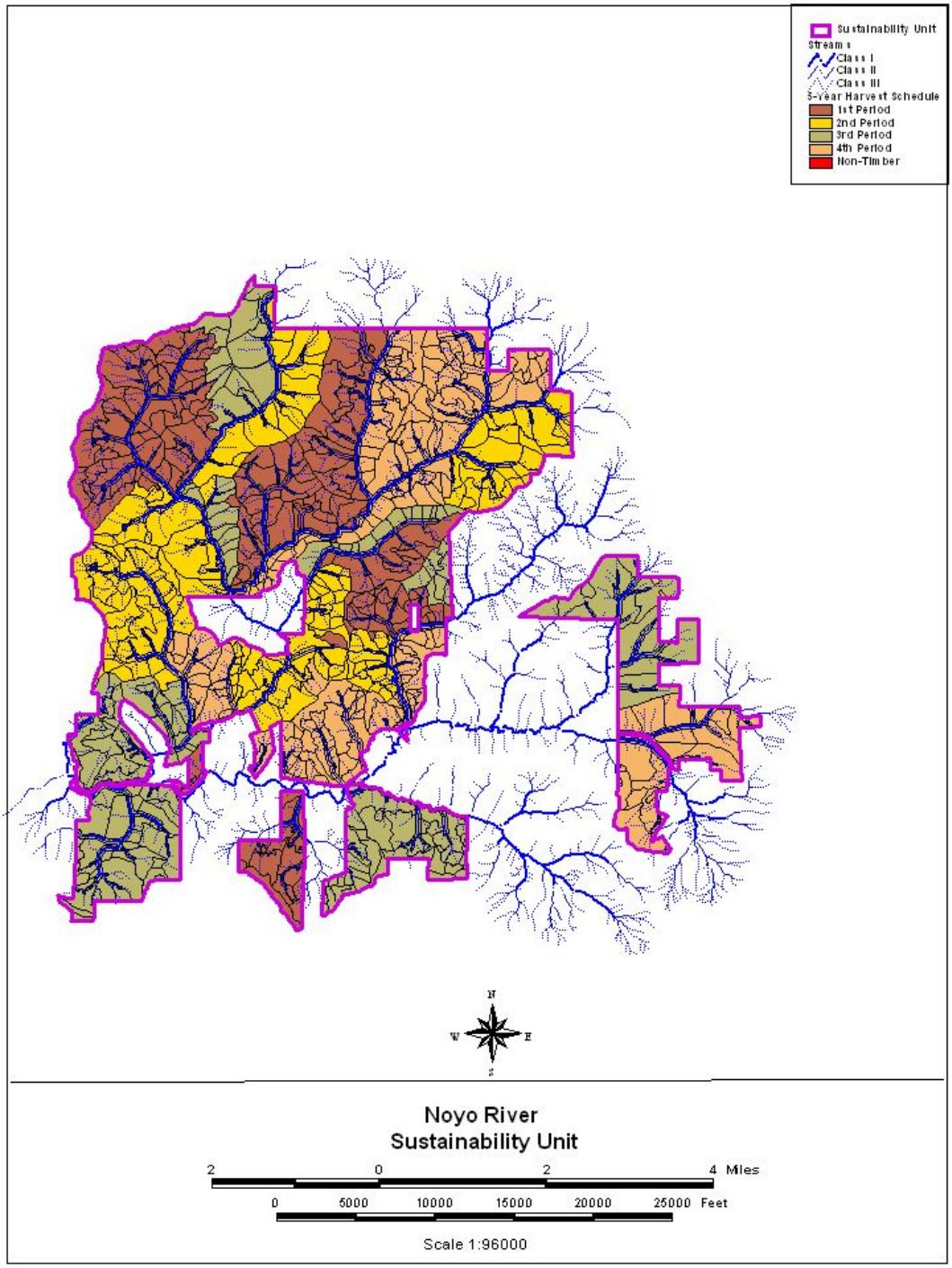
- Harvest less conifer than we grow on our forestlands
- Disperse harvest activity over the landscape to prevent concentrating impacts
- Retain and recruit the older stand component in the forest with more advanced structure
- Operate without traditional clearcutting; all harvest will retain elements of the original stand such as snags, green trees, stand structure, and other features important for a variety of ecological functions.

MRC forestlands are divided into two areas – managed by an individual forest manager. Each forest manager uses a variety of factors to decide where to harvest within a particular Sustainability Unit. Our approach to silviculture and harvest is based on the sustainability units. Each Sustainability Unit has been divided into four separate groups of Harvest Blocks, dispersed in a proportional manner across planning watersheds. Each Harvest Block represents a 5-year management period. Harvest Blocks are managed on average, every 20 years, since each silviculture method is slated for a 20-year re-entry. By harvesting in blocks of stands assembled around a common road network, we have reduced road use. By extending average harvest intervals to 20-years, we have reduced frequency of harvest. Our resource staff worked hard to design this system of 'Harvest Blocks' based on on-the-ground knowledge and aerial photo interpretation. These Harvest Blocks establish what is commonly referred to as 'area control' (see example page - - Noyo Sustainability Unit). Harvest blocks may change over time based on changing conditions (i.e. large wildfires).

The longer interval between harvests is accompanied with a silviculture strategy that is appropriate for regenerating the forest and managing competition. Silviculture methods continue to focus on selection with a 20-year return interval.

MRC will continue to incorporate restoration harvest methods, such as rehabilitation and transition as needed, to hasten the development of conifer dominated stands.

Map of the 4 5-year harvest periods in the Noyo Sustainability Unit.



The table below describes MRC's sustained yield over a 100-year period for the ownership based on our inventory modeled estimates for the ownership. The calculations are based on an accumulation of sustained yield from each sustainability unit in 5-year period increments. This information was submitted to the California Department of Forestry and Fire Protection as part of MRC's Option A to insure MRC meets state Forest Practice Rules requirements for Long-term sustained yield (LTSY) defined as, "the average growth sustainable by the inventory at the end of a 100-year planning horizon." The calculated LTSY for conifer portions of MRC is 151 million board feet (mmbf) per year or 654 board feet per acre per year.

Modeled Inventory, Growth, and Harvest by 5-year Period*

5-Year Period	Conifer Inventory	Conifer Growth	Conifer Harvest	Harvest as a Percent of Growth	Harvest as a Percent of Inventory (Annual)
1**	2,740,722	515,344	246,413	48%	2.25%
2	3,009,652	540,355	344,437	64%	2.29%
3	3,205,570	567,561	417,485	74%	2.60%
4	3,355,647	589,286	478,520	81%	2.85%
5	3,466,413	619,386	395,354	64%	2.28%
6	3,690,445	654,847	377,177	58%	2.04%
7	3,968,114	688,044	454,555	66%	2.29%
8	4,201,603	719,902	488,163	68%	2.32%
9	4,433,341	724,882	555,939	77%	2.51%
10	4,602,284	725,697	547,461	75%	2.38%
11	4,780,521	723,617	585,657	81%	2.45%
12	4,918,480	712,774	600,867	84%	2.44%
13	5,030,387	715,404	656,380	92%	2.61%
14	5,089,412	724,964	633,293	87%	2.49%
15	5,181,082	730,100	665,720	91%	2.57%
16	5,245,462	734,801	668,685	91%	2.55%
17	5,311,578	739,001	645,682	87%	2.43%
18	5,404,897	747,449	617,115	83%	2.28%
19	5,535,230	754,043	631,532	84%	2.28%
20	5,657,741	758,930	640,742	84%	2.27%

*All inventory data are in net thousand board feet (Scribner short log), unless otherwise specified.
** Inventory period 1 is only a 4-year period (from 2007-2010).

6) Silviculture

Silviculture is the science of managing aspects of forest composition and growth. Silviculture treatments include a variety of activities such as harvesting, planting, thinning, and brush management that impact the stocking and growth of a forest stand as well as the habitat provided by the stand.

Currently, the vast majority of MRC acreage is in young forest types. To meet our inventory goals, MRC has developed and implemented a set of trigger and retention policies for different kinds of harvests, also found in our current Option A document (http://www.mrc.com/Reports-OptionA.aspx). MRC discontinued the use of traditional clearcutting on its properties when we began business. However, MRC foresters needed a method to restore conifer forest in areas dominated by hardwoods. Instead of traditional clearcutting, foresters use variable retention, a special prescription initially developed by Jerry Franklin, implemented by MRC foresters, and approved by the California State Board of Forestry, to restore conifer forests that maintain structural elements and biological legacies on the landscape. Variable retention leaves from 10% to 40% of the original stand intact. MRC foresters prescribe classic uneven-aged harvest, such as selection, to conifer stands with healthy stocking (≥105 square feet conifer basal area per acre). Watercourse and lake protection zones (WLPZs) are targeted for high retention selection harvest to promote the growth of larger trees. MRC expects the restoration of stands back to conifer dominance will be largely completed over the next 20 years. After those stands mature, MRC will move towards a forest management regime more dominated by selection silviculture.

MRC Targeted Forest Conditions		
	Percent of Acres	
	Standing Conifer Volume	
	>25 mbf/acre	15-25 mbf/acre
Current	7.9%	17.8%
After 5th Decade	14.2%	25.3%
	Total Volume - MBF	
	Conifer Trees in Larger Size Classes	
	24-32" DBH	>32" DBH
Current	674,700	351,340
After 5th Decade	1,072,500	834,400

Explanations of the silvicultural activities and guidelines for company foresters are set out in the following tables.

Prescription	Description	CFPR* Reference and Label
Special Prescription		
Restoration Variable Retention	Used where mature conifers are presenting a stand that has a high level of hardwood competition to restore conifer forest.	913.4(d) Variable Retention
Rehabilitation	Used in stands that are capable of growing conifers but have high levels of hardwood stocking that impede the establishment or growth of conifers. Very limited conifer component.	913.4(b) Rehabilitation of Under stocked Area Prescription
Special Selection Regimes	Used in stands that have special constraints such as watercourse or lake protection zones (WLPZ), endangered wildlife species or habitat, etc.	913.4(a) Special Treatment Area Prescription
Uneven-Aged Management		
Single Tree Selection	Used in stands that are well-stocked with conifers to maintain an uneven-aged condition. Generally used in younger stands with intent to thin trees.	913.2(a)(2)(A) Selection System
Group Selection	Used in stands that are well-stocked with conifers to maintain an uneven-aged condition. Generally used in older stands requiring more openings for conifer regeneration.	913.2(a)(2)(B) Group Selection
Transition	Used in stands that are unbalanced in terms of age class distribution and species composition – intent is to move stand towards use of selection silviculture.	913.2(b) Transition
Even-Aged Management		
Seed Tree Removal	Used in stands with scattered predominant trees with an understory well-stocked in conifers. May also be used in conjunction with thinning understory of young trees.	913.1(c)(2) Seed Tree Removal Step

* California Forest Practice Rules 2009, Title 14, California Code of Regulations Chapters 4, 4.5, and 10.

Targeted pre-harvest conditions on MRC forestlands

Prescription	Pre-harvest conifer basal area – lower limit	Pre-harvest conifer basal area – upper limit	Other key pre-harvest factors
Special Prescriptions			
Restoration Variable Retention	25	125	Minimum 60 square feet conifer basal area; conifer stocking must be in trees > 16" diameter at breast height
Rehabilitation	0	50	Must also have less than 300 vigorous conifer trees per acre (any size).
Special Selection Regimes	120-300*	NA	*Pre-harvest triggers depend on the type of selection regime implemented (see detail in MRC Option A document, Appendix A, page 25)
Uneven-Aged Management			
Single Tree Selection	105	NA	Stand is well stocked with conifers
Group Selection	105	NA	Stand is well stocked with conifers
Transition	60	105	
Even-Aged Management			
Seed Tree Removal	10	60	Conifer basal area must be in trees > 16" dbh, must be well stocked with conifers in understory

Targeted stocking, retention, and next likely silvicultural application

Prescription	Post-harvest stocking	Retention of conifers (Basal area – square feet/acre)	Next likely silviculture application
Special Prescriptions			
Restoration Variable Retention	10-40% of stand left intact or dispersed retention or 10 square feet of conifer retained	10-40% of stand left intact or dispersed retention or 10 square feet of conifer retained	Transition
Rehabilitation	300 point count (CFPR 2009, 912.7(b)(1))	5 sq ft > 16 inches diameter at breast height	Transition
Special Selection Regimes	Retain an uneven-aged stand	120-200*	Special Selection
Uneven-Aged Management			
Single Tree Selection	NA	75	Group Selection
Group Selection	Maximum of 20% of area in group openings	75 (outside of group openings)	Single Tree Selection
Transition	Minimum of 10 square feet in trees > 16” diameter at breast height	50	Single Tree Selection
Even-Aged Management			
Seed Tree Removal	Minimum of 300 understory vigorous small conifer trees (or a mixture of fewer large trees) per acre	15	Transition

*Post-harvest retention standards depend on the type of selection regime implemented (see detail in MRC Option A document, Appendix A, page 25)

MRC Forestlands - Estimated Silviculture Applications		
Silviculture	Next 5 Years % Total Harvested Acres	Fifth Decade Average % Total Harvested Acres
Uneven-aged	64.6%	99.7%
Even-aged	35.4%	0.3%

7) Regeneration

Regeneration activities on MRC lands include tree planting, site preparation work, pre-commercial thinning, and brush removal work. Regeneration work is designed to improve conditions for the growth of new trees on a site that has been harvested and where openings are left in the forest canopy.

Annual Tree Planting 1998-2015

	Doulas-fir	Redwood	Total
1998-1999	246,865	322,180	587,045
1999-2000	289,003	357,861	664,864
2000-2001	233,618	433,030	676,648
2001-2002	221,238	438,179	704,417
2002-2003	253,350	367,712	651,662
2003-2004	187,508	337,858	525,366
2004-2005	252,899	354,680	607,579
2005-2006	278,573	501,673	780,246
2006-2007	160,090	505,425	665,515
2007-2008	64,450	514,290	578,740
2008-2009	53,620	624,178	677,798
2009-2010	0	229,500	229,500
2010-2011	54,510	379,444	433,954
2011-2012	0	444,610	444,610
2012-2013	75,840	483,350	514,190
2013-2014	75,900	482,435	558,355
2014-2015	45,570	455,120	500,870
Total	2,511,034	7,255,341	9,766,555

Due to a tremendous shortage of available redwood seed for seedling production – MRC has embarked on a program of vegetatively reproducing redwoods for planting. Over the last 5 years, MRC has identified redwood stands and individual redwood trees that have superior charcterictics, specifically: stem quality, limb angle, crown condition, diameter, height, and ring count. MRC has been testing various cultivars (a cultivated tree that has been selected because of desired characteristics) for their performance in the field. Cultivars are now used annually, mixed with seedlings from seed, to meet our annual planting needs. In 2005, MRC cleared approximately 7 acres of forestland to convert to a "hedge farm". This hedge farm is used to grow cultivars to enable harvest of biological material to develop into cultivar seedlings for planting. Overall, the hedge farm provides the following benefits:

- A secure source of planting material for redwoods for all seed zones across our forestlands (redwood seeding is rare in this region of California and seed is limited in quantity and quality)
- A viable stock of trees production for conducting forest restoration activities (specifically restoring conifer forests across the landscape)
- A source of redwoods that are "superior trees" and enable better survival and faster growth (thus insuring stable growth and yield over the life of the forest)

The area cleared was not a part of our network of High Conservation Value areas or Representative Sample Areas. The hedge farm remains a minute portion of our forestlands (7 acres of 228,000, equivalent to about 3 thousandths of 1% of our forest area).

Site preparation includes removal of a portion of the post-harvest slash material, brush, and in some cases stumps, with the use of mechanical, manual, or burning techniques. The majority of

Cultivar Program

- Continue to identify local redwoods suitable for producing cultivars to plant.
- Plant cultivars throughout the forestlands to test for field suitability.
- Use cultivars to insure a seedling source appropriate for local environmental conditions.

tanoak slash is treated by whole tree yarding and moving limbs and tops to burn piles. MRC plans for 400 to 500 acres of site preparation on an annual basis. Burning is tightly restricted to areas with heavy slash concentrations and is generally spot burning rather than broadcast burning.

Pre-commercial thinning is typically prescribed on 300 to 500 acres annually to reduce stand density. Pre-commercial thinning enhances the growth potential of remaining trees in forested stands where excessive competition for light, nutrients, and water is occurring due to the close spacing of trees.

Brush removal work includes the use of mechanical and chemical means to control the growth of woody plant species.

In 1999, MRC, in conjunction with an external watershed science consultant, designed experiments and received permitting to test nine products as alternatives to Garlon. Trials for these products as well as over ten kinds of manual and mechanical removal techniques began in the fall of 1999. Results indicated our best alternative was to continue using the same treatment methods with the most effective herbicide – currently Imazapyr.

Early on, MRC set an ambitious target to reduce its use of herbicides by 60% over 4 years. While this goal was not completely achieved, MRC did reduce herbicide use by 44% in 2000-2002 and by 48.5% in 2003. MRC continues to search for methods to reduce our needs for herbicides. In some stands where tanoak is less pervasive, MRC can use chainsaw cutting to reduce tanoak competition. It is likely that this method of control will be continued in these stands as an effective, non-chemical treatment for tanoak control.

In the future, the annual herbicide use for MRC will vary dependent on the level of harvest and which forest stands are chosen

Herbicide Policy

- Herbicides will only be used to address ecological imbalances on the forestlands (e.g. suppression of conifers by tanoak sprouts) with the goal of reducing and eliminating their use over time.
- Herbicides will only be applied by hand to control specific vegetation.
- MRC will actively work with local, state, and federal agencies to control invasive exotics
- MRC will not apply herbicides within watercourse protection zones of Class I and Class II streams, and will not apply herbicides within 25 feet of a Class III stream.*
  * Herbicides may only be applied within these boundaries to manage our “most wanted” invasive species, MRC will only use herbicides labeled for aquatic use within these boundaries.
- MRC will annually sample watercourses downstream of treated areas for herbicides.
  * Any detection of herbicides in water samples will trigger an internal review of best management practices for herbicide application.
- MRC will notify landowners if herbicide application will occur within 300 feet of their property line.
- MRC will work with the County Agricultural Commissioner to ensure contractor operations are in compliance with all state and federal regulations.
- MRC will work with Native American groups to issue permits for safe gathering activities buffered from any herbicide application areas.

for restoration. The trend, however, is a reduction in herbicide use over the long-term. We are committed to phasing out the use of chemical herbicides as a routine management tool in keeping with Forest Stewardship Council (FSC) principles as we transition towards uneven-aged silvicultural regimes.

From our past experience, we recognize that it is currently unrealistic to exclude herbicides as a management option. Nevertheless, we are committed to exploring alternatives for herbicides. Until better solutions become available that are practical, environmentally suitable, and economical, we will continue to use herbicides responsibly and in a limited fashion to:

- Restock conifer stands previously impacted by hardwood competition;
- Promote conifer growth where there has been no effective vegetation management;
- Foster conifer growth where it is being retarded;
- Contain non-native invasive plants; and
- Conduct experiments that could further reduce herbicide use.

Herbicide Use Stand Characterization
I. No Need to Use Herbicides
Conifer Outcompeting Hardwood Species
Treatment Completed
High Conifer Stocking
Watercourse Zones
Not Targeted for Conifer Recapture
Opportunity for Single-Step Manual Release
II. Herbicide Application On Recent Harvests
Variable Retention
Past Clearcuts
Seed Tree/Shelterwood Removal
Transition
Rehabilitation
III. Herbicide Application For Tanoak Overstory
High growing site with excessive competition
High opportunity for release
IV. Control of Exotic Invasives
Pampass Grass
Eucalyptus
French and Scotch Broom
Gorse
Yellow Star Thistle

8) Fire Prevention and Protection

Preventing fires on the forestlands is an important priority for all employees and logging contractors at MRC. Forestry personnel make regular rounds to inspect the adequacy of fire tools and prevention practices of on-site logging subcontractors. These include adequate clearings around yarder cable blocks, spark arresters on chain saws, and fire trails. Pre-harvest meetings are held with contractors to address important fire prevention issues such as fire safety, access, fuel humidity, and the company policy regarding smoking and warming fires. Concentrations of logging debris are scheduled for burn or disposal within two years.[3]

[3] All burning will be completed with permits from the Mendocino Air Quality Management District – this ensures maintenance of air quality across the county.

Since its inception, MRC has worked to restore forests mismanaged by prior owners. This involves the removal of hardwoods (mainly tanoak) which dominate sites previously well stocked with conifers. Herbicides are used to treat standing hardwoods to reduce tanoak abundance to enable conifer regeneration and growth. Conifers are planted in the stand to restore the conifer balance. Various fungi breakdown the dead trees in a relatively short period of time, admittedly, during the short time, fire hazard may increase. In timber harvest plans (THPs) that require treatment of tanoaks, MRC evaluates the potential fire hazard and visual impacts to adjacent neighbors, local communities, and wildlife habitat. One measure utilized to reduce the potential hazard and visual impact is logging hardwoods near property lines followed by treating stumps. However, there may be steep, remote corners of the forestlands where this is infeasible. Forest managers may consider a green belt where treatment of hardwoods is avoided or only limited treatment occurs. MRC foresters also ensure that there are significant areas of untreated forestland between treated areas.

In June and July of 2008, 23,190 acres of MRC forestland burned in the Mendocino Lightning Complex. This was part of a larger lightning complex which swept across northern and central California in the evening of June 20th and continuing into the early hours of June 21st spawning over 2,000 individual wildfires and burning a total of 1.2 million acres in California. MRC staff was heavily involved in planning fire suppression strategies along with CalFire and local fire agencies. MRC had many ongoing fire protection policies ongoing at the time of the fires, such as:

- Annual meetings with the local Battalion Chiefs and CalFire engineers – allowing CalFire personnel to become familiar with all primary road access to MRC property.
- Maintaining a “call down” list of critical MRC employees and their emergency phone numbers.
- Providing significant funding for a county-wide aerial patrol, this is completed on days of extreme fire hazard.
- Maintaining primary access roads so that they are ready for fire truck access.
- Providing all-forest based employees a company-wide communication system to provide for effective and quick response (this system is in the process of being upgraded).
- Disposing of slash piles within two years of their creation

As a result of the 2008 Lightning Complex fires, MRC has developed further actions to better prepare for a fire event including:

- Providing all forest-based employees with fire-fighting equipment.
- Providing all forest-based employees a map atlas with locations of all roads, water drafting facilities, helicopter landings, and gates across our forestlands for better navigational capabilities.
- Maintaining a subscription with a weather service which notifies key personnel automatically if a lightning strike is detected on or near our land.

2. Terrestrial Wildlife Species and Habitat

"The habitat available to land-based species will improve."

MRC forestlands are home to many species of terrestrial wildlife. One key focus of our management is to maintain the species currently occurring on the forestlands including threatened, endangered, and sensitive species such as the Northern Spotted Owl, California Red-legged Frog, and North Coast Semaphore Grass (for a full listing of threatened, endangered, and sensitive species known to occur on MRC forestlands – see Appendix B). We focus our most intensive conservation efforts on those threatened, endangered, or sensitive species known to occur in greater densities on our forestlands, while providing protection for every known occurrence. For instance, most of our wildlife survey work is focused on locating and determining nesting status of northern spotted owl on the forestlands. This provides us with a year to year barometer of owl populations and also allows us to tailor protection for each individual northern spotted owl.

In addition to the focus on threatened, endangered, and sensitive species, we also inventory various taxonomic groups (such as medium-sized carnivores), in order to better understand species occurrence and abundance of other species on the forestlands. While these species are not yet endangered, tracking their occurrence and if possible, their densities and habitat associations, gives us a better understanding of the effects of forest restoration and management over time.

The table below lists the wildlife survey work that is ongoing on our forestlands.

HIGHLIGHTS OF WILDLIFE SURVEY AND PROJECT WORK
Northern Spotted Owls • Band owls to estimate survival, turnover, and population trends • Monitor barred owl detections and effects on spotted owl detectability • Develop habitat models
Marbled Murrelets • Complete radar surveys in potential habitat areas • Monitor activity level trends in only occupied drainage on forestlands (Alder Creek)
Point Arena Mountain Beaver • Monitor size of and activity trends in known burrow systems • Survey potential habitat for new burrow systems • Refine definition of potential habitat through sampling vegetation in and adjacent to known burrow systems
Medium-sized Carnivores • Complete systematic surveys of forestlands (2004-2008). Zero detections of Pacific fisher or Humboldt marten • Continue surveys at selected monitoring sites using cameras • Repeat systematic survey in 10 years

HIGHLIGHTS OF WILDLIFE SURVEY AND PROJECT WORK (continued)

Small Mammals

- Monitor diversity, distribution, and habitat association of small mammal species
- Monitor trends in distribution and abundance of spotted owl prey

Songbirds

- Monitor diversity, distribution, and habitat association of breeding songbirds
- Continue surveys at monitoring sites to examine occupancy trends of common songbirds

Amphibians

- Completed baseline distribution surveys for red-legged frogs, coast tailed frogs, and southern torrent salamanders
- Conduct bullfrog removal and diet study at red-legged frog breeding sites
- Participate in genetic study to understand red-legged frogs breeding dynamics in hybrid zone
- Examine landscape genetics of coast tailed frog

MRC takes a three tiered approach to protecting terrestrial wildlife species on its forestlands:

1) Provide overall conservation for existing natural communities (oak woodlands, redwood forest, etc) – by insuring that these communities remain on the landscape, we provide a coarse filter that can protect a majority of the species within that community.
2) Provide specific retention strategies for habitat elements that are key to ecosystem function (retaining and recruiting wildlife trees) – this insures that key habitat elements within each natural community remain to provide key structures for existing species.
3) Provide species-specific protections and monitor trends for threatened, endangered, and sensitive species populations (breeding season protection buffers for California Red-legged frogs).

BREEDING RAPTOR POLICY

- Prior to preparation of management activities, MRC staff will review GIS layer for known raptor occurrences and nest sites within ¼ mile of the project area and check with company biologist for prior raptor surveys of the project area.
- If raptor activity is detected prior to initiation of management activities the activity will be reported to a company biologist prior to initiation of operations who will then schedule a raptor survey in the area. If a nest is discovered, the MRC forester and biologist will delineate protection areas for active raptor nests including a ½ acre special treatment zone.
- If a raptor nest is discovered after operations have begun, operations will be halted in the area adjacent to the nest until the MRC biologist reviews the area. If a nest is discovered, the MRC forester and biologist will delineate protection areas for active raptor nests including a ½ acre special treatment zone.

A major goal of MRC is to maintain and where possible, increase habitat for aquatic and land-based species. This requires long-term planning with federal, state, and local agencies as well as key stakeholders in forest management.

MRC is in the process of developing a Habitat Conservation Plan (HCP) with the federal agencies (US Fish and Wildlife Service and National Marine Fisheries Service), in addition, a Natural Communities Conservation Plan (NCCP) with the State Department of Fish and Game, and a Program Timberland Environmental Impact Report (PTEIR) with the California Department of Forestry and Fire Protection (CAL-Fire). To date, the process has provided multiple opportunities for public participation including three public scoping sessions in 2002, and two further public scoping sessions in 2006. In May of 2010, MRC staff provided an update on our activities, including development of the HCP/NCCP at two public meetings

When approved, the HCP/NCCP will become MRC's operational plan for managing threatened and endangered species, rare plants and natural communities on the property. In addition to the PTEIR, MRC and the public agencies will submit several other planning documents along with the public draft of the HCP/NCCP.

- The Environmental Impact Statement and Report (EIS/EIR) is the environmental analysis of our plan.
- The Timber Management Plan (TMP) specifies how much and what type of harvest can be done to accomplish a sustainable timber harvest over 80 years. In combination with the EIR and HCP/NCCP these documents can be considered a Program Timberland Environmental Impact Report (PTEIR).
- The Implementation Agreement (IA) is the contract between MRC and the signatory Governmental Agencies for the implementation of the plan.
- A Long Term Streambed Alteration Agreement (LTSAA) will provide for a programmatic approach to permitting for stream crossing permits versus the current project by project approach.
- The Water Quality Memorandum of Understanding (MOU) is an agreement between MRC and the North Coast Regional Water Quality Control Board to meet water quality objectives.

PROPOSED HABITAT CONSERVATION PLAN

- Protects, enhances, and increases habitat for rare, threatened, or endangered species covered in the plan
- Mitigates the impact of land management on covered species
- Maintains and improves biodiversity on our lands
- Contributes to the recovery of threatened and endangered species

A major requirement of this planning effort, as well as MRC's current policies, is to retain, recruit, and protect key habitat elements throughout the landscape. These key habitat elements include:

1) Individual old growth trees, stands of old growth trees, and mature forests
2) Wildlife trees and snags
3) Large woody debris
4) Hardwoods
5) Unique habitat elements such as caves or rocky outcroppings
6) High Conservation Value (HCV) and Representative Sample Areas (RSA)

1) Old Growth and Mature Forests

MRC focuses protection on stands of old growth and mature forest as well as individual old growth trees as unique and important habitat elements. MRC lands contain approximately 101 acres of stands that have never been harvested and are large enough to maintain most of the functions of typical old growth stands. MRC lands contain approximately 520 acres of stands that have previously been harvested and contain at a minimum of 6 old growth trees per acre over a contiguous three acre area.

Un-harvested Old Growth Stands Policy

- Preserve all previously un-harvested stands (minimum 3 contiguous acres) displaying old growth characteristics
  - Prohibit harvesting within these stands
  - Visit and monitor these stands over time to insure they maintain their old growth characteristics
- Protect a 150 foot buffer for Hendy Woods State Park maintaining 75% of the basal area within the Type I stand in Hendy Woods.
  - they maintain their old growth characteristics

Additionally, MRC protects individual old growth trees outside of old growth stands. Trees are preserved based on a policy that defines old growth trees by their age, size, function, and characteristics specific to particular species.

Previously Harvested Old Growth Stands Policy

- Preserve the character and functionality of all previously harvested stands with at least 6 old growth trees per acre over a contiguous 3 acre area
  - Allow harvesting only with the intent to enhance functionality of the stand (i.e. thinning from below)
  - Protect residual old growth trees within stand per policy

Individual trees are marked for retention and recorded as foresters and inventory personnel visit stands across the ownership.

Residual Old Growth Tree Policy

- Preserve individual old growth trees that have significant habitat values or provide unique ecological function within the forest. These old growth trees are remnant trees from the primary forest, established prior to 1800 AD. These trees would be impossible to replicate within the forest landscape. The include:
  - Any redwood tree, ≥ 48” dbh, established prior to 1800
  - Any Douglas-fir tree, ≥ 36” dbh, established prior to 1800
  - Any tree established prior to 1800 with a preponderance of species-specific old growth characteristics (see table on next page)
  - Any trees established prior to 1800 which cannot be replaced in size and function within 80-130 years
- Retain screen trees – those trees with intermingling limbs with old growth trees

Redwood Old Growth Characteristics

- Trees generally in the upper 20% diameter class of the species on site
- Deep, plate-like bark patterns, fire resistant
- Flattened or irregular crowns, highly complex structure
- Highly reiterated crowns (multiple sprouting, replicated growth patterns)
- Large limbs, in excess of 6-8 in diameter
- Crown debris accumulation
- Platforms
- Cavities, partial snag formation
- High presence of complex lichens and moss
- Basal burn cavities

Douglas-fir Old Growth Characteristics

- Trees generally in the upper 20% diameter class for the species on site
- Bark deeply fissured, thick and fire resistant
- High presence of lichens and moss, where crown soils present, ferns
- Large lateral limbs in excess of 8-10 inches in diameter
- Flattened, irregular crowns with lower limbs with signs of decay and crown thinning
- Conks
- Partial sagging in tops
- Broken out tops
- Crown debris accumulation
- Trees along the margins of pioneer vegetation types which reoccupied the sites following disturbances, normally will have limbs extending nearly to the ground, and are often wind shaped.

Hardwood Old Growth Characteristics (Tanoak, Live Oak, Black Oak, Madrone, Laurel, Chinquapin)

- Trees generally are in the upper 20% diameter class for the species on site
- Flattened or irregular crowns, highly complex structure
- Multiple branching crowns with few large well developed main limbs
- Large limbs, in excess of 4-12 inches in diameter
- Crown debris accumulation
- Platforms
- Cavities, partial snag formation
- Crown die-back
- Basal burn cavities

Mature forest habitat contains relatively dense canopy closure and an over story of trees with greater than 16" dbh, and the presence of forest structure such as snags and downed wood. This type of habitat supports nesting habitat for spotted owls. Currently, there are limited acres of spotted owl nesting habitat (or mature forest) on MRC lands – though this acreage will increase over time. Our silvicultural prescription policies, harvest policies within the WLPZs (approximately 22,000 acres) and Northern Spotted Owl buffer zones (approximately 9,000 acres) are designed to encourage development of more mature forest on MRC lands. The landscape planning process described in the first section of this management plan will allow for much more specific planning and monitoring for mature conifer forest across the forestlands.

2) Wildlife Trees and Snags

Snags and wildlife trees add complexity to forest habitat and provide critical elements for the survival of many species; both are essential to a healthy forest ecosystem. In order to meet the needs of snag-dependent species, MRC has set a target of 2 hard snags per acre. While snags are of value to wildlife species, their presence on the landscape is short-lived; hence we have also set a target of 1 wildlife tree per acre. These numbers represent a future desired condition and in areas where snags or wildlife trees are deficient, MRC will mark and retain trees likely to recruit to wildlife trees or snags sooner than surrounding trees.

Wildlife Tree and Snag Definitions

- A **snag** is any standing dead tree. A hard snag is composed primarily of sound wood.
- A **recruitment tree** is a standing live tree that is retained during a harvest because an area is below a snag or wildlife tree density target so that it might develop into, and then provide the desired habitat element. These generally exhibit signs of decadence, deformity, structure, and large size.
- A **wildlife tree** is any standing live tree that possesses special and uncommon characteristics providing valuable habitat for wildlife. We have defined the characteristics of trees that MRC considers to be wildlife trees in this section.
- A **silvicultural unit** is an area within a THP with only 1 type of silviculture that is non-contiguous with other areas of that same type.

The retention targets for snags, wildlife trees, and recruitment trees are:

1 hard snag or recruitment tree at least 24" dbh and 40' tall per acre[4], and

1 hard snag or recruitment tree at least 16" dbh and 30' tall per acre, and

1 wildlife or recruitment tree at least 16" dbh and 30' tall as described below, per acre.

[4] When recruiting for this size class, foresters must choose recruitment trees from those within the upper 20th percentile for diameter in the THP unit.

Wildlife trees and snags will be retained[5] along with their associated screen trees (even if the targets above have been met). It is the intent of this policy to retain the highest value snags and wildlife trees and if density is low, to recruit snags and wildlife trees up to three trees per acre on average. Our intent is that recruitment trees retained during a previous entry would be retained during subsequent harvests unless a) they no longer exist, b) better wildlife trees have developed during the re-entry period and these trees now supersede the previous recruitment trees, or c) additional trees of equal wildlife value have developed in densities that exceed three trees per acre. It is our expectation that these retained trees will provide the highest quality wildlife habitat. Once the average wildlife tree, snag, and recruitment trees have met or exceeded three trees per acre, however, recruitment trees of equal or lesser wildlife value may be harvested.

We will assess targets as an average across each silvicultural unit (for instance a 30-acre silvicultural unit would require 30 snags > 24" dbh, 40' tall, 30 snags >16" dbh 30' tall, and 30 wildlife trees or an equivalent number of recruitment trees). If snags or wildlife trees are deficient within the THP, recruitment trees will be marked for retention by the appropriate size class. Only 50% of the recruitment trees may be hardwood trees. This information will be maintained in MRC's geographic information system.

Wildlife Tree Characteristics

A tree with any of the following characteristics is considered a wildlife tree:

- Old growth trees (see MRCs old growth tree definitions above)
- Potential nest trees for marbled murrelets: (a) conifer species; and (b) diameter must exceed 48 in for redwood, 36 in for Douglas-fir, 36 in for grand fir, 36 in. for Sitka spruce, 30 in. for western hemlock, 30 in. for other conifers; and (c) have at least one platform capable of retaining an egg
- Trees with known raptor nests.
- Trees in which the entrance hole leading to a cavity is > 3 in. diameter and 10 ft or more above the ground
- Granary trees (any tree with at least 100 small holes either filled with acorns or that are capable of holding acorns—that are either tightly clustered or spread throughout the bark or limbs of the tree).
- Trees > 24 in. dbh with basal hollows that are >12 in. wide and deep and extend vertically above the outside cavity.

[5] Wildlife trees and snags will be retained unless they present a safety or fuel load hazard. If MRC needs to fell a snag or wildlife tree we will cut it to the maximum safe stump height and leave the felled tree in place unless it is blocking a road right-of-way, an existing road, or skid trail. If it is necessary to move a felled snag or wildlife tree, MRC will place it near the location where it originally was felled. If MRC removes a snag or wildlife tree for this reason and there are less than 2 snags per acre and 1 wildlife tree per acre a tree of similar value will be retained and the wildlife agencies will be advised.

Recruitment trees are selected from other trees that have the most likelihood of developing into wildlife trees or snags in the near future.

3) Large Woody Debris on the Forest Floor

MRC defines large woody debris (LWD) as downed logs or fallen trees greater than 16 inches in diameter at the large end and longer than 10 feet. The LWD provides a moist microclimate for various plant and animals including mosses, invertebrates, and amphibians. It also provides feeding substrate for invertebrates and for the mammals and birds that feed on the invertebrates and fungi living in and on the logs. As the wood decays, the downed logs also contribute nutrients to the forest floor. LWD has also been part of the ongoing inventory program.

Large Downed Logs on the Forest Floor By Sustainability Unit (all numbers represent average number of logs per acre)

Sustainability Unit	Conifer	Hardwood	Total
Albion	6.47	0.27	6.74
Alder Creek	7.11	0.37	7.48
Big River North	7.33	0.32	7.65
Big River South	7.33	0.32	7.65
Elk Creek	5.40	0.31	5.71
Garcia River	6.41	0.67	7.08
Greenwood Creek	8.74	0.46	9.20
Hollow Tree	6.73	0.43	7.17
North Navarro East	9.25	0.62	9.87
North Navarro West	7.41	0.41	7.83
Noyo	5.16	0.20	5.36
Rockport Coastal	6.73	0.43	7.17
South Navarro East	9.25	0.62	9.87
South Navarro West	7.41	0.41	7.83
Ukiah	6.73	1.47	8.19
Forestland average	7.16	0.49	7.65

Baseline data by sustainability unit indicates that our forestlands have a healthy amount of woody debris. Our target density is 5 to 7 downed logs per acre across the landscape. We achieve this target by retaining and recruiting LWD during timber harvesting operations and by returning logs from old decks of logs along roads resulting from past harvest to the forest floor. LWD accumulation is also monitored by company biologists and foresters to reduce fire hazards or pest infestations.

Large Woody Debris Policy

- All large woody debris (LWD) in watercourse protection zones will be retained unless it is removed for road obstruction or moved for riparian and stream restoration work.
- In watercourse protection zones, MRC will recruit and retain a minimum of 7 downed logs/acre (minimum 16 inch average diameter, 10 foot length) averaged over a silvicultural unit.
- In general forested areas, MRC will recruit and retain a minimum of 5 downed logs/acre (minimum 16 inch average diameter, 10 foot length) averaged over a silvicultural unit.
- All unmerchantable logs generated from current operations will be returned to the forest floor prior to the removal of equipment, unless they will be used for stream restoration purposes.
- Unmerchantable logs from past operations will be returned to the forest floor or used for watercourse enhancement projects when equipment is available in the area.

4) Hardwoods

The role of hardwoods in a properly functioning conifer forest is often discounted because the hardwood species have not provided commercial returns to timberland owners. Our intent is (a) to restore hardwood-dominated to conifer stands to a conifer-hardwood ratio which we believe is (a) more representative of a mature conifer forest in the region and (b) to leave natural oak stands unmanaged.

Hardwood Policy

- Every timber harvest plan will be reviewed for the retention of any hardwood trees that enhance wildlife habitat.
- Every harvest plan will retain trees of the true oak species > 18 inches dbh unless trees are removed for safety, road right of way, yarding corridors, or the president has given prior approval to remove these trees.
- The objective across the forestlands is to restore hardwood-dominated stands to a conifer-to-hardwood nature that is more representative of a mature conifer forest. In practice this means that we will retain a minimum of 15 square/feet per acre of hardwoods in all harvest plan operations.

5) Unique Habitats Elements

MRC protects unique habitat elements on the landscape such as rocky outcrops, wetlands, springs, and caves. When these elements are discovered, they are mapped and protected with a site-specific buffer zone to avoid adverse impacts of harvesting or other forest management activities. These features are used by multiple wildlife species and are important to protect on the landscape.

6) High conservation value (HCV) and Representative Sample Areas (RSA)

Early in our land tenure, MRC completed a reserve analysis with advice and expertise from various stakeholders. This information was used to protect key natural and cultural resources as well as to better understand harvest opportunities across the landscape. The areas were

protected for various reasons and included: aquatic management zones, spotted owl core areas, unique habitats such as pygmy forest and oak woodlands, as well as old growth forest stands. Some of these areas are reserved only for a period of time and serve as a shifting protection system across the ownership that track mobile, sensitive resources such as northern spotted owls. Not all reserves designated were large in size (i.e. pygmy forests) due to the nature of the unique resource they protected. Additionally, while we reserved a large portion of the ownership, we continued to maintain our working forest stands to provide connectivity between identified reserves on the landscape. These working forest stands would also provide alternative reserve areas should a catastrophic event strike currently delineated reserves.

During MRC's Forest Stewardship Council audit in 2010, we were required to review and revise our initial reserve system assessment (completed in 2005) and classify reserves into either High Conservation Value (HCV) or Representative Sample Areas (RSA). Following an in-depth review of the FSC-US standards related to HCV (Criterion 9) and RSA (Criterion 6.4), we made an initial classification of each of our defined protected areas. Many areas could be classified as either HCV or RSA. Since HCV stands under the FSC standards require greater protections, we classified these stands as HCV rather than RSA in order to maximize protections. The process we used to make these decisions is discussed briefly below.

We initially consulted with our sister company, Humboldt Redwood Company, to better understand their assessment process for HCV and RSA. Additionally, we utilized ongoing consultations from developing our Habitat Conservation Plan/Natural Communities Conservation Plan (NCCP). Development of the HCP/NCCP has required consultation with public trust agencies, scientists and the general public. We also revisited stakeholder and expert review conducted throughout the history of MRC (public stakeholders, nonprofit groups, public trust agencies, and other local sources of expertise) in addition to visiting with various stakeholder and expert groups again to receive feedback. Based on this input, we identified areas as High Conservation Value because they have some or all of the following characteristics:

- High public concern
- Protection of old growth stands
- Forests that contribute to the health of water resources and fisheries
- Areas that are in or contain rare, threatened, or endangered ecosystems
- Forest areas critical to local communities' traditional cultural identity

We identified smaller-scale stands and habitats as Representative Sample Areas (RSAs) based on having the following characteristics:

- Relative rarity within the forest landscape (e.g. Bishop Pine, natural grasslands, marsh, deciduous riparian stands)
- Habitat elements important to sustaining existing populations of protected wildlife species (e.g. northern spotted owl core areas, rocky outcrops)

MRC currently tracks our HCVs and RSAs using our GIS system. All HCVs and RSAs are delineated as a GIS feature to allow for comparison of future trends, as well as to ensure their protection when forest management projects are proposed. It is important to note that all unique habitats follow a trend of succession and it is likely that some will trend into different habitat types over the course of our lifetimes; for instance, a small, Type 2 old growth stand may be destroyed by a pest outbreak the result of which may be a regenerating young stand. In this case, MRC staff will decide whether to retain this area as an HCV or RSA.

HCV/RSA classification and acreage on MRC forestlands

Type	**Acres**	**HCV or RSA?**	**Stakeholders/Experts Consulted**	**Other known reserves**
Type I old growth	101	HCV	NRDC, Greenpeace, Mendocino Forest Council, Albion Watershed Group, Greenwood Watershed Group, General Public Stakeholders, Big Creek Lumber, Greg Giusti, HCP/NCCP Science Panel	TCF, TNC, Hendy Woods, Montgomery Woods, Admiral Standley, Angelo Coast Range Reserve, Maillard Ranch, Ridgewood Ranch Conservation Easement, JDSF (400 acre preserve)
Type II old growth	528	HCV	NRDC, Greenpeace, Mendocino Forest Council, Albion Watershed Group, Greenwood Watershed Group, General Public Stakeholders, Big Creek Lumber, Greg Giusti, HCP/NCCP Science Panel	TCF, TNC, Hendy Woods, Montgomery Woods, Admiral Standley, Angelo Coast Range Reserve, Maillard Ranch, Ridgewood Ranch Conservation Easement, JDSF (400 acre preserve)
Pygmy Forest	168	HCV	DFG, CNPS, FRAP,	TNC (Little River

Type	Acres	HCV or RSA?	Stakeholders/Experts Consulted	Other known reserves
			VTM, HCP/NCCP Science Panel	airport pygmy), Van Damme State Park, Mendocino County (Little River Airport)
Oak Woodland	1,101	HCV	DFG, CNPS, FRAP, VTM, HCP/NCCP Science Panel, Native American Tribes	Ridgewood Ranch Easement, Vichy Easement, UC Hopland Station, PFT – Olive Twining Easement, Mann Ranch, Bradford Ranch, Shamrock Ranch, Diamond H Ranch , Richard Wilson Ranch
Coho core areas (Class I riparian stands)	3,320	HCV	DFG, USFWS, NOAA, CCC, TU	TCF, TNC, Sonoma Coast State Beach (Willow Creek State Park), Navarro River Redwoods State Park, JDSF
Coho core areas (Large Class II riparian stands)	1,280	HCV	DFG, USFWS, NOAA, CCC, TU	TCF, TNC, Sonoma Coast State Beach (Willow Creek State Park), Navarro River Redwoods State Park, JDSF

Type	Acres	HCV or RSA?	Stakeholders/Experts Consulted	Other known reserves
Lower Alder Creek Murrelet Area	1,133	HCV	DFG, USFWS, HCP/NCCP Science Panel, Dr. Tom Hamer	Admiral Standley, Russian Gulch, Hawthorne (Gulch 16 and Horsetail), Big River Park (detection), JDSF
Significant archaeological sites	TBD*	HCV	CalFire, local Native American Tribes	Industrial Forestland Owners, UC Hopland Station, Public Lands
Salt Marsh	66	HCV	DFG, USFWS, CalFire	San Francisco salt marsh
Class I Hardwood Stands	212	RSA	DFG, USFWS	
Hardwood Representative Sample Areas	1,487	RSA	DFG, USFWS	
Bishop Pine Forest	384	RSA	DFG, USFWS, HCP/NCCP Science Panel	
Rocky Outcrops	65	RSA	DFG, USFWS, HCP/NCCP Science Panel	
Natural Grasslands	1,827	RSA	DFG, USFWS, HCP/NCCP Science Panel	Hopland Station
Spotted Owl Core Areas	7,309	HCV	DFG, USFWS, HCP/NCCP Science Panel	JDSF, Russian Gulch State Park, Navarro River Redwoods State Park
Point Arena Mountain Beaver Areas	246	HCV	DFG, USFWS	Stornetta Conservation Easement, MCI, South Coast State Parks

Type	Acres	HCV or RSA?	Stakeholders/Experts Consulted	Other known reserves
Conservation Easements	776	RSA	Pacific Forest Trust, Save the Redwoods League, Sonoma County Agricultural Preservation and Open Space District	
Marbled Murrelet Habitat Recruitment Stands	138	RSA	DFG, USFWS	
Brush	550	RSA		
Class I Riparian Stands (Outside Coho Core Area)	11,430	RSA	DFG, USFWS, NOAA, CCC, TU	TCF, TNC, Sonoma Coast State Beach (Willow Creek State Park), Navarro River Redwoods State Park, JDSF
Large Class II Riparian Stands (Outside Coho Core Area)	4,907	RSA	DFG, USFWS, NOAA, CCC, TU	TCF, TNC, Sonoma Coast State Beach (Willow Creek State Park), Navarro River Redwoods State Park, JDSF
Deciduous Riparian Areas	64	RSA	DFG, USFWS	
Marsh	35	RSA	DFG, USFWS	
TOTAL	**37,127**			

- not available at this time.

Description of HCV/RSA areas and management prescriptions applied to each.

1. Type I old growth stands are those with 3 acres or more that have never been logged and display old growth characteristics (FSC-US Forest Management Standard 2010, p. 95)

Management prescriptions: No harvest. Pursue conservation easement to permanently protect old growth stands.

Type: HCV

2. Type II old growth stands are those stands that are (typically) a minimum of 20 acres that have been logged but which retain significant old growth structure and function.

Management prescriptions: Harvest using single-tree selection to maintain and increase mean stand diameter. Maintain screen trees for old growth trees and mark them with an "R" so that they are retained during harvest. Preserve all individual old growth trees as defined by MRC's policy. Cooperate with the wildlife agencies, if and when, on their own initiative, they reintroduce ecological burns into the area.

Type: HCVF

3. Pygmy Forest is distinguished from Bishop Pine Forest by the prevalence of Bolander's pine and pygmy cypress. This forest type is located on thin acidic soils where many trees and shrubs, having adapted to suboptimal growing conditions, are limited in stature. Even the oldest trees reach only limited heights. Other plants occur in or near pygmy forests, including coast trefoil and Bolander's sweet pea, both of which are suspected food plants of lotus blue butterfly larvae.

Management prescriptions: Avoid conducting management activities in this area if feasible. Management activities to allow access to adjacent timber stands will occur only if no other routes are feasible. Consult with United States Fish and Wildlife Service for management activities which may impact the Lotis Blue Butterfly. Seek opportunities to apply surrogates for natural disturbance agents (e.g. fire) within pygmy forest areas. Decommission, close, and re-vegetate historic roads.

Type: HCV

4. Oak Woodland occurs where precipitation falls mostly in the winter, followed by warm to hot dry summers (Mayer and Laudenslayer 1988). Oak woodlands are not limited by soil type or parent material (Mayer and Laudenslayer 1988), but generally occur on moderate to well drained soils that are also moderately deep. In oak woodland stands, the overstory usually consists of hardwoods with scattered conifers. On mesic sites, trees form a dense closed canopy; on dry sites, trees are more widely spaced. Typical oaks of this natural community include Oregon white oak, California black oak, and canyon live oak. Understory plants in oak woodlands can include blackberry and creeping snowberry. In drier areas, shrubs may include greenleaf, manzanita, and gooseberry.

Management prescriptions: Avoid conducting management activities in oak woodlands if feasible. Management activities to allow access to adjacent timber stands will occur only if no

other routes are feasible. Seek opportunities to apply surrogates for natural disturbance agents (e.g. fire) within oak woodland areas. Decommission, close, and re-vegetate historic roads. Harvest encroaching Douglas-fir and avoid replanting the harvested area with conifers if feasible and cost-efficient.

Type: HCV

5. Coho core areas (Class I and Large Class II) are designated by both the state and federal wildlife agencies as areas of key importance to coho salmonids.

Management prescriptions: Follow AMZ protections and accelerate completion of sediment control activities in these areas.

Type: HCV

6. Lower Alder Creek Murrelet Area MRC has designated the area in Lower Alder Creek where the primary effort for murrelet conservation will focus as the Lower Alder Creek Management Area (LACMA), this is the only area on MRC forestlands where murrelets are known to continuously occupy the area and nest.

Management prescriptions: Core areas within LACMA are no harvest, habitat improvement area harvest operations are allowed but only with the intent to accelerate the growth of habitat for murrelets. Harvests within buffer area allowed only with the intent to provide buffering characteristics for the core and habitat improvement areas.

Type: HCV

7. Significant archaeological sites are sites assessed as significant prehistoric sites or sites that would qualify to be on the national historic register. Significant prehistoric sites are maintained on a confidential archaeological feature available only to individuals who have taken the required archaeological training.

Management prescriptions: Avoid management in the area.

Typing: HCV

8. Salt Marsh areas are found along the margins of bays, lagoons, and estuaries. These areas include any substrates that are periodically or permanently flooded as well as open water portions of somewhat enclosed waters. Soil salinity in salt marshes varies from nearly the same as seawater, to greater than seawater, to nearly brackish water. The various psychological stresses exerted in the estuarine environment, especially those related to changing salinities, result in natural communities that are low in species richness but high in density.

Management prescriptions: Water drafting prohibited within the boundaries of the salt marsh. Maintain a 50-ft equipment exclusion zone (excluding existing roads) around a salt marsh. Provide AMZ Class I protections around watered areas of the marsh.

Typing: HCV

9. Class I Hardwood Stands are dominated by native hardwoods (tanoak, madrone, true oak, etc.) and have never been managed for conifer timber production.

Management prescriptions: No harvest.

Type: RSA

10. Hardwood Representative Sample Areas are designated as examples of the early seral condition of a conifer-dominated stand type. Approximately 1,487 acres of forest stands are designated as representative sample areas throughout MRC forestlands.

Management prescriptions: Harvest only to maintain relative proportion of hardwoods to conifers. Maintain a mixed-age stand of hardwoods, representative of an early seral hardwood stand. Meet minimum stocking standards.

Type: RSA

11. Bishop Pine Forest is distinguished from Pygmy Forest by the prevalence of Bishop Pine and Redwood/Douglas-fir.

Management prescriptions: Avoid conducting management activities in this area if feasible. Management activities to allow access to adjacent timber stands will occur only if no other routes are feasible. Consult with United States Fish and Wildlife Service for management activities which may impact the Lotis Blue Butterfly. Seek opportunities to apply surrogates for natural disturbance agents (e.g. fire) within pygmy forest areas. Decommission, close, and re-vegetate historic roads.

Type: RSA

12. Rocky Outcrops are at least (a) 1 acre in size with ground cover entirely of rock or (b) near-vertical rock faces at least 50 foot high and 100 foot long that have not been affected by the hand of man.

Management prescriptions: Survey for peregrine falcons when timber operations occur within ½ mile of rocky outcrops or within 1 mile of any proposed helicopter yarding. Survey newly discovered outcrops for sensitive species if there are plans to convert them to quarries (if sensitive species exist, do not convert to quarry).

Type: RSA

13. Natural Grasslands in the plan area usually occur in forest openings or glades—the typical grassland of the northern California coast. Grasslands are often on ridges and south-facing slopes (Mayer and Laudenslayer 1988). Natural openings can occur in areas where soil is alkaline and high in clay; this prevents trees or forests from establishing. Some grassland currently in the plan area may be the result of burns used to convert forestland to range or farm areas (Sawyer et al. 2000b).

Management prescriptions: Avoid conducting management activities in grasslands if feasible. Management activities to allow access to adjacent timber stands will occur only if no other routes are feasible. Seek opportunities to apply surrogates for natural disturbance agents (e.g. fire) within grasslands. Decommission, close, and re-vegetate historic roads. Harvest encroaching Douglas-fir and avoid replanting the harvested area with conifers if feasible and cost-efficient.

Type: RSA

14. NSO Core Areas receive conservation measures to protect habitat around a spotted owl activity center.

Management prescriptions: Maintain an 18 acre no-harvest core area around the nest tree or activity center and a 72 acre habitat retention area for protection of suitable spotted owl habitat.

Type: HCV

15. Point Arena Mountain Beaver areas contain burrow systems identified by our forest science staff.

Management prescriptions: No harvest activities within 200 foot buffer of known burrow systems (except use and maintenance of existing roads). Exclude most harvest activities within 500 feet of known burrow systems during breeding season.

Type: HCV

16. Conservation Easements are voluntary, legally binding agreements that limit MRC's activities on 4 individual easements on MRC forestlands. Current easements are held with Save the Redwoods League, Pacific Forest Trust, and Sonoma County Agricultural Preserve and Open Space District.

Management prescriptions: No harvest, limited road management for sediment control actions and road maintenance.

Type: RSA

17. Murrelet Habitat Recruitment Stands Even though Lower Alder Creek Management Area is the primary location for marbled murrelets on covered lands, MRC recognizes the need to prepare for a potential catastrophe in Lower Alder Creek Management Area, such as a fire or severe windstorm, which would severely damage murrelet habitat. Such preparation includes designating other potential sites encompassing potential habitat for murrelet dispersal and occupation.

Management prescriptions: Harvest prohibited until wildlife agencies have had reasonable opportunity to purchase or provide conservation easements for these areas.

Type: RSA

18. Brush areas consisting mainly of coastal scrub, chaparral, or brush and are low soil site areas. These areas provide key habitat value to many bird, mammal, and reptile species.

Management prescriptions: Do not attempt to convert to conifer. Seek opportunities to apply surrogates for natural disturbance agents (e.g. fire) within brush areas.

Type: RSA

19. Class I AMZs outside Coho Core areas are prescribed to protect riparian corridors around Class I streams (those that do or could bear fish). These AMZ stands will typically develop late seral conditions over time due to the high tree retention prescriptions.

Management prescriptions: No harvest within 100 feet of the watercourse. Between 100 and 190 feet, retain at least 50% of the overstory canopy – these prescriptions will change once MRC's HCP/NCCP is implemented.

Type: RSA

20. Class II AMZs outside Coho Core areas are prescribed to protect riparian corridors around Class II streams (streams bearing non-fish aquatic life). Over time, these aquatic management zone stands will develop late seral conditions.

Management prescriptions: No harvest within 75 feet for large Class II streams or 10 feet for small Class II streams. For large Class I, retain 50% canopy from the edge of the inner zone to 190 feet. For small Class II, for remaining Watershed and Lake Protection Zone as defined in FPRs retain 50% of canopy – these prescriptions will change once MRC's HCP/NCCP is implemented.

Type: RSA

21. Deciduous Riparian Areas are riparian aquatic management zone stands dominated by hardwood species rather than conifers. This is a very rare habitat type on MRC forestlands.

Management prescriptions: Same as other aquatic management zones except do not restore hardwoods to conifers.

Type: RSA

22. Marsh areas are found in Ray Gulch in the Navarro watershed, Albion lagoon in the Albion River, and Nat's Opening in Big River. These marshes provide important habitat for various amphibian and bird species.

Management prescriptions: Follow aquatic management zone and floodplain protections.

Type: RSA

7) Invasive species management and monitoring

MRC has developed an invasive species management plan to delineate our objectives, assess extent of invasive species, degree of threat of invasive species, develop practices to minimize the risk of spread of invasives, eradicate or control invasives where possible, and develop ongoing monitoring of control measures to determine their effectiveness in preventing or controlling invasive species. It is nearly impossible for MRC to manage all exotic species on our forestlands. Instead, MRC foresters and biologists will focus efforts on our list of "most wanted" species – these are the species most likely to have negative effects on natural processes, communities, or rare species. MRC will re-assess this list annually to insure we are still targeting key species and address new species that have occurred on the landscape.

Management practices to maintain or control invasives

- Place a high priority on treating invasives on or in close proximity to currently used roads or roads that will be used in the near future
- Place a high priority on treating invasives that are likely to spread into forest management unit from the transportation network
- Ask loggers to inspect their truck before leaving the job site to insure no additional materials are being carried off site.
- Work with road contractors and staff to work carefully in areas where disturbance may enable a seed-banking exotic species to thrive.
- Manage invasive animal species to reduce impacts to sensitive species, High Conservation Value areas, and Representative Sample Areas.
- Follow all state and federal regulations related to reducing the spread of Sudden Oak Death and other non-native forest pathogens.

3. Aquatic Wildlife Species and Habitat

"The habitat available to aquatic-based species will improve"

Anadromous salmonids (salmon that are born and raised in freshwater, move to the ocean to mature, and return to freshwater to reproduce) such as Chinook salmon, coho salmon, and steelhead have been the focus of intense survey effort throughout several watersheds on MRC lands. Sampling techniques include: electrofishing and snorkeling, outmigrant trapping, and winter carcass (escapement) surveys. This provides a snapshot of the current distribution of these species throughout watercourses within the forestlands and in some cases, allows tracking trends in life stages.

Fish and Fish Habitat Sampling Activities

- Carcass/Escapement Surveys – South Fork Albion (2008-2009)
- Fish Distribution – Ownership-wide annually in 18 watersheds (2003-2015)
- Stream Temperature Monitoring (ongoing)
- Fish Habitat Assessment – complete (ongoing)
- Long-term Channel Monitoring – monitor 6-10 segments annually; 60 segments total throughout property in almost all major watersheds (ongoing)
- Outmigrant trapping – ongoing

In addition to increasing the baseline survey data for species such as coho salmon, Chinook salmon, steelhead trout, and aquatic amphibians, MRC targets the habitat elements that have beneficial impacts to these and other aquatic-based species. The maintenance and improvement of these elements, combined with controlling the harvest activities upslope, are expected to improve fish abundance over time. Targeted habitat elements for improvement include large woody debris, stream temperatures, canopy/shade, coarse and fine sediment, water flow, nutrients, and barriers to migration. Restoration work enhances these elements by focusing on limiting habitat factors identified in the Watershed Analysis work (see following section), and biological survey work.

Aquatic-Based Habitat Elements Priorities
Large Woody Debris
Stream Temperature
Canopy/Shade
Coarse and Fine Sediment
Water Flow
Nutrients
Barriers to Migration

As with the land-based habitat protections, MRC is currently engaged with a variety of federal and state agencies (National Marine Fisheries Service, United States Fish & Wildlife Service, California Department of Fish & Game) as well as external consultants for technical assistance in determining targets for these habitat elements. This is a part of the same Habitat Conservation Planning effort discussed earlier in the Terrestrial Wildlife Section. We

hope to publish this document for public review in late 2010, with completion in early 2012. This habitat plan will draw heavily on the ongoing watershed analysis work, road survey work, harvest protective measures, and restoration programs described in following sections.

1) Watershed Analysis

Several of the watercourses on the MRC ownership have been listed as quality impaired by the State Water Resources Control Board and the EPA (Section 303d, Clean Water Act) and are in need of restoration activities. These watercourses were listed due to concerns that accelerated sediment production and, in some cases, elevated water temperatures, have adversely affected salmonid habitat. As a result of these listings, the aquatic biology and hydrology staff have been actively engaged in watershed analysis.

Watersheds are a fundamental unit of ecosystems that can be used to evaluate cumulative impacts on fish and other aquatic resources. The purpose of the intensive watershed analysis program is to provide baseline data to monitor stream conditions. This provides forest science and forestry staff guidance to determine the mitigations needed for any harvest plan, prioritize road repair and stream restoration, and monitor long term trends.

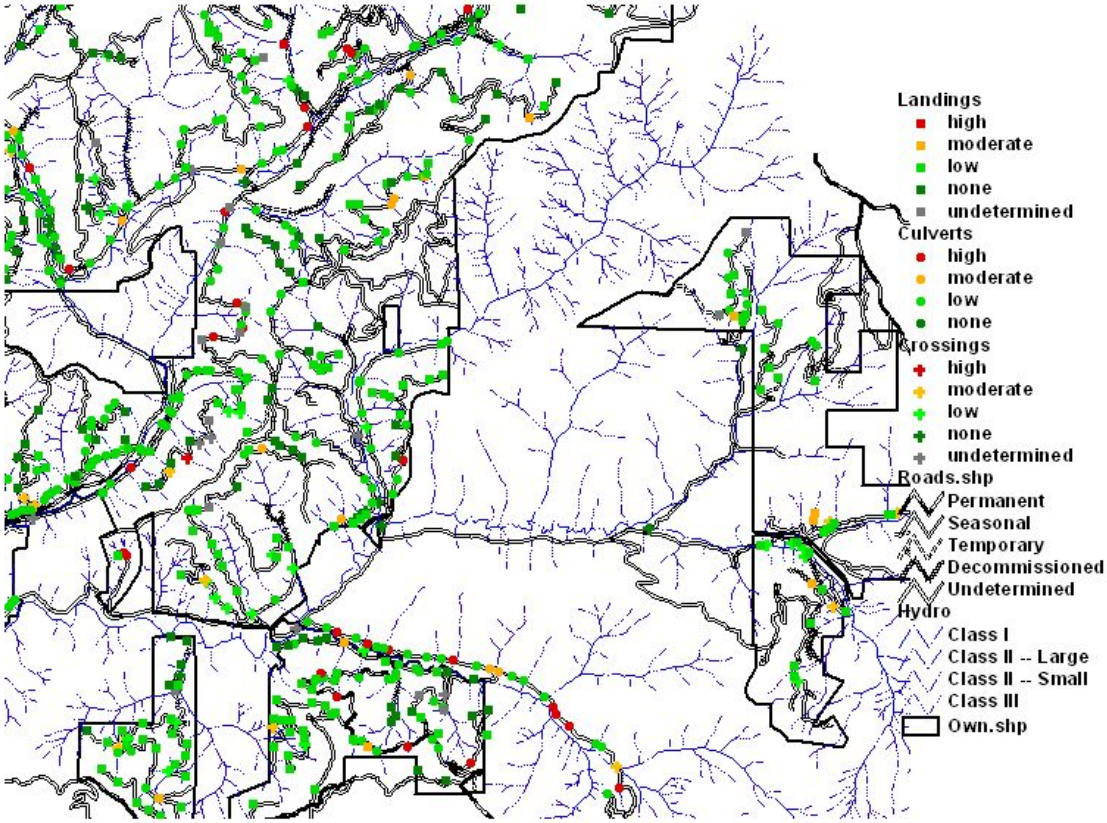
Watershed Analysis

- Watershed analysis is completed on all MRC watershed analysis units (WAU).
- The analysis includes assessments of:
  - Mass wasting inventory and map units
  - Road erosion and erosion risk
  - Stream channel condition
  - Riparian function and condition
  - Fish habitat condition
  - Potential salmonid distribution and habitat
  - Potential amphibian distribution and habitat

By understanding restoration priorities and the locations of high risk roads and stream crossings, foresters can combine the restoration work and harvest work while equipment is present in any one watershed area. (See following map on high priority road projects) Watershed analysis also enables MRC to establish more sophisticated improvement targets and to monitor progress. As of 2015, MRC has completed Watershed Analysis for the entire ownership.

Road Surveys

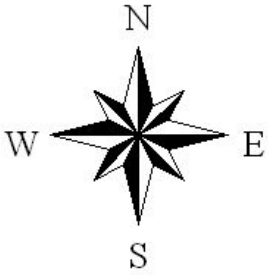
- The majority of MRC roads have been inventoried, mapped, associated sediment sources assessed.
- Site specific projects for road stabilization, removal, and other prescriptions to address sediment sources will be developed, implemented, and monitored.



Map depicting road inventory data for a portion of the Noyo Sustainability Unit.

Each feature is dividied into high, moderate, low, unknown, or no erosion hazard.

Foresters can use this information to assist in determining harvest plan location and erosion control priorities.



2) Road Improvements

MRC owns and manages approximately 2,475 miles of forest roads. MRC places heavy effort into road restoration each year based on the belief that road improvement will have the largest and most immediate positive impact on reducing sediment in the streams. Improperly designed roads and road crossings are the primary sources of man-made stream sediment on MRC lands. Past road building practices still contribute to chronic sediment loading. Priorities for road projects are based on the volume of sediment that can potentially be controlled, and the risks of imminent failure to the road or drainage structures.

Road Policy

- Construction and reconstruction of roads will be based on the experience of the forestry staff, including consideration of guidelines in the 1994 Handbook For Forest and Ranch Roads by Weaver and Hagans; as well as MRC Planning Agreement with California Department of Fish and Game; and Regional Water Quality Control Board requirements.
- Construction and reconstruction will also meet the standards developed in MRC's watershed analysis work designed to control sediment delivery, protect stream bank stability, and provide passage for fish in all life stages in Class I streams.
- Rocked fords, rolling dips, and out-sloping will be used where possible; watercourse crossings will be sized to pass 100 year flood requirements.
- Inspect condition of culverts, bridges, and other erosion control structures annually. Monitor "trouble spots" during winter and major storm events.
- Develop a long-term road management plan as part of our Habitat Conservation Planning efforts.

Sediment reduction is an integral part of the preparation of each Timber Harvest Plan (THP) and is specifically targeted in several ongoing restoration projects outside harvest areas. These projects often involve cooperative work with conservation organizations and government agencies.

3) Streamside Protections

Another method of protecting key aquatic habitat elements is to limit management activities within the watercourse protection zone (See policies on following page). Silviculture activities in these zones are generally restricted to High Retention Selection. A practical result of MRC's restrictive streamside policies is that MRC will delay harvest in most stream zones for the next 10 years.

Large woody debris (LWD) in streams influences the scour of streambeds creating pools and gravels favorable for rearing, overwintering, and spawning habitat for salmonids.

LWD also acts to store and slowly release stream sediment as it makes its way through the stream network. To improve recruitment of LWD in streams, MRC permanently retains larger trees near stream channels, restricts removal of downed logs in stream zones, and works with the California Department of Fish and Game to place larger log pieces and root wads into stream channels. To maintain and improve streamside temperatures, MRC implements canopy closure guidelines, and stream buffer zone policies. To control the flow of fine and coarse sediment into streams, MRC restricts operations in unstable areas, restricts winter harvesting, covers bare mineral soil, and most importantly reconstructs and de-activates roads with high potential for sediment input or failure.

MRC Streams and Stream Classifications		
	Miles on MRC Lands	**Definition**
Class I	453	Year-round water flow, fish bearing stream
Class II	570	Adequate water flow for nonfish aquatic species
Class III	1,198	Seasonal flow, no aquatic species

Streamside Zones

- Follow no-harvest zones for streamside buffers*:
    - Class I – 100 foot no-harvest, 100-190 feet retains 50% canopy cover, 100-150 feet Single Tree or Group Selection harvests only.
    - Large Class II** – 75 foot no-harvest, 75-190 feet retain 50% canopy cover, 75-100 feet Single Tree or Group Selection harvests only.
    - Small Class II** -- 10 foot no-harvest, remainder of protective zone (width dependent on slope class, California Forest Practice Rules) retain 50% canopy cover. On Small Class IIs with less than 30% slope, if adjacent silviculture is even-aged, 75 foot WLPZ rather than FPR required 50 ft.
    - Class III – if down cutting, 10 feet no-harvest, 10-50 feet retain 50% canopy cover; if not down cutting 0-50 feet retain 50% canopy cover.
- Prohibit sanitation salvage operations within the streamside zone
- Follow a 20-year minimum interval between harvest activities within the streamside zone
- Retain all large woody debris (LWD) in the watercourse and streamside zone.
- Encourage foresters to look, with guidance from biologists, for ways to put more LWD into the stream channel
- Encourage foresters to develop increased filter capacity in streamside zones including revegetating slides
- Include mitigation in any future livestock leases to protect stream characteristics and streamside zone vegetation

* These will be followed until implementation of MRC's HCP/NCCP. When implementation occurs, this management plan will be updated with the new streamside buffer zones.
** The division between Large and Small Class II streams has been developed in consultation with the California Department of Fish and Game as part of a Planning Agreement required for completion of the Natural Communities Conservation Plan (NCCP). A Large Class II is defined as a drainage that has adequate flow for non-fish aquatic species and has more than a 100 acre drainage area (a Small Class II stream has less than the 100 acre drainage area).

4) Logging Methods

MRC current utilizes three types of yarding methods to bring logs from the forest to a landing where they are loaded onto log trucks. The two primary methods are cable and tractor yarding, while the third less common type is helicopter yarding. Cable yarding is used on steeper slopes to minimize soil disturbance and erosion concerns. It is typically accomplished using cable yarders capable of reaching distances in excess of 2500' with a lift capacity of 8,000 to 10,000 pounds or less. Tractor yarding is used for logging on more gentle slopes when erosion is less of a concern. Rubber tired skidders, tracked skidders and winch tractors with the capability to skid logs in excess of 15,000 pounds or less are used. Helicopter yarding is used on rare occasions where a harvested area is too far from a landing or road to be either cable or tractor yarded. Helicopters capable of lifting 25,000 pounds or less are utilized for helicopter logging. Helicopter yarding is generally avoided due to the high costs involved. It is our goal to use the most environmentally appropriate and economically feasible method to bring logs out of the forest. MRC also restricts winter logging operations and operations in unstable areas to prevent detrimental aquatic habitat impacts.

Unstable Area and Landslide Policy

- Foresters will first use Division of Mines and Geology landslide maps, past timber harvest plans, and the SHALSTAB (Shallow Slope Stability) model as tools to identify potentially unstable areas.
- SHALSTAB maps will be included in the harvest plan and sites will be reviewed in the field by the forester preparing harvest plans.
- No harvest, road, or landing construction activity will occur in areas identified in the field as having a significant likelihood of sediment delivery to a watercourse from mass wasting unless a site-specific assessment is conducted and the operations are approved by a registered geologist, unless operations are cable or helicopter harvesting that retains over 50% of the basal area.
- Additionally, all areas are evaluated prior to land management activities to identify the risks and hazards associated with landslides. A Professional Geologist has classified Terrain Stability Units (TSU) as part of MRCs Watershed Analysis which aids Foresters in locating and addressing landslide concerns. In specialized, identified areas a Professional Geologist may be used to provide consultation.
- All land management activities proposed for areas with an identified potential risk of landslide must be mitigated to the extent required to reduce the potential for an occurrence to less than significant as a result of the proposed land management activity.
- Identification of a land management activity which would result in a significantly increased potential for landslide which cannot be reasonably mitigated is classified as “Extreme Landslide Potential” and will be avoided in land management activities.

Water Drafting

- Water drafting for timber operations within the channel zone of a watercourse will meet the following minimum standards:
    - Must have an approved drafting permit for the California Department of Fish and Game
    - Speed of water entering intake pipe will be less than 0.33 feet per second
    - Rock all approaches to water drafting locations
    - Screen intakes with mesh, perforated plate or pipe having openings of 3/32” or smaller
    - Restrict water usage to maintain flows above critical levels
    - Minimize removal/disturbance to the stream bank, bed, and existing vegetation when modifying drafting location

Exposed Soil in Streamside Zones Policy

- Mulch, cover with slash, seed, or use mitigation methods providing equivalent protection for all existing and proposed logging roads
- Mulch, cover with slash, seed, or use other mitigation methods providing equivalent protection for any area with more than 100 square feet of exposed mineral soil (in addition to logging roads)
- Mulch, cover with slash, seed, or use other mitigation methods providing equivalent protection tractor roads used during timber operations.

Winter Harvesting Policy

- The following measures apply during the period of November 15th – April 1st.
  - Haul logs only on roads with either an asphalt or rocked surface and where all road drainage structures are functioning and meet the standards of the Forest Practice Rules.
  - Cease hauling if fine sediments are being eroded and delivered to flowing inside ditches or watercourses.
  - Ask trucks in the woods to return home for the day at the first sign of significant rain
  - Operations during this time-frame require an approved winter operation plan included in the harvest plan
- The following measures apply from April 1st – May 15th
  - Suspend timber hauling on seasonal roads when precipitation exceeds 0.25" in any 24-hour period.
  - Continue suspension for 48 hours after precipitation stops
  - Inspect potential sources of sediment input into watercourses before re-starting hauling to avoid sediment input into watercourses after re-start of operations.
  - Continue suspension if timber hauling on seasonal roads causes visible sediment transport to a watercourse until the visible sediment transport will not be caused.

5) Restoration Projects

Restoration projects on MRC properties are a mix of company and cooperatively sponsored activities. MRC is fortunate to have interested conservation groups and government agencies willing to assist in stream restoration work. The focus of these projects has been: removing fish passage barriers, reducing sediment addition to the stream, adding structure to the streams (large woody debris and boulders), and improving stream-side vegetation. The following tables show the outcome of eleven years of stream restoration work on our forestlands.

The table on the left shows the amount (cubic yards) of sediment (or dirt) that was controlled to ensure it would not deliver to a stream and total dollar amount spent to control that sediment, including contributions from other agencies and non-profits. The table on the right shows the number of fish passage barrier projects MRC has completed since our inception and the amount of fish-bearing habitat that was opened up for spawning as a result of those efforts.

Year	Controlled sediment (cubic yards)	Total $ contribution
1998	7,284	$421,170
1999	52,819	$628,156
2000	127,555	$1,075,629
2001	38,126	$938,484
2002	88,286	$1,449,999
2003	203,463	$1,762,298
2004	30,388	$1,418,903
2005	66,284	$1,601,816
2006	58,066	$1,723,100
2007	68,726	$1,946,168
2008	34,006	$1,766,266
2009	7,893	$294,874
2010	82,985	$2,473,137
2011	33,062	$1,262,219
2012	94,273	$1,789,254
2013	35,623	$730,548
2014	45,529	$1,064,000
Total	1,074,368	$22,456,824

Area	Number of Projects	Habitat Enhanced (feet)
Rockport	9	11,697
Noyo	1	1,755
Big River	2	1,655
Albion	8	21,691
Navarro	6	20,259
Ukiah	3	41,934
Garcia	1	1,614
Total	30	100,605 (19 miles)

4. Species Composition

"The species composition present on our land will begin to more closely resemble the composition of forestlands and wildlife before commercial timber harvest removal."

Human activities have profoundly changed MRC's forestlands over the past 150 years. One of the most significant of these changes has been the alteration of the historical tree species composition. Past harvest operations focused on the easiest and most valuable trees, generally large redwood and Douglas-fir. Few reforestation efforts existed following these harvests, and repeated burning was frequently used to attempt to convert forestland into grazing lands. The net result of this past high-grading and conversion activity is a current imbalance in species composition. Initially, about half of MRC's lands had a much higher percentage of hardwood in forested stands than existed before commercial logging activities. Currently, only 32% of MRC's lands are in this condition – with ongoing work to manage these stands to return them to a more conifer-balanced condition. In these stands hardwoods currently make up the dominant over story species.

Tanoak is by far the most common and abundant hardwood. It is a stump-sprouting species and competes vigorously in commercially harvested areas. Today, hardwoods make up about 19% of the total wood volume on MRC lands and a majority of the hardwood present is tanoak. MRC's goals are (a) to restore hardwood-dominated conifer stands to a conifer-to-hardwood ratio which we believe is more representative of a mature conifer forest in the region and (b) to leave natural oak stands unmanaged. Retention of a proportion of hardwoods, especially Madrone and true oaks, is desirable for wildlife habitat. The targeted level for hardwood retention is 15 square feet per acre of hardwoods.

5. Employees

"Being a business that people will want to work for."

MRC can only achieve its objectives with the help of dedicated employees. To retain and attract creative, motivated people, the company is committed to providing a safe workplace, attractive pay and benefits, opportunities for personal development, and a chance to impact MRC's strategies and goals.

Important Community Issues

- Clean water sources
- Neighbor notification
- Access for recreation, education, and mushroom and firewood collecting
- Community donations
- View sheds
- Historical site
- Archaeological sites
- Use of herbicides
- Health of the forest ecosystem
- Health of the fisheries
- Health of wildlife
- Protection of unique areas
- Viability of company
- Over-harvesting
- Cumulative impacts
- Housing subdivisions
- Marijuana cultivation
- Old growth
- Employment
- Fire protection
- Yield taxes
- Shared use of roads
- Illegal dumping

MRC currently employs 43 full-time employees. This group includes skilled equipment operators and others with a wide variety of scientific backgrounds and expertise. Over the next decade, the company would like to expand this expertise as well as the diversity of its team to meet challenges raised by the goals of this plan.

6. Community

"Being a business that the community is proud of"

From the day it was formed, improved community relationships have been important goals for MRC. MRC stepped into a set of relationships, many of which had been damaged by past practices and lack of good communication. MRC remains committed to building and maintaining trust with the community over time based on open, honest and responsive communication. To that end, MRC will continue to respond to inquiries in as prompt a manner as possible. Additionally, MRC encourages people to make arrangements to visit its forestlands to review its forest management. See our community input policy below for more information about formal input opportunities.

Neighbors and other community members take a strong interest in what is happening on MRC forestlands. This interest comes from a heartfelt desire to ensure the lands will remain a vital community resource well into the future. This interest also comes from a desire to protect a variety of individual and group educational and recreational uses that are available on MRC forestlands.

Some of MRC's forestlands are adjacent to public and private roads, neighbors, railroads, and parks. Approximately 4,000 acres on the ownership are managed with special sensitivity to the impacts any silvicultural activities may have on the view sheds and aesthetic quality for adjacent neighbors.

Also, MRC in association with Mendocino Forest Products has a Community Giving Program to review and consider non-profit funding requests in a fair and equitable manner. The companies accept requests for donations from local non-profit organizations from September 1-November 15, for funding consideration in the coming year. Non-profit organizations with 501(c) (3) status may request funding over $250. Non-profit organizations that do not hold 501(c) (3) may be considered for funding up to $249. Funding priorities may be given to programs designed to impact a broader group, in support of youth sports and education, the elderly, those less fortunate, the environment, safety, and those organizations the company has supported in previous years.

Public Access

- Encourage cooperative education and research projects on our forestlands.
- Open properties at designated times and locations for the following activities: hiking; camping; cross-country running; hunting; fishing; and collection of burls, mushrooms, greens, and basket making material.
- Require permits or leases for all public activities on our forestlands (707-463-5110) in order to protect wildlife, prevent road damage and sediment delivery to streams, and to educate individuals about safety issues.
- Provide two areas for local public recreation: Rockport picnic grove (off Highway 1 north of Fort Bragg) and Navarro picnic grove (corner of Highway 128 and Masonite Road). When management occurs in these areas, they will be closed until the area is deemed safe for use again.

Protection for Adjacent Recreation Areas and Scenic Corridors

- Implement a Special Treatment Area within 200 feet of the Navarro River Redwoods State Park (harvest in this special treatment area must consider impacts to the Park).
- Maintain a 200 foot Special Treatment Area on forestlands adjacent to Highway 1 in the Rockport tract (considered a “scenic highway corridor”).

Domestic Water Source Policy

- Protect sources of domestic water with a no-harvest or high retention selection harvest buffer.

1) Value of local goods and services

MRC uses local contractors and suppliers when they available and can meet our needs. In 2013, the value of local goods and services purchased by MRC was $12.7 million, while in 2014 the value was $11.5 million. The table below shows our local spending since 2005.

Year	Value of Local Goods and Services
2005	$14 million
2006	$15.5 million
2007	$16.6 million
2008	$17.9 million
2009	$4 million
2010	$15.5 million
2011	$8.3 million
2012	$18.8 million
2013	$12.7 million
2014	$11.5 million

As MRC improves forest inventories and wildlife habitat, these successes will contribute to the stability and diversity of employment in our communities. Employment opportunities will be related directly to the forest products industry and value-added products. The impacts will also be indirect with the benefits of restored fisheries, recreation and tourism.

2) Contractor Training Policy

Most contracts are involved in logging and hauling operations. MRC is partnering closely with these contractors to ensure that company policies and forest stewardship objectives are carried out in all aspects of operations on the ground. Partnering activities include joint training programs and greater involvement of contractors with timber harvest planning and layout.

Contractor Training Policy

- Train all contractors and employees on company policies as they relate to specific forest management activities.
- Include contractors and MRC representative in pre-harvest inspection meetings when possible.
- Communicate information clearly to logging contractors on harvest operations.

3) Community input policy

It is our goal to be transparent and open to public input. We have designated multiple opportunities for day to day public input – including the contact form on our website, the mandatory public input process as part of developing a timber harvest plan[6], and having our resource staff attend watershed group meetings and other local group meetings when possible.

It is Mendocino Redwood Company's goal to provide transparency and opportunities for public input regarding planning initiatives. To further facilitate that goal, we have developed a strategy that sets criteria for conditions that will trigger public input, avenues for public input, and further information on each of these avenues. In the future, additional triggers or avenues for public input may be developed in response to new initiatives or methods of communication.

The following conditions will trigger formal public input opportunities[7]:

1) Major amendment, public draft release, or final agency approval of proposed study plans within our Long-term sustainable forest management plan (includes: HCP, NCCP, TMP, LTSAA, MOU, PTEIR, and EIS)
2) Proposed major change[8] to MRC's landscape plan.
3) Public scoping meetings required by regional, state, or federal agencies required as part of planning processes (i.e. those required for the Long-term sustained forest management plan).[3]

MRC will provide opportunity for public input when we propose major changes or new planning initiatives. Avenues for public input may include: public meetings, submittal of written comments on the website, and possibly online forum. In order to provide the most meaningful information and the best opportunities for public interaction MRC will generally limit public meetings to one per calendar year. Most opportunities for public input will be provided prior to a change being made, however; some more urgent changes may be implemented prior to seeking public input (for instance, we may need to begin on proposed study plans for the Long-term sustainable forest management plan prior to them being approved by agencies to collect baseline data).

Avenues for public input:

[6] MRC foresters must provide notice to all property owners within 300 feet of the plan boundary of our intent to submit a timber harvest plan within 300 feet of their property.

[7] Additional opportunities for input are provided by informal tours or meetings regarding specific concerns. This often occurs when a member of the public expresses concern about a specific timber harvest plan or action and a field meeting is convened to discuss the concern and provide an opportunity for direct input to MRC's management staff.

[8] A major change to the landscape plan is defined as any change that results in a change from our stated objectives within MRC's current management plan; any change in silvicultures applied; any change in retention standards for applied silvicultures – unless following the CFPRs.

[3] While these public forums are managed by agency personnel – MRC receives valuable public input from the results of these meetings and often plays a major participatory role in organizing and facilitating these meetings.

1) Public meetings – These will be advertised in the local papers in Fort Bragg and Ukiah. They will also be noticed on the home page of our web site (www.mrc.com).
2) Submittal of written comments on web site – These opportunities will be noticed on the home page of our web site (www.mrc.com)

Description of each avenue for public input:

1) Public meetings:

Public meetings will occur in the evening and will be held in both Fort Bragg and Ukiah. Generally, the meetings will be scheduled to run 2 hours with 30-45 minutes scheduled for MRC/agency presentations; 30-45 minute scheduled for breakout groups by topic (with each group having an MRC representative); and 30-45 minutes for general input and questions. These would require a person functioning either simply as a note-taker or as a facilitator. The goal of these meetings would be to provide the baseline information on the change and to provide the majority of the meeting time for discussion and question and answer sessions.

2) Submittal of written comments:

This would occur through an online form. MRC staff would provide information regarding the latest change on the web site and request input on that change using a web form (similar to our current contact form process). This would require MRC to provide a formal response for each contact.

4) Interacting with Native American tribes

Local Native American tribes are key members of the local community. As part of our goal to be a business the community is proud of, we believe that we need to communicate openly and honestly with local tribes, provide them opportunities to provide input to our management activities, and work with them to protect significant archaeological sites.

Interacting with Native American tribes

- Follow the California Forest Practice Rules requirements for notification of local Native American tribes of project location and notification of newly located sites for Timber Harvest Plans. Provide protections for newly discovered or known sites.
- All timber harvest plans require a survey by an employee trained in archaeological survey and reporting methods.
- For ground-disturbing projects not included in Timber Harvest Plans or grant projects, review with area foresters to determine if survey should be completed or if known sites exist in the area of disturbance.
- Stewardship Director will request to attend one meeting per year of the Mendocino/Sonoma Tribal Environmental Program Managers to provide an update on MRC management and request feedback on overall management; as well as discussing potential future projects with tribes.

5) Protecting historical sites

Historical sites also have an irreplaceable nature for the local community. Our goal in addressing historical sites is to protect these sites from degradation or destruction as part of our forest management. As required by the California Forest Practice Rules, archaeological surveys also include surveys for historical sites – when sites are discovered they are protected in a similar fashion to archaeological sites.

7. Quality Products

"Being a business that is known for producing quality products and keeping its word"

Reliable delivery of high quality logs to customers is an important component of MRC's long-term viability. Quality control means delivering logs that meet customer specifications with a minimum of wood or fiber loss. Damage of logs in the woods can cause significant loss in product recovery and undo years of valuable fiber growth. One objective is to close the feedback loop and let logging contractors know immediately about quality targets, improvements, and issues. In 2009, MRC began a major initiative to increase quality of logs delivered to the mill by improving log specifications and focusing on quality. For example, from late November to early December 2009, out of 6,561 logs delivered to the mail, only 27 failed to meet quality specifications in the woods.

Sustainable, exemplary forest management practices will serve MRC's customers well. MRC acquired FSC forest management certification in 2000, and was re-certified in 2005 and in 2010. MRC hopes that our FSC-certified wood will increase demand for our products over time.

MRC is also exploring development of non-timber sources of revenue from its lands. MRC continues to lease land for hunting as an additional source of income. Of potentially more significance is a growing field for non-extractive "conservation" products. MRC is strongly considering submitting a carbon project for a portion of its lands to the Air Resources Board.

8. Business Return

"Being a business that earns return on the capital invested in the business over time"

The monitoring of business income and expenses is accomplished through finely detailed and elaborate accounting systems. Since MRC is a privately held business, these records are not made available to the public, but are available as needed for auditing purposes.

Revenues for business come largely from logs sold at market rates. Other revenues may include hunting and telecommunications site leases. Expenses include contracted logging costs, road improvements, forestry work, wages and overhead, wildlife and aquatics surveys and monitoring, forest restoration work, tree planting, property and yield taxes, interest and insurance.

9. Monitoring and Responding to Changed Circumstances

Our monitoring efforts are focused on 8 components of our purpose stated on the first page of this management plan. Ideally, we could measure every tree and locate every animal on our forestlands – unfortunately that level of survey is nearly impossible to implement. Instead, we focus on key elements of this management plan to insure that we are on track to meet our targets and understand trends in key aspects of the forest.

We monitor[9] each element from this management plan through a variety of programs:

1) Inventory – We monitor trends in annual harvest and conifer inventory. Our conifer inventory has increased every year since 1998. Additionally, we provide annual detailed reports to CalFire on our annual harvest by silviculture types as well as acres harvested.
2) Terrestrial Wildlife Species and Habitat – We focus the majority of our efforts on monitoring three threatened and endangered species on our forestlands – Northern Spotted Owl, Marbled Murrelet, and Point Arena Mountain Beaver. Our staff also develops and implements various projects to better understand trends in broad faunal groups across our forestlands (songbirds, small mammals, etc). Additionally, we review our old growth stands on a 10 year basis to insure they still maintain the characteristics typical of an old growth stand. Also, we ensure compliance with our policies via tracking of habitat elements such as wildlife trees. Finally, we monitor our unique natural communities via aerial photos and field visits to better understand their current condition. While this program remains anecdotal, it provides basic information on the current extent and condition of these unique habitats.

[9] MRC monitoring reports are available on our website at: http://www.mrc.com/Monitoring-Overview.aspx

3) Aquatic Wildlife – Efforts to better understand aquatic wildlife and their habitat are focused on understanding trends in our watercourses as well as direct sampling of various salmonid species. Additionally, each Watershed Analysis provides a detailed description of conditions in individual watershed. These Watershed Analyses (along with other monitoring programs) will be used in the future as a baseline condition to compare future conditions.
4) Species Composition – We monitor trends in hardwood and conifer inventory to better understand current and predicted species composition.
5) Employees – We track the number of employees who work for MRC on annual basis, as well as tracking the amount spent on local goods and services. This provides a baseline understanding of how our business affects the local community.
6) Community – We track donations to local community organizations on annual basis. Also, we respond to all requests that occur in a timely manner (via website, phone call, etc). These requests also provide an opportunity to better understand key community concerns.

We recognize that even with our best planning, the environment and our understanding of it will change over time. Our management plan will continually be reviewed and revised to address new scientific knowledge as well as our own experiential learning. In the intervals between revisions, we insure that we respond appropriately to unexpected events with strong internal communication. This internal communication provides notification to the appropriate parties of any new circumstances (including environmental and safety hazards) and enables us to document and learn from these changed circumstances.

Landscape Planning and Sustainability Units

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Landscape Planning refers to the suite of inventory databases, forest growth models, habitat models, and Geographic Information Systems (GIS) programs that enable the analysis and presentation of current and projected forest conditions. Many efforts are made to ensure an approach that reflects actual 'on-the-ground' conditions and constraints. The Landscape Planning approach is designed to allow planners to assess the effects of a broad range of management activities at the stand level, watershed units, and the ownership. Examples of the types of review provided through this approach include:

- Conifer and hardwood stocking levels on a periodic basis.
- Area harvested on a periodic basis.
- Forest structure types (habitat) on a periodic basis.

Stands – The Basis of Landscape Planning

Stands are smallest geographic units (polygons) in Landscape Planning. The size and extent of stands is based on vegetation, topography, and sensitivity attributes, as well as regulatory considerations. Inventory information can be interpreted at the stand level. That information can be grown and harvested in growth and yield simulations. Reports of all management activities can be prepared at the stand level. Critical information stored in the relational databases for each stand includes:

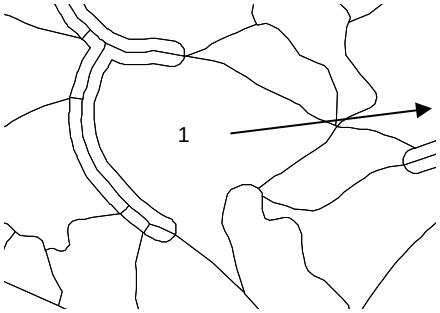
- Stand Identifier
- Acres
- Vegetation Codes
- Sensitivity (watercourse buffers, old growth stands, spotted owls, etc.).
- Site Class
- Harvest Timing

Each of these attributes will be described independently below. The management activities identified in Landscape Planning databases and models can be mapped using GIS and monitored on the ground to validate model outputs.

I-A. Stand Delineation

Stands are identified using aerial photos, drawn on a base map, assigned a unique identifier, and digitized into the GIS. Stands are manageable units that are accessible by a road or cable system and limited by ridges and/or watercourse buffers. Each stand is assigned a unique identifier so it can be 'joined' to relational databases (Table 1). Generally, the minimum mapping unit for stands is 20 acres, unless the stand has a particular sensitivity (such as a watercourse) or a sharp contrast in vegetation. Sensitivity constraints reduce the minimum mapping unit to an appropriate size to represent the sensitivity. Watercourse stands can be less than an acre since watercourse buffers are linked to the adjacent, upslope stand. A sharp contrast in vegetation could result in a minimum mapping unit of 10 acres.

Table 1. Example of relationship between stands in the GIS and stands in a relational database. The image on the left displays a stand with a unique identifier (1). Information about the stand is stored in a relational database.



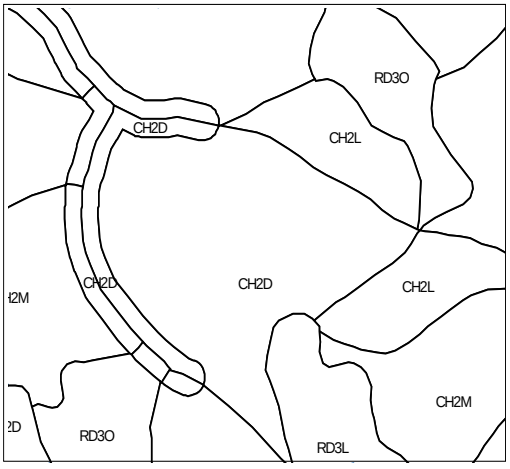
Stand	Acres	Vegetation	Sensitivity	Site Class	Harvest Timing
1	25	CH2D	00010	III	10
2	14	RD3L	10001	III	5

I-B. Acres

Acres are calculated in the GIS and exported to the relational database. Acres are stored as gross acres (the total acres within the polygon) and net acres (an adjustment assigned to each stand to account for roads and landings that are not part of the forested stand). The road deduction assigned to all stands is 3% since roads and landings have been computed to represent approximately 3% of the ownership's area. It is the net acres that are used to expand per acre estimates of volume, habitat, and other features to larger scale units (planning watersheds, Sustainability Units, ownership).

I-C. Vegetation

Each stand is assigned a vegetation label that forms the basis of a stratified sample. Sampling generates tree lists that are used to estimate inventories of many forest variables, such as volume, density, basal area, and habitat conditions. Vegetation labels are determined for each stand from aerial photos or field visits. The vegetation label consists of a species class code, a size class code, and a density class code. Figure 1 below displays how vegetation labels are assigned to each stand.



Tree lists for the stands that have been sampled are generated from the plots within the stand. Tree lists are developed for stands that have not been cruised by assigning all plots for a given stratum to the un-sampled stands of the same stratum.

Vegetation Classification Rules and Symbology

Introduction

Vegetation is classified according to a stand's species composition, the dominant size of the trees in the stand, and the canopy closure, or density, of the stand. The system has been developed to address mixed age stands and even age stands. Rules for classification have been created to reduce ambiguity in labeling stands. Standards have been established to ensure that vegetation classification is consistent.

Determining Size Classes

Size classification is the first component of vegetation classification to be determined. A diameter size class label is assigned to each of the forested stands. Vegetation polygons are classified into one of five "Diameter at Breast Height (DBH)" classes (Table 2).

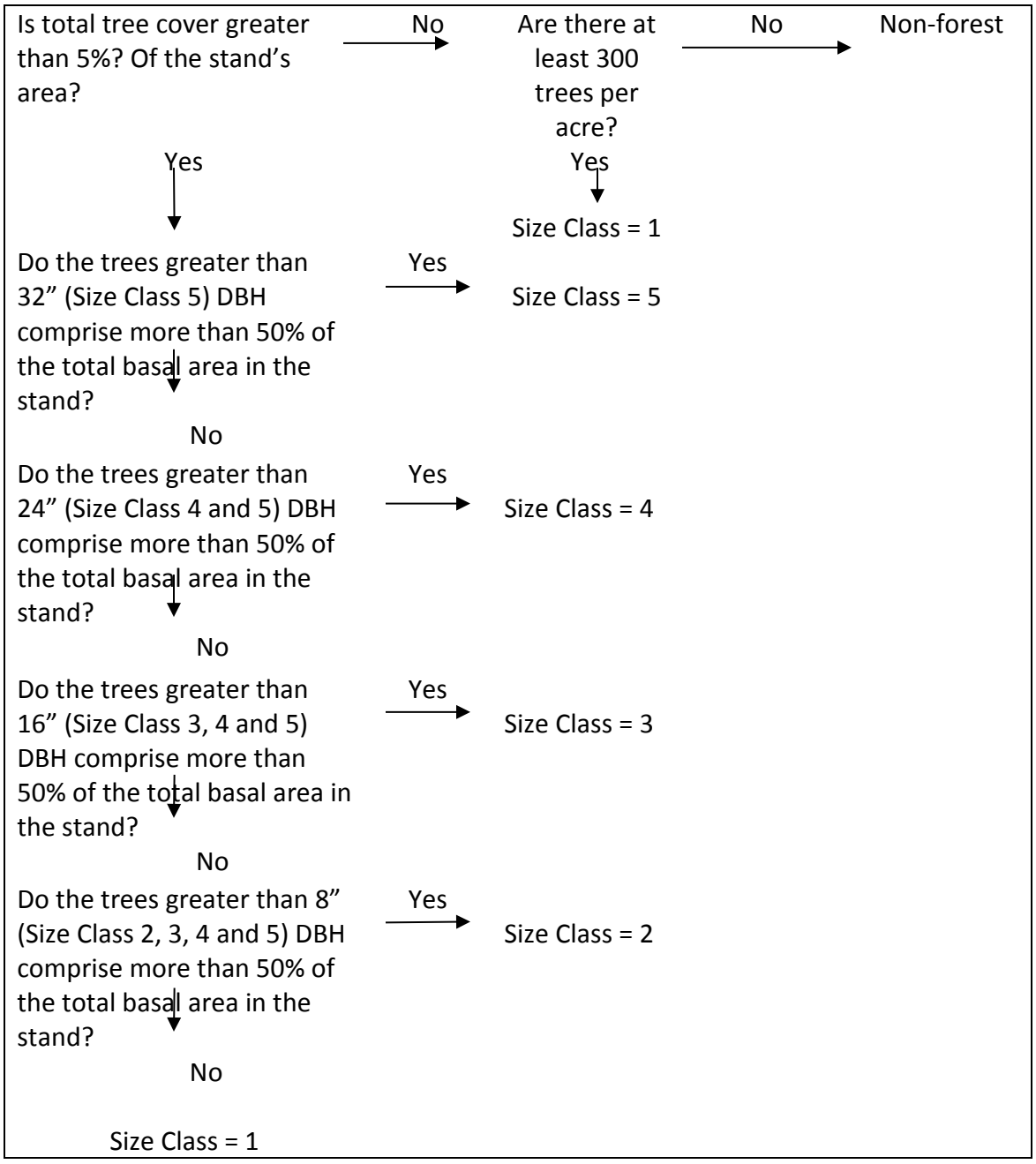
Table 2. Class assignments for Diameter at Breast Height (DBH) ranges.

DBH Classes

Class	DBH
1	0- 8 inches
2	8-16 inches
3	16-24 inches
4	24-32 inches
5	>32 inches

Rules have been developed to assign a size class to each vegetation polygon which accounts for trees of many age classes and many diameter classes (Table 3).

Table 3. Decision matrix for determining dominant diameter class.



Species Classification

Vegetation polygons that have 5 percent or more of their area covered by tree crowns are classified as forest and will be labeled with a three-part labeling system that includes species, size, and density. The vegetation labels are developed for inventory purposes. They are not intended to define natural communities. Definitions and symbols for each are as follows.

Species Classification – Non-Forest Symbols

Vegetation polygons that have less than 5 percent of their area covered by tree crowns should be classified as non-forest and will be labeled with one of the following symbols, depending on the predominant cover. Table 4 displays the vegetation symbols applied to stands that do not have forest cover, or the forest cover is a non-timber species.

Table 4. Vegetation symbols assigned to non-forest stands.

BR	Brush – Chaparral
GR	Grass and Meadows
BG	Bare ground, including rocks and watercourse beds
WA	Water
PG	Pygmy Forest
GX	Oak Woodland
RK	Rock Outcrop
BP	Bishop Pine Forest

A forested polygon is labeled with an appropriate conifer or hardwood species symbol when 70 percent or more of the basal area in the stand can be attributed to that species. If no one species represents 70 percent or more of the basal area, a mixed-species symbol will be used.

Species Classification – Dominant-Conifer Species Symbols

Table 5. Vegetation labels assigned to stands that have at least 70 percent of the stand's basal area in the conifer species identified.

RW	Coast redwood
DF	Douglas-fir

Species Classification – Dominant-Hardwood Species Symbols

Table 6. Vegetation labels assigned to stands that have at least 70 percent of the basal area is in the species identified.

AL	Alder
TO	Tanoak
LO	Live oak
BO	Black oak
MO	Madrone

Species Classification – Two-Species Symbols (Conifers)

Table 7. Vegetation labels assigned to stands where no one conifer species has 70 percent of the stand's basal area, but two species combined do have at least 70 percent of the basal area and each of the dominant species constitute at least 30 percent of the overall basal area.

RD	Redwood/Douglas-fir
RM	Redwood/Monterey Pine

Species Classification – Two-Species Symbols (Conifers and Hardwoods)

Table 8. Vegetation labels assigned to stands where conifer species do not comprise 70 percent or more of the stand's basal area. The stand is comprised of a mixture of species that make up 70 percent of the basal area and each of the dominant species (species groups) constitutes at least 30 percent of the overall basal area.

CH	Conifer/Hardwood mix
MH	Mixed Hardwood – Upland Broadleaf Forest
RE	Redwood/Eucalyptus

Density Classification

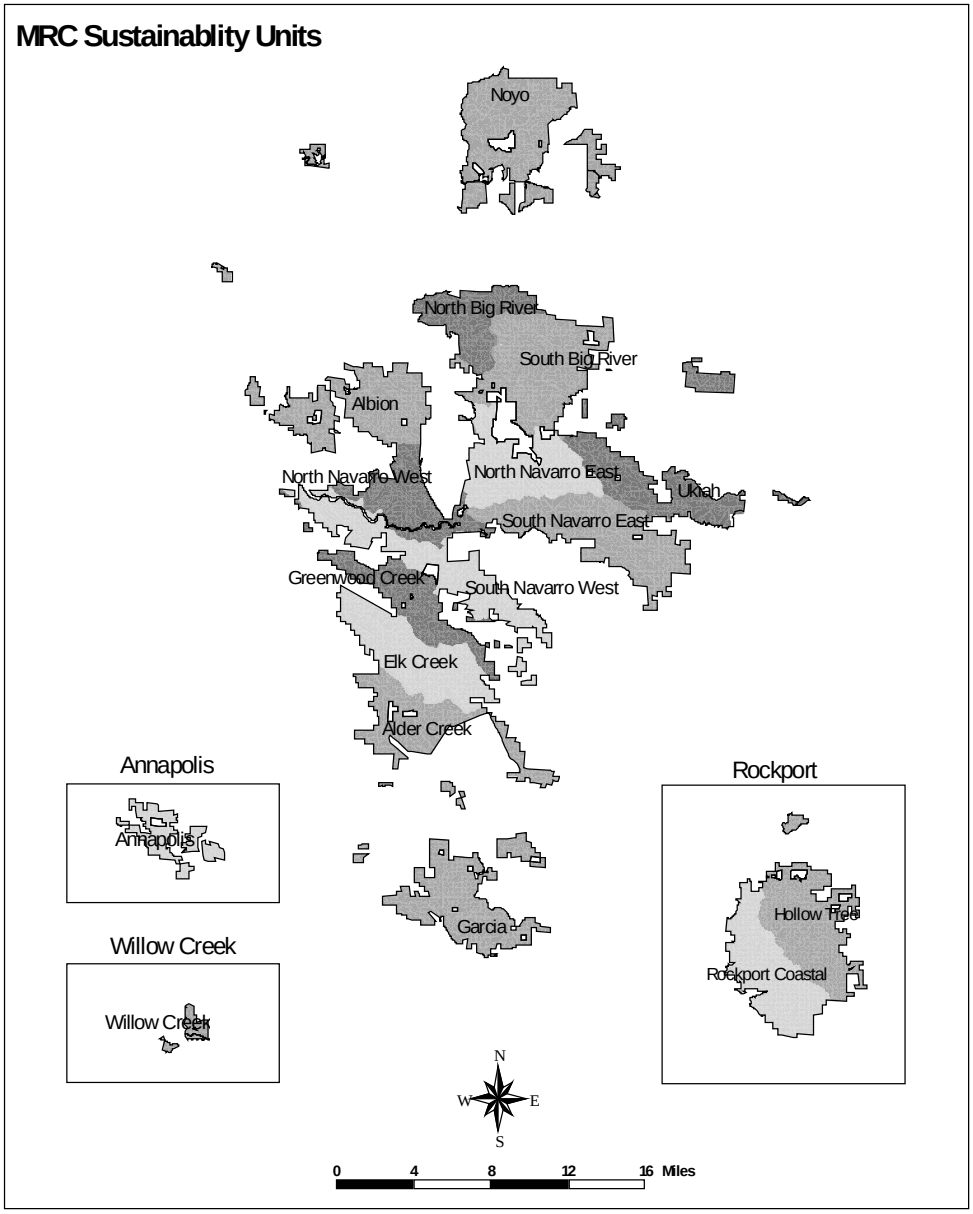
Table 9. Density classes are based the canopy closure of all trees greater than 8' DBH for Size Class 2 and above. All trees are considered for the canopy closure estimates in Size Class 1 stands.

Canopy Cover	Description	Code
0 – 20 %	Open Canopy Coverage	O
20 – 40%	Low Canopy Coverage	L
40 – 60%	Medium Canopy Coverage	M
60 – 80%	Dense Canopy Coverage	D
80 – 100%	Extremely Dense Canopy Coverage	E

Sampling Methodology

The ownership is broken into smaller units called Sustainability Units. Sustainability Units are the basis for sampling and deriving confidence targets. They also serve as the basis for assessing timber sustainability. Sustainability Units were developed by aggregating planning watershed boundaries that contain similar environmental characteristics. The largest Sustainability Unit is approximately 20,000 acres in size. The sampling goal is to be within 10% of the net board foot volume within the Sustainability Unit at the 90% confidence interval. Figure 2 shows the Sustainability Units.

Figure 2. Map showing location of Sustainability Units.



II-A. Stratified Sampling

The vegetation labels, or strata, that are assigned to a stand using photo interpretation or field visits are the basis for a stratified sampling system. Strata types with higher expected volume levels are sampled at a higher intensity (more stands sampled) than strata types with lower volume levels, since the principal goal of sampling is to derive confidence in volume estimates.

II-B. Selecting Stands for Sampling

Stands are randomly selected for sampling across a Sustainability Unit and/or planning watersheds. No effort is made to separate sensitivity classes within a vegetation stratum for sampling. The application of management policies (treatments) to stands of the same vegetation stratum in different sensitivity classes results in different outcomes for the vegetation. Vegetation labels are updated when stands are harvested or, at least every 20 years if a stand is not harvested.

Sampling priorities are identified at the beginning of each calendar year based on an assessment of the number and age of plots that represent each stratum within each planning watershed. MRC has established a goal of having at least 30 plots in 3 different stands for each planning watershed in a Sustainability Unit for strata that are estimated to have at least 100 square feet of conifer basal area. The goal for strata that are estimated to have less than 100 square feet of conifer basal area, but at least 30 square feet of conifer basal area, is 20 plots in 2 different stands. Strata that are estimated to have less than 30 square are assigned 10 plots in 2 different stands.

II–C. Sampling Procedure

The allocation of plots is based on an effort to achieve an estimate that has adequate confidence to represent the stand being cruised and to distribute the plots in enough stands of a given stratum to represent potential variation between polygons, thus achieving a higher level of confidence at the stratum level. We have determined that 10 plots are adequate for the stand level confidence and 20 to 50 plots are adequate for the stratum level confidence. The variation in the number of plots is based on the anticipated volume in the stratum and the proportion the stratum represents in the overall inventory. A stratum with a high anticipated volume that represents a high proportion of the acres will be allocated more plots than a stratum that represents a small proportion of the acres and has low volume.

Points (plot centers) are located on the stand map at the appropriate chain intervals that evenly distributes the desired number of plots throughout the stand along cardinal bearings. Once in the field, an entry point to the first plot is determined. Common entry points are landmarks such as landings, watercourse crossings or other identifiable stand boundaries. This point will be the anchor point from which all cruise lines will be established. A GPS coordinate is taken (if possible) and directions to the first plot are written on flagging displayed at the entry point. Plot locations will be referenced by flagging that identify the plot number and specify directions to the next plot.

II-D. Data Collection at Plots

The plots are sampled using a set of nested plots. All trees equal to or greater than six inches (Diameter at Breast Height) are sample with a variable radius plot. A fixed 10^{th} acre plot is used to measure down logs and brush cover. A 100^{th} acre fixed plot is used to tally trees smaller than 6 inches.

1) Trees greater than six inches are measured if they fall in the variable radius plot. The basal area factor (BAF) selected for the stand is based on getting, on the average, five to six trees 'in' per plot. Trees will be tallied and measured in a clockwise direction beginning at a North line.

2) Species: Species are coded on the plot sheets with the codes shown in Table 10.

Table 10. Codes and scientific names for common species found in Mendocino Redwood Company's forests.

Species Code	Common Name
AL	Red Alder
BM	Big Leaf Maple
BO	Black Oak
BP	Bishop pine
CB	California Bay
DF	Douglas-fir
EU	Eucalyptus
GC	Golden chinquapin
GF	Grand fir
LO	Live Oak
MO	Madrone
MP	Monterey pine
NM	California Nutmeg
PY	Pacific yew
RW	Redwood
SP	Sugar pine
SS	Sitka spruce
TO	Tanoak
UK	Unknown
WH	Western Hemlock
WM	Wax Myrtle
WO	White Oak

3) Diameter at Breast Height (DBH) Diameters are measured at a point 4.5 feet above the ground level or root collar on the uphill side of the tree. Measurement accuracy is to the nearest inch. In the case of irregularities in DBH, such as swelling, bumps, depressions, branches, etc., diameters are measured immediately above the irregularity at the place where it ceases to affect the normal stem form.

4) Height. Total height is measured on all trees on every third plot starting with the first plot. If the angle from level to the point of measurement exceeds 45 degrees (i.e., 100% or 66 topo), the distance from the measured tree must be increased to reduce the angle. At least 30% of the total trees should have height measurements while emphasizing a good distribution throughout the diameter classes. A regression equation is derived from the measured trees to estimate the unmeasured tree heights. Species that are uncommon in a particular stand should be measured for height if they are in any plot, since the sample size for developing a regression estimator might be inadequate.

5) Height to Crown Base (HTCB). This measurement provides an estimate of the total crown area. The measurement is taken on every tree that is measured for height. The measurement is taken from the base of the tree to the visually balanced base of the crown, since tree crowns are often irregular.

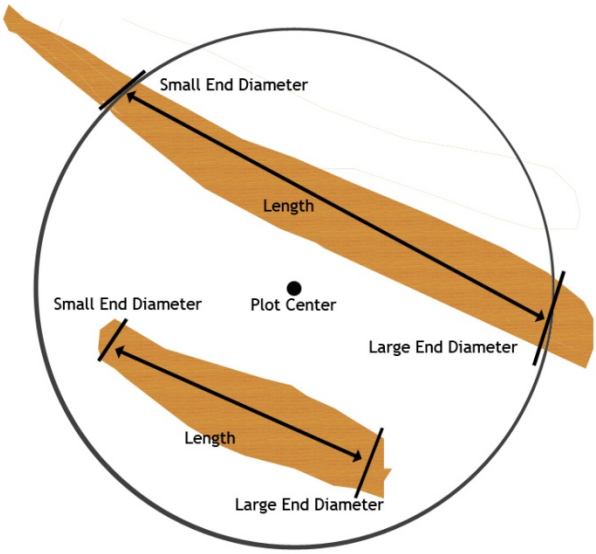
6) Status. A status code is entered for each tree. Status codes describe the physical condition of the tree (Table 11).

Table 11. Status codes for trees sampled.

STATUS CODES		
Code	**Features**	**Description**
L	Live	Default code for trees with normal form.
S	Snag	Standing trees that are dead.
H	Live Snag	Standing trees that retain little live component – mostly dead.
W	Old growth	Old growth trees.
R	Snag Recruitment	Trees that will be retained for future snags.
P	Broken Top	Trees that are not snags or old growth and are not of normal form.
P	Dead Top	
P	Forked	
P	Suppressed	

7) Downed Logs**.** Downed logs are measured on every plot. The sample area for downed logs is a fixed 1/10th acre plot (37.2 feet radius). Downed logs must meet the following criteria to be sampled:
   - The log must have an average diameter of at least six inches (as determining by summing the large end diameter and the small end diameter and dividing by two),
   - The log must have a length of at least ten feet, for average diameters less than 16 inches, or
   - A length of at least six feet, for average diameters greater than 15.9".

Figure 3. Figure displays how downed logs are measured on each plot.



Downed logs are determined to be either hard (no material gives way when kicked, sound when kicked is a thud) or soft (material falls of when kicked, sound is muffled). Hard logs generally have the top intact, the bark on, and the wood is sound. Soft logs usually have a broken top, the bark is sloughing off, and the wood is decaying. A status code 'H' is applied to hard down logs and a status code 'S' is applied to soft down logs.

8) Regeneration. Trees less than 6" DBH are tallied on every plot. The sample area measured for regeneration is a fixed 1/100th acre plot (11.8 feet radius). Record all conifers and hardwoods by species and tally seedlings and saplings in two size classes: 0-2.9 inch DBH and 3-5.9 inch DBH.

9) Shrub Cover. Shrubs are defined as any plant species less than 10 feet tall with crown diameters equal to at least 75% of the height. The measurement is derived from an ocular estimate of the shrub cover within a 1/10th acre plot (37.2 feet radius). The

dominant shrub species is recorded along with the following density codes shown in Table 12.

Table 12. Density codes for understory vegetation sampled on each plot.

Density Code	Description of Understory Coverage	Percent Coverage of Understory
O	Open	0 – 19.9%
L	Low	20 – 49.9 %
M	Medium	40 – 59.9 %
D	Dense	60 – 79.9 %
E	Extremely Dense	80 – 100%

Additional Notes. Any further information concerning the stand being cruised can be extremely important. Items that should be noted are the location of skid trails, springs, watercourses and historical artifacts. Wildlife observations are also noted including wood rat nests, bird nests, owls, raptors, mountain lions, and bears.

II–E. Site Index Sampling

Site trees are sampled to derive an estimate of the height of the co-dominant trees (by species) at age 50. Stands that share similar environmental variables, particularly soil are grouped together into various site classes. The site indices derived from sampling are used to assign an average site index for each species to the stands that share the same site class. The current data applies site index estimates to an ownership stratification of site classes.

Approximately 3 to 5 trees per stand are selected for site trees and measured for species, DBH, height, HTCB, and age. Selected site trees are conifer trees that display no deformities and are in a co-dominant position in the stand. The trees measured for site index are averaged for each species. The allocation of site index to the landscape is based on expanding the results of the estimated site index from the sampled trees to other stands within the Planning Watershed based on soil stratification.

II-F. Measurement Tolerance Standards

Listed below (Table 13) are the tolerance standards that will be used to evaluate the accuracy of field measurements. Mendocino Redwood Company performs inventory sampling with company personnel. Periodic check cruises are performed by senior inventory staff to ensure the following standards are being met.

Table 13. Tolerance standards allowed for each measurement theme

Measurement	Tolerance
Percent slope	±10%
Percent brush cover	±20%
Species identification	±1% of the total trees recorded
Diameter at breast height	±1.0 in.
Total tree height	±5 ft
Height to crown base	±10 ft
Breast height age	±5 yr

II–G. Inventory Updates

Maintaining a forest inventory requires consideration of changes to the basis of the estimates over time. These changes result from forest growth, harvesting events, and natural disturbances. The inventory is updated in the first quarter of each calendar year. Annual reports are produced after updating the inventory. This section discusses the methodology used in updating inventory records.

Growth – All plots 10 years of age or less are 'grown' on an annual basis using the CRYPTOS (Cooperative Redwood Yield Project's Timber Output) growth model. Any plot older than 10 years of ages is deleted from the inventory database records. This is to minimize an over-reliance on the growth model for maintaining the inventory. The growth assigned to each plot is based on the age of the plot.

Harvested Stands – A harvested stand is placed into a vegetation stratum based on an ocular examination of the stand in the field, using the vegetation typing rules described in Section I-C above. The existing tree list for the stratum (in the same planning watershed) is applied to the stand.

Natural Disturbances - A natural disturbance has a similar effect on a stand as a harvest. They are treated in the same way as a harvest in terms of making adjustments to strata assignments and applying the appropriate tree lists.

Stand strata assignments are examined and updated every 20 years regardless of whether a stand is harvested or not. This helps to maintain integrity with the strata label assigned to the stand, as growth can be irregular between stands with the same vegetation label.

III. Growth and Yield Modeling

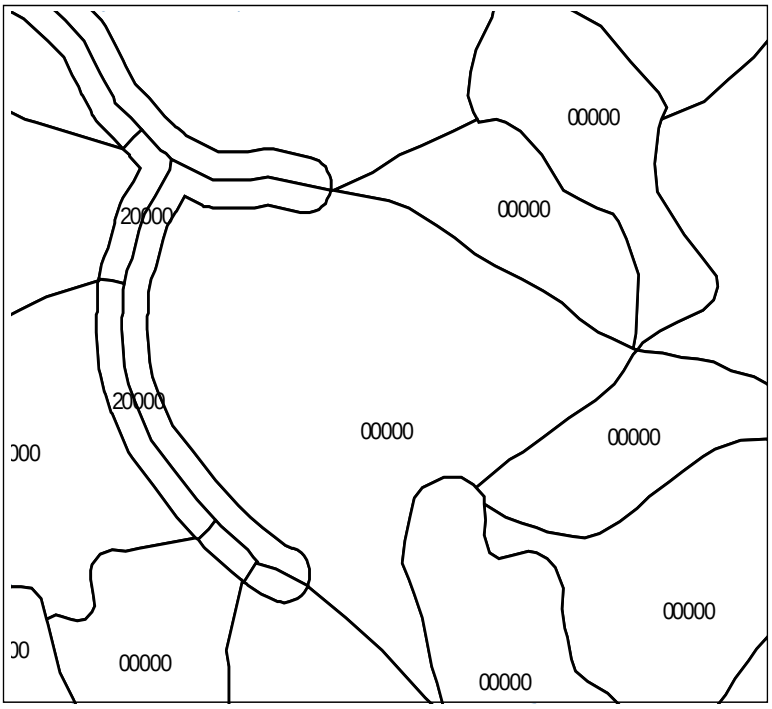
Growth and yield modeling projects the tree lists derived from inventory sampling through time (forest growth) and management activities (harvest) over a long period of time (100 years in this case). The growth model used in MRC's Option A planning effort used the CRYPTOS equations for height and diameter growth, crown recession, and mortality. CRYPTOS estimates growth for 5-year timeframes. The model is set to 'harvest' stands (if they are scheduled for harvest) before they are grown.

This is a more conservative approach to estimating harvest volumes than growing the stands before they are harvested, since the harvest estimate doesn't consider the real growth that occurs in the forest for periods 2 through 5 in any five-year planning period. Projected inventory, harvest estimates, and growth estimates are reported for every 5 year period in MRC's Option A (available on our website: www.mrc.com).

III-A. Stand Sensitivity Attributes

Each stand is assigned a code that indicates any special management considerations for the stand. The code allows maps to be made that display the geographic extent of the sensitive areas. The codes also direct the stands to silviculture strategies in growth and yield modeling that are consistent with management policies. Figure 4 displays a set of stands with their respective concern codes.

Figure 4. Map displaying how a sensitivity code is assigned to each stand.



The sensitivity code consists of five digits. Each digit indicates a specific theme. Table 14 displays the key to the sensitivity code.

Table 14. Key to the sensitivity code assigned to each stand. As an example, a stand with a code of 20000 has watercourse sensitivity (Large Class II) and has no visual, special considerations, wildlife, or vegetation sensitivities.

Watercourse		Visual		Special Considerations		Wildlife		Vegetation	
0	No Concern	0	No Concern	0	No Concern	0	No Concern	0	No Concern
1	Class I	1	Special Viewshed	1	Special Treatment Area	1	Spotted Owl – Level I	1	Old Growth – Type I
2	Large Class II	2		2	Deeded Conservation Easement	2	Spotted Owl – Level II	2	Pygmy Forest
3	Class I Floodplain	3		3	Non-deeded special conservation	3	Spotted Owl – Level III	3	Old Growth – Type II
4	Class II Floodplain	4		4	Carbon Management	4	Marbled Murrelet	4	Rock and Talus
5	Floodplain	5		5		5	Point Arena Mountain Beaver	5	Oak Woodland
6	Small Class II	6		6		6	Spotted Owl – Level I/Marbled Murrelet/Point Arena Mountain Beaver	6	Old Growth Buffer
7		7		7		7	Spotted Owl – Level I/Marbled Murrelet	7	
8		8		8		8	Marbled Murrelet Buffer	8	
9		9		9		9	Spotted Owl – Level I/Point Arena Mountain Beaver	9	

Many stands have multiple concerns. Management activities in these stands default to the most conservative treatment. Table 15 describes the various forest conditions found on Mendocino Redwood Company along with descriptions of management goals and silviculture allowed in each area.

Table 15. Description of forest management types, management goals, and management activities.

Forest Management Type	Description	Total Acres*
Aquatic Management Zone	*General information:* Management buffers along fish-bearing watercourses and watercourses used for domestic water supply (Class I), watercourses that support non-fish aquatic life beneath a watershed area that exceeds 100 acres in size, and certain floodplains. Our modeling assumed a conservative buffer width for modeling of 150 feet (horizontal distance from the centerline of the watercourse). The actual buffer widths that will be implemented in the field will vary based on slope.	**22,710**
	Management goals: The key management themes in these areas are to keep creeks and rivers cool, to reduce sediment delivered to watercourses and to provide a source of large woody material to these watercourses. These areas will contain very large and dense stands of redwoods and Douglas-fir over time and will conserve habitat features such as snags, downed logs, and old growth trees.	
	Silviculture: Harvesting will be conducted with high retention selection (Class I) and medium retention selection (Class II) with adequate retention to ensure large woody debris recruitment and a high level of shade to the watercourse.	
Small Class II Watercourse Zones	*General information:* Small II watercourses are watercourses that support aquatic life that are non-fish-bearing and begin beneath a watershed area that is less than or equal to 100 acres in size. Option A modeling assumed a conservative buffer width for modeling of 75 feet (horizontal distance from the centerline of the watercourse). The actual buffer widths that will be implemented in the field will vary based on slope.	**6,373**
	Management Goals: The key management themes in these areas are to keep creeks and rivers cool, to reduce potential sediment delivered to watercourses and to provide a source of large woody material to these watercourses. These areas will contain very large and moderately dense stands of redwoods and Douglas-fir over time and will conserve habitat features such as snags, downed logs, and old growth trees	
	Silviculture: **Medium retention selection will be the most likely harvesting method in these stands. Adequate retention will remain to ensure large woody debris recruitment and a moderate level (50% canopy cover or greater) of shade to the watercourse.**	

Table 15. Continued

Forest Management Type	Description	Total Acres*
Pygmy Forest	*General information:* Pygmy forests are rare and unique ecosystems that exist close to the Pacific Ocean shore. There are many rare plants which are found only in these vegetation communities, including dwarfed pines (Bolander pine) and rhododendrons.	**730**
	Management goals: Minimize disturbance in these areas. Use existing roads, if possible.	
	Silviculture: Prohibit harvest.	
Rocky Outcrop	*General information:* Natural rock outcrops are a unique feature in the forested landscape. Some of these features may be suitable habitat for Peregrine falcons.	**94**
	Management goals: Management goals for protecting these sites include minimizing road building and providing vegetative buffer zones.	
	Silviculture: Prohibit harvest.	
Conservation Easement	*General information:* MRC has three separate conservation easements on the property where certain harvesting and development rights have been legally restricted	**926**
	Management goals: Conserve for aesthetics or protecting view sheds adjacent to park areas.	
	Silviculture: Conservation Easements on MRC's lands are no harvest easements.	
View Shed	*General information:* View sheds are important scenic areas in areas adjacent to State Parks, non-industrial neighbors, state highways, county roads, and the Skunk Train.	**3,552**
	Management goals: Maintaining a high quality of aesthetic value is given priority.	
	Silviculture: Computer simulation of these areas includes adequate retention in all silviculture methods to allow for aesthetically-pleasing view sheds. Field implementation of this practice will focus retention in areas that will protect the aesthetic value.	
Oak Woodlands	*General information:* Forested areas consisting largely of true oaks and madrone.	**1,128**
	Management goals: Management will include activities such as harvest and controlled burns to maintain these areas as oak woodlands.	
	***Silviculture:* Computer simulation modeled these areas as no harvest. Actual management will include activities such as harvest and controlled burns to maintain these areas as oak woodlands.**	

Table 15. Continued

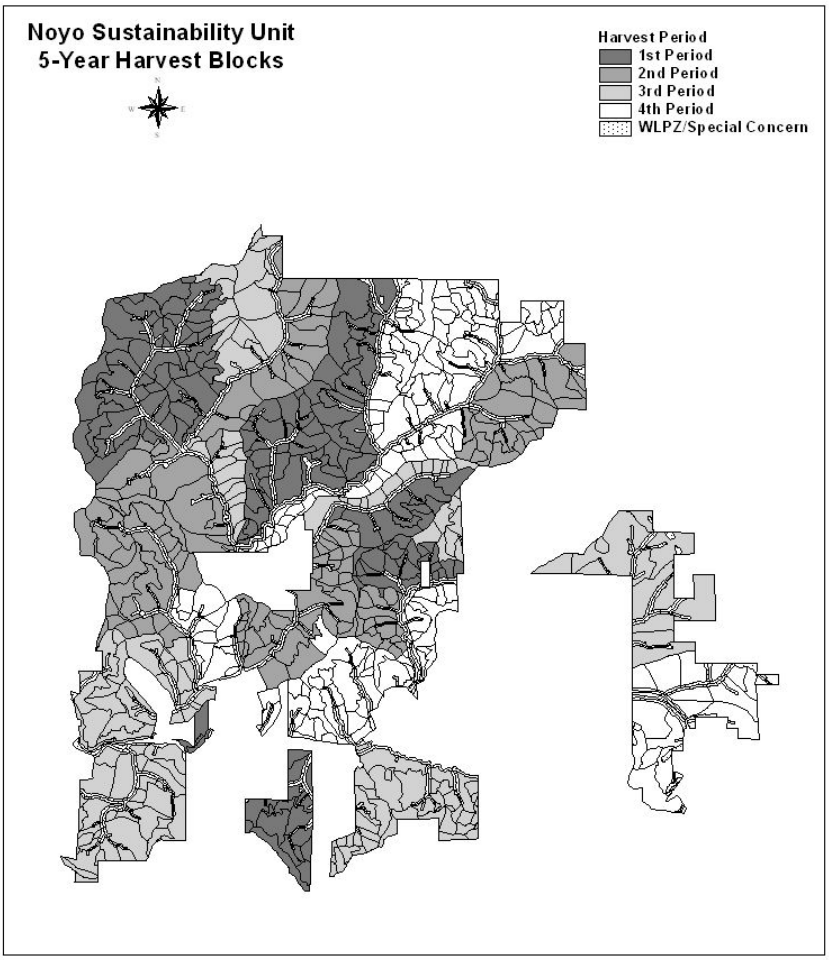
Forest Management Type	Description	Total Acres*
Lower Alder Creek Management Area – Core Area	*General information:* Un-entered and second growth stands in Lower Alder Creek that support marbled murrelet nesting activities.	**496**
	Management goals: Maintain area in favorable condition for nesting marbled murrelets.	
	Silviculture: Prohibit harvest.	
Lower Alder Creek Management Area – Buffer Area	*General information:* Largely second growth stands that surround marbled murrelet core nesting areas.	**804**
	Management goals: Management will ensure that a forest stand with a medium to dense canopy will be adjacent to the core marbled murrelet area.	
	Silviculture: Selection silviculture only.	
Coastal Zone Special Treatment Area	*General information:* Stands that have been identified from Coastal Commission maps.	**647**
	Management goals: Maintain an aesthetically pleasing landscape.	
	Silviculture: Selection silviculture will occur in these areas.	
Northern Spotted Owl – Core Area	*General information:* Stands that have been identified as NSO core activity centers or nesting sites.	**7,450**
	Management goals: To maintain high quality nesting habitat.	
	Silviculture: Prohibit harvest.	
Northern Spotted Owl – Buffer Area	*General information:* Stands that have been identified as buffers surrounding NSO nesting sites.	**9.087**
	Management goals: To assist in maintaining high quality nesting habitat.	
	Silviculture: Medium retention selection silviculture.	
Point Arena Mountain Beaver	*General information:* Stands that have been identified as Point Arena Mountain Beaver habitat.	**14**
	Management goals: Maintain habitat conditions.	
	Silviculture: Prohibit harvest.	
Carbon Sequestration	*General information:* Stands that are experimentally managed to maximize carbon sequestration.	**341**
	Management goals: Develop and test hypotheses related to management related to carbon sequestration.	
	Silviculture: High retention selection	

*** The acres reported may include a combination of other sensitivities. They are not necessarily independent from other sensitivities.**

III-B. Harvest Timing

Each stand is attributed with a harvest period (5-year periods) of 0, 5, 10, and 15. This establishes the initial harvest period for each stand. Subsequent harvests within the stand are based on the re-entry period assigned to each silviculture regime. All silviculture regimes in this plan have the same re-entry period (20-years). This facilitates the use of area control, referred to as Harvest Blocks, which are based on dividing the Sustainability Units into four near equal geographic parts. This facilitates an even and efficient flow of harvest. The careful establishment of Harvest Blocks minimizes the use of roads and allows for the longest period of rest to areas not scheduled for harvest. Figure 5 displays how the Harvest Blocks are established for a portion of the 'Noyo' Sustainability Unit.

Figure 5. Example of harvest blocks in the Noyo Sustainability Unit.



III-C. Silviculture

The general goal of the all silviculture methods is to restore and maintain conifer-dominated stands where appropriate – (oak woodland management has a different focus, for example) that are structurally diverse. For stands that do not have any specific sensitivity, Selection and Group Selection are considered the 'steady state' silviculture methods once conifer-dominated conditions have been developed. Restoration harvests (all silviculture methods other than Selection and Group Selection) are used no more than twice in the life of a stand.

The conifer retention levels modeled are intended to address Forest Practice Rule standards, agreements with various agencies, and our internal guidelines. The agreements include retention guidelines for:

1. Unstable areas such as steep streamside slopes, headwall swales, and inner gorges. Implementation will focus a higher level of retention in these areas and recruit and retain large trees.
2. Class III watercourse protections. An average 50% canopy retention level will be maintained.
3. Rare plants. Up to 50' protective buffers
4. Wildlife trees. An average of at least 2 trees greater than 16" Diameter at Breast Height (DBH) and 1 tree greater than 24" DBH per acre will be retained for wildlife.

MRC's landscape model 'grows' and 'harvests' trees in 5-year periods. A stand is only considered for harvest and the silviculture logic applied to the stand if the stand is scheduled for harvest in the specific period. Possible silviculture regimes for any particular stand are based on the stand's specific sensitivity constraints, if any. Stands constrained for a particular sensitivity usually have only one possible regime available. Non-constrained stands are assigned a silviculture regime based on a decision hierarchy. The decision hierarchy results in a silviculture selection that is based on conifer and hardwood stocking criteria. Some stands do not meet any of the criteria and fall into a 'no harvest' category and are reviewed at the next entry cycle – 20 years later.

Table 16. This describes the various silviculture regimes used in our landscape plan (for non-sensitive stands) and their general application based on stocking levels of conifers and hardwoods. Note that this table indicates a stand with 105-125 square feet of conifer may fit into selection or restoration variable retention, dependent on the amount of hardwood stocking in the unit.

Table 16. General Decision Logic in Selecting Silviculture Methods

Conifer Stocking (Basal Area (square feet) per Acre)	**Hardwood Stocking** (Basal Area (square feet) per Acre)		
	> 60	**20 - 60**	**< 20**
>125	**Selection, Group Selection, Alternative Group Selection**		
105 - 125	***Restoration Variable Retention (Conifers must be Large)***		
50 - 105		**(Alternative) Transition**	
<50	**Rehabilitation**	**(Alternative) Seed Tree Removal (Conifers Must be Large)**	

The trend in silviculture implementation will migrate stands toward a condition where they can continuously be managed under Selection and Group Selection methods. Each silviculture method has a 20-year re-entry period.

Table 17. This describes the generalized retention standards assigned to silviculture regimes.

Table 17. Quick Reference Guide to Generalized Retention Minimums for Conifers for Non-Constrained Stands

Silviculture	**Conifer Basal Area Retention (per Acre)**	**Other**
Selection	75	
(Alternate) Group Selection	60*	An alternate group selection is used where the harvest of hardwoods results in more than 20% of the stand in group clearings**.
(Alternative) Transition	50	An alternate transition is used where the harvest of hardwoods results in more than 20% of the stand in group clearings**.
Restoration Variable Retention	Per CCR 14 913.4 (d) (3))	
(Alternative) Seed Tree Removal	15	An alternative seed tree removal is used when thinning operations occur in the regenerated stand. The area to which this is applied must meet the retention standards for commercial thinning activities, defined in the Forest Practice Rules.
Rehabilitation	5	

*The stand will average 75 square feet of conifer basal area per acre outside of group clearings. Group Selection is the preferred silviculture to promote conifer regeneration where needed.
**For the purposes of implementation of this plan, "group clearings" are stated in the California Practice Rules are defined as areas of 0.25 to 2.5 acres where harvest results in stocking below the minimum stocking standards (14 CCR 912.7 (b)(2)). If there are no operations in an area with less than the minimum stocking, the area is not considered a group clearing.

Threatened, endangered, and sensitive species known to occur on MRC forestlands

Common name	Scientific name	Federal status	State status
Amphibians			
Southern torrent salamander	*Rhyacotriton variegates*	None	**Special concern**
Coastal tailed frog	*Ascaphus truei*	None	**Special concern**
California red-legged frog	*Rana draytonii*	Threatened	**Special concern**
Northern red-legged frog	*Rana aurora*	None	**Special concern**
Foothill yellow-legged frog	*Rana boylii*	None	**Special concern**
Reptiles			
Pacific pond turtle	*Actinemys marmorata*	None	**Special concern**
Birds			
Osprey	*Pandion haliaetus*	None	**Board of Forestry - sensitive**
White-tailed kite	*Elanus leucurus*	None	**Fully protected**
Northern harrier	*Circus cyaneus*	None	**Special concern**
Golden eagle	*Aquila chrysaetos*	Protected	**Fully protected, Board of Forestry - sensitive**
Bald eagle	*Haliaeetus leucocephalus*	Protected	**Endangered**
Northern goshawk	*Accipter gentilis*	None	**Special concern, Board of Forestry - sensitive**
American peregrine falcon	*Falco peregrinus anatum*	De-listed	**Endangered**
Marbled murrelet	*Brachyamphus marmoratus*	Threatened	**Board of Forestry - Sensitive**
Northern spotted owl	*Strix occidentalis caurina*	Threatened	**Board of Forestry - Sensitive**
Vaux's swift	*Chaetura vauxi*	None	**Special concern**
Olive-sided flycatcher	*Contopus cooperi*	None	**Special concern**
Purple martin	*Progne subis*	None	**Special concern**
Mammals			
Pallid bat	*Antrozous pallidus*	None	**Special concern**
California ringtail	*Bassariscus astutus raptor*	None	**Fully protected**
Point Arena mountain beaver	*Aplodontia rufa nigra*	Endangered	**Special concern**
Sonoma tree vole	*Arborimus pomo*	None	**Special concern**
Plants			
Humboldt milk-vetch	*Astragalus agnicidus*	None	**Endangered**
Small ground cone	*Boschniakia hookeri*	None	**Rare**
Pygmy cypress	*Callitropsis pygmaea*	None	**Rare**
Swamp harebell	*Campanula californica*	None	**Rare**
Oregon goldenthreads	*Coptis laciniata*	None	**Rare**
Coast lily	*Lilium maritimum*	None	**Rare**
Bolander's beach pine	*Pinus contorta ssp. Bolanderi*	None	**Rare**
White flowered piperia	*Piperia candida*	None	**Rare**
North coast semaphore grass	*Pleuropogon hooverianus*	None	**Threatened**
Maple-leaved checkerbloom	*Sidalcea malachroides*	None	**Rare**
Long-bearded lichen	***Usnea longissima***	**None**	**Rare**