Yurok Tribe

Yurok Indian Sustained Yield Lands

Forest Management Plan

2012

Working Forest Management Plan

November 16, 2012

Yurok Tribe Forest Management Plan 2012

For the purpose of forest management planning, the Yurok Indian Sustained Yield Lands (YISYL), which encompass the Yurok Indian Reservation (YIR), is designated a "Category 1" reservation. This means that it is comprised of more than 10,000 acres of commercial timberland in trust, or is determined to have more than one (1) million board feet per year of timber products harvested. The Forest Management Plan (FMP) for a Category 1 reservation must contain, at a minimum, the following components:

- Approval Page
- Tribal Goals and Objectives
- Forest Inventory Analysis
- Forest Description – components of which are spread throughout the FMP
- Resource Protection Plan
- Timber Management Plan (Forest Land Management)
- Forest History
- Forest Economics Benefits Assessment
- Document Retention Plan
- Environmental Assessment (EA) – (Other Federal Mandates)

Additional sections have been included: Carbon Projects, Fuels Management, Woodland Management, Road Management, and Yurok Aquatic Habitat Conservation Plan. These additional sections provide information on the recent land purchases, management requirements, future uses, and assessment needs. Sections were also expanded, such as Forest Health, with the addition of an extensive chapter devoted to the Sudden Oak Disease and the need for mitigating damage caused by the black bear.

FOREST MANAGEMENT PLAN

YUROK INDIAN SUSTAINED YIELD LANDS

2012

Compiled by

YUROK FORESTRY DEPARTMENT

Concur:_____,20____

_____

Superintendent Northern California Agency

Approved: _____, 20____

_____

Chairperson

YUROK Tribe

by Tribal Resolution No.

Approved:_____, 20____

_____

Director

Pacific Region Office

For Phase I Lands

Approved : _____, 20____

_____

Director, State Water Resources Control Board

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825

IN REPLY REFER TO:

OCT 21 2013

Honorable Thomas O'Rourke
Chairperson, Yurok Tribe
Post Office Box 1027
Klamath, California 95548

Dear Chairperson O'Rourke:

The Pacific Regional Office would like to extend our congratulations to the Yurok Tribe on the approval of the Tribe's enclosed Forest Management Plan (FMP). The FMP is intended to protect and improve your tribal sustained yield unit resources (16 USC §§ 583 et. seq.) guided by your tribal values. As you may know, it is currently a Bureau of Indian Affairs mandate that all Indian trust land capable of growing forest resources receive an approved FMP. The Tribe has the opportunity to amend/modify the FMP at any time provided these changes are compliant with existing laws and regulations.

The Preferred Alternative- Alternative 3 (Preferred Action) has been selected to allow the Tribe to meet its forest management goals and objectives. A key goal set in by the Government Performance Results Act (GPRA) is meeting the annual allowable cut. The removal of these forest products in a responsible manner assists in the protection and improvement of your trust assets. In addition, meeting the annual allowable cut set in your Forest Management Plan provides the Tribe the full benefit of its valuable forest products. The National Indian Forest Resources Management Act (NIFRMA), Senate Report noted that "cutting less than the annual allowable harvest levels is not in harmony with the Bureau's forest management objective of sustained yield". The current annual allowable harvest (hard target) levels set by your approved FMP are as follows:

Timber Type	Annual Allowable Cut (Annual Target)
Conifer	2.5 MMBF
Residual-Salvage/Hardwood	320 cords

The approval of your plan allows for the Tribal Sustained Yield Unit to seek funds that promote growth, improve forest health, protect and improve natural resources. In addition, investment opportunities to improve forest assets that promote Tribal sovereignty in accordance with the NIFRMA (25 USC § 3109) should be sought. If the Tribe would like to change or update your FMP or require assistance in implementing the plan, the Tribe should contact the Pacific Regional Office (53 BIAM Supp. 1 § 1.3).

The approval of the FMP does not approve the Tribe's permitting policy for harvest or burning that were included in the appendix of the FMP. The Tribe may wish to manage a "free" harvesting policy that is provided to Indian benificiaries (25 CFR § 163.27) and/or a Tribal burning program that could regulate the proprietary burning rights provided to allottees within the Tribe's jurisdiction (18 USC § 1855). If the Tribe wishes to manage a Tribal permitting policy it should be resubmitted as a FMP addendum (30 BIAM Supp. 10 Illustration 2).

If you have any questions, please call Gerald Jones, Assistant Regional Forester, at (916) 978-6076, or Dale Morris, Acting Chief, Regional Division of Natural Resources, at (916)978-6050.

Sincerely,

Amy L. Dutschke

Regional Director

Enclosure

cc: Director, Branch of Forest Resources Planning (with approved plan)
Superintendent, Northern Cal. Agency

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INTRODUCTION

The Yurok Indian Sustained Yield Lands (YISYL) encompasses the Yurok Indian Reservation (YIR) which was created by the Hoopa-Yurok Settlement Act of 1988, and was previously referred to as the "Extension" portion of the Hoopa Square reservation. There are approximately 59,000 acres in the entire YIR, and of these, approximately 3,320 acres are forested Tribal trust lands, and 2,171 acres are forested allotted lands held in trust. Restricted status Tribal owned forested fee land, managed as a sustained yield unit (SYU) within the YISYL, consists of 31,146 acres both within the YIR and outside of the YIR boundary. Total forested Tribal ownership is 36,637 acres. This forest management plan includes elements for the management of all Yurok Tribal lands both within and outside of the reservation boundary.

The reservation extends approximately one mile on either side of the Klamath River from the Hoopa Reservation to the mouth of the Klamath River (see Location Map). Except for occasional side hill benches and riverside flats, reservation lands are all located on moderate to steep slopes within the river gorge. Elevations range from sea level to 2,500 feet, and precipitation ranges from 40 to 80 inches per year. Deep soils and substantial rainfall has resulted in excellent conditions for timber growth.

Except for the last remaining old growth stands found on tribal trust lands and within the Redwood National Park, the entire Lower Klamath River watershed has been heavily logged over the past 70 years. Despite recent dramatic declines in populations, the Klamath River remains an important fishery. Any potential effects of logging on tribal trust lands will have to be analyzed in the context of all other harvesting within the watershed, which includes intensively managed industrial and allotment ownerships. Because old growth habitat is concentrated on tribal lands, special considerations (including limitations to harvesting) for wildlife species such as the Northern Spotted Owl and marbled murrelet may have to be made.

Tree species found on the trust lands include Sitka Spruce and Western Hemlock near the river mouth, redwood and Douglas-fir upriver, and scattered ponderosa pine in the higher elevations. Douglas-fir is the predominant conifer species (approximately 90% by volume). Hardwoods follow a similar pattern with red alder common near the river mouth, tanoak and madrone up river, and black oak, white oak and canyon live oak further up river. A variety of vegetation and land use types are found within the tribal ownership

Some of the additions and changes in the 2012 Forest Management Plan (FMP) include an update on the significant purchases of forestland and address the future management of these acres. The forest carbon credit program is also addressed and the expected carbon production over the next 100 years is outlined. The agreement between the Yurok Tribe (Tribe), State Water Board, and the Regional Water Board as well as the implementation and requirements of the Aquatic Habitat Conservation Plan is also addressed. Some of the other items addressed include the need for a timber stand exam program, increased watercourse protection, commercial hardwood sales, road use standards, exotic invasive plant species, and the potential sudden oak death (SOD) problem.

Purpose and Need

The purpose of this FMP is to describe the management strategy the Tribe intends to implement during the period 2012-2022. The accompanying environmental assessment documents how the proposed management alternatives might cause impacts to YISYL biodiversity, as well as to the socio-economic

and cultural resources of the YISYL. An additional purpose of this document is to provide an opportunity for informing the Tribal membership about their forest resources, and provide the Tribal Council with alternative management strategies to assess.
The need for this document is based on the requirement of the Tribe to adopt a new forest management plan. A new forest management plan is also required due to changes in statutory, administrative, and regulatory requirements relating to forest management.
This document is intended for information and guidance; <u>not</u> for regulatory purposes.

Tribal Objectives

After discussions with the Tribal Council, Executive Office, various Tribal Departments, Committees and Tribal Members, objectives were outlined. Following the use of a survey questionnaire, distributed by the Forestry staff, the following goals were developed. These goals describe the Tribe's desires for the long-term management of their timber resources:

- Establish a regular, periodic, long term sustained yield (LTSY) of timber products.
- Generate Tribal income and employment from timber sales.
- Limit the use of clear cutting and eliminate the use of herbicides.
- Protect and enhance areas considered culturally significant.
- Acquire lands (including cutover lands) in the YISYL to increase the Tribal land base.
- Protect and enhance fisheries.
- Use prescribed burning when possible.
- Generate Tribal income from the sale of carbon credits.
- Provide oversight and professional expertise on the best way to utilize Tribal forestland for non-timber use.
- Use mechanisms that promote the unique relationship that the Tribe maintains with the Federal government and provides for true partnerships, such as:
    - Indian Forest Land Assistance Accounts
    - Indian Self Determination Awards

Bureau of Indian Affairs Trust Responsibility

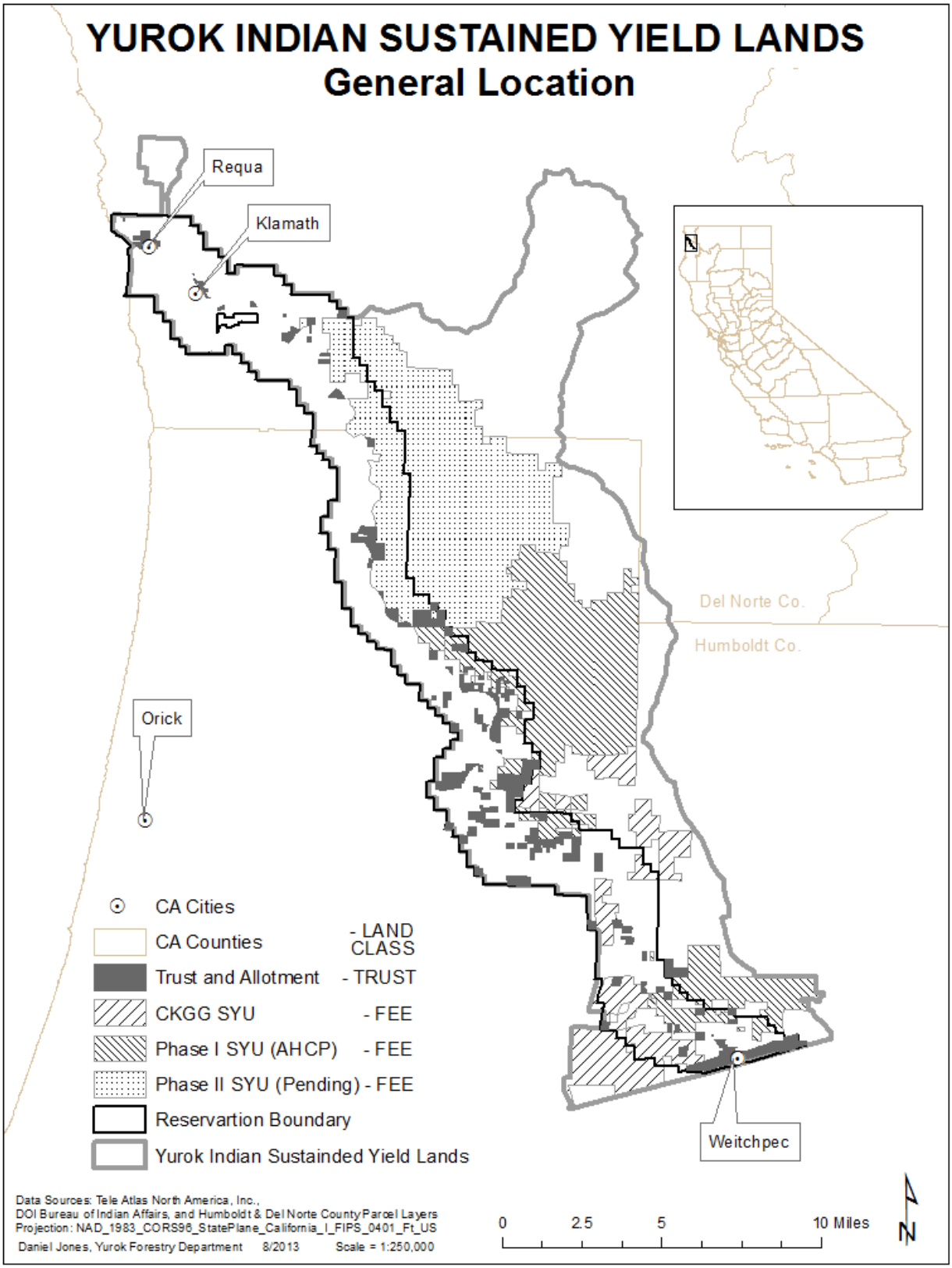
Indian Reservation lands (Trust and Allotment – definitions in Glossary) are considered private property held in trust by the Federal Government. As trustee, one of the duties of the Bureau of Indian Affairs (BIA) is to oversee the proper management of the tribal timber resources. This plan is intended for Tribal and BIA joint jurisdiction action planning. Thus, Tribal and BIA policies must be coordinated.

Adaptive Management

The purpose of the Adaptive Management Measures is to incorporate the results of project operations, plan implementation and monitoring projects and to provide the basis for necessary modifications to Forest Management Plan. Modifications of the FMP may be made as the result of new information being provided as the result of project implementation or completion. The addition of new forestland purchases will also be incorporated into and the FMP will be updated.

General Location

The YIR is located in northern coastal California, in the counties of Del Norte and Humboldt. The reservation starts (from south to north) near the confluence of the Trinity and Klamath rivers, extends for approximately one mile on either side of the Klamath, and follows the Klamath River until it empties into the Pacific Ocean.



Map 1: Yurok Indian Reservation General Location

FOREST LAND ASSESSMENT

Acreage and Land Assessment

Table 1: Land Acres by Classification

Gross Timber	Volume by	Land Class			
Land Class	**Acres**	**Conifer Vol. (MMBF)**	**Hardwood Vol. (MMBF)**	**Total Volume (MMBF)**	**Avg.(MBF) Volume/Ac**
Trust Land	3,320	116.56	10.58	127.15	38.3
Allotments	2,171	75.87	6.89	82.76	38.1
Phase I Fee (Restricted)	22,495	271.91	127.67	399.58	17.9
CKGG Fee (Restricted)	8,909	31.29	46.38	77.67	8.7
TOTAL	**36,865**	**495.63**	**191.52**	**687.16**	**18.7**

Note: MM = millions; M = thousands; of board feet (BF) and the decimal is a place holder; not representative of significant figures.

Restricted Fee Land Status

Fee lands (definition in Glossary) purchased under the Phase I purchase agreement along with the lands commonly referred to as the Cook Koppala Gerber Gleason (CKGG) purchase will be placed in restricted status as a sustained yield unit (SYU) within the YISYL. Pursuant to the Sustained Yield Forest Management Act this SYU will be established to provide for coordinated management and administered on a sustained yield basis. Sustained yield would be the yield that a forest can produce continuously at a given intensity of management. Sustained yield management implies continuous production, so planned as to achieve, at the earliest practical time, a balance between increment and cutting. Approximately 31,150 acres will be placed in this Restricted Sustain Yield Unit.

Phase I Agreement

In addition to the Sustained Yield Forest Management Act, the Tribe has entered into an agreement (see Appendix: Yurok Acquisition Cooperative Agreement) with the State Water Board and the Regional Water Board to develop a cooperative approach for the short- and long-term monitoring of the Phase I SYU in order to ensure that the Tribe successfully protects beneficial uses of waters with the unit. The Tribe will also implement and comply with the following guidelines for the Phase I SYU:

i. No harvest of trees after the closing date of the Acquisition pending approval of timber harvest by either CAL FIRE for off-Reservation portions of the Phase I SYU or the BIA for on-Reservation portions of the Phase I SYU;
ii. Eliminate use of pesticides, herbicides, and fungicides; and
iii. Establish minimum riparian buffers that are significantly wider than required under the California Forest Practice Rules in effect as of the closing date of the Acquisition.

The Tribe also entered into an Installment Sale Agreement with the State Water Board for the purchase of Phase I lands in order to implement the following management measures: "elimination of pesticide use; increased stream buffering; longer timber harvest rotations; no clear cutting; road decommissioning; and the setting aside of carbon reserves."

See Table 8, under the Timber Management Plan section, Watercourse Assessment and Protection subsection, for further explanation of Yurok riparian buffers pursuant to these agreements with the State Water Board.

New and Pending Land Purchases

The initial SYU was formed based on a map that indicated additional parcels that would be added to the YISYL management acres. Currently a large land purchase, referred to as the Phase II purchase, is pending. This second phase will have a boundary established (see Map 1) to include additional fee parcels into the YISYL. Land within the unit boundary may be added with the approval of a form approved by the owner, the Tribe, and the BIA. The pending Phase II land acquisition comprises approximately 25,110 acres. This area will be managed under a sustain yield management system with very long rotations. The long rotation cycle, which is years passed optimal maximum mean annual increment (MAI), is planned so that the current young growth redwood and Douglas fir plantations can eventually resemble old-growth stands. It is the desire of the Yurok Tribe to produce and enhance the acres of older timber stands within its ownership. The current timber stands within the purchase area are generally less than 40 years of age and are comprised on many past harvest units. These units range in age from newly planted clear cuts to older areas that currently support well established second growth timber. The Tribe will eliminate clearcutting or other even-aged management techniques (except in certain circumstances) when it harvests. For instance, in Blue Creek watershed area, only silvicultural methods that: provide for wildlife retention, growth forms that simulate older stands, or for cultural resource development and maintenance (for example, removal of conifer encroachment into oak stands to perpetuate acorn groves in upland areas), should be sought when developing site specific prescriptions.

Cultural Considerations

The Yurok Tribe Forestry Department (YTFD) is committed to protecting and enhancing areas considered culturally significant. Many areas that have culturally significant components are classified as Woodlands. There are currently no Tribal ordinances and standards (O&S) pertaining to Woodland Management (see Woodland Management Plan section). The YTFD plans to develop a Woodland Management Plan as part of that plan, the YTFD will be delineating and enhancing areas for acorn production. The YTFD plans to partner with outside agencies/entities to produce an experimental design and study, to enhance acorn yield.

In addition to acorn production, the YTFD plans to partner with agencies/entities to restore and enhance encroached prairies. The YTFD is also in the process of creating and implementing a Fuels Management

Plan which will allow for project specific burn plans. Each burn plan will be conducted in accordance with the applicable federal and/or state rules as they may apply.

The restoration of prairies and grassland will have three primary objectives:

1. The restored areas will be accessible for ceremonial gatherings.
2. Basketry material will be produced by the burning.
3. Restoration efforts will be beneficial for wildlife habitat and diversity.

Use of Geographic Information Systems

The use of geographic information systems (GIS) has played, and will continue to play, an integral role in the development of the Yurok Tribe's forestry program. The creation of the Forest Management Plan (FMP) relied heavily upon GIS. All the maps produced for the FMP employed the use of a GIS, however, GIS was utilized for more than just mapping. The slopes, vegetation, and timber types were determined for the Yurok land base and several analyses were undertaken.

Yurok Fisheries data were used to determine watercourse and lake protection zones (WLPZ). The WLPZs were combined with road inventory data to identify roads within WLPZs. An analysis of the road density by watershed was performed and as a result, three watersheds have been targeted and prioritized for future road decommissioning. A rudimentary erosion hazard potential analysis was conducted by combining slope classifications with Natural Resource Conservation Society (NRCS) soils data. Also, possible Sudden Oak Death hotspots were identified utilizing the Classification and Assessment with LANDSAT™ (Land + Satellite Thematic Mapper) of Visible Ecological Groupings (Calveg) California Wildlife Habitat Relationship (CWHR) data.

The Yurok Tribe uses the most up-to-date publicly and proprietarily available data for analysis purposes. Regional analyses typically use coarse resolution datasets, for instance, a ten meter pixel resolution elevation dataset for a broad based slope analysis or 2.5 acre pixel resolution vegetation data for property wide - tens of thousands of acres – timber type identification. For site specific projects the Tribe uses finer resolution data, such as, one meter LiDAR (Light Detection And Ranging) data for slope analyses or one meter aerial imagery for stand delineation. For more information about the acquisition and quality of GIS data, please contact the Yurok Tribe GIS Program in the Information Technology Department.

The use of GIS will continue to play an important role for Forestry as well as other Tribal departments. The YTFD plans to design and implement, with the input of other various Tribal departments, a geospatial land management database to track projects and changes that occur within and around the YISYL. The YTFD also plans to utilize modeling software to strategically deploy fire breaks and implement stand improvement projects in order to safeguard structures and forest stands against wildfire. With integrated resource management using a GIS platform, the Tribe will take its resource management into the twenty first century.

BIA Forest Land Classification Acres on the Yurok Reservation

( ): Acres of Trust/Allotments

```
                                                                    (4,227)
                                                                    Commercial
                                                        Timberland  |  ( )
                                                  (5,089)       |   |Non-comm.
                                              Accessible  |           (862)
                                                |         |  (862 )   Commercial
                                                |         |Woodland   |  ( )
                                    (5,089)     |                     |Non-comm.
                                Unreserved      |                       ( )
                                |               |           ( )       Productive
                                |               |         Timberland  |  ( )
                                |               |  ( )      |         |Unproductive
                                |               |Inaccessible |           ( )
                                |                         |  ( )      Productive
                                |                         |Woodland   |  ( )
                  (5,089)       |                                     Unproductive
                Forest          |                                     |  ( )
                |               |                           ( )       Productive
                |               |                         Timberland  |  ( )
                |               |                  ( )      |         Unproductive
                |               |                Accessible  |           |  ( )
                |               |                |         |  ( )      Productive
                |               |                |         |Woodland   |  ( )
   (5,491)      |               |  ( )           |                     |Unproductive
 Yurok          |               |Reserved        |                       ( )
Reservation     |                                |           ( )       Commercial
                |                                |         Timberland  |  ( )
                |                                |  ( )      |         |Non-comm.
                |                                |Inaccessible |           ( )
                |                                         |  ( )      Productive
                |                                         |Woodland   |  ( )
                |                                                     |Unproductive
                |  (402)
                |Non-Forest
```

Figure 1: BIA Forest Land Classification Form

Main Access Routes

The YIR's two main access routes are U.S. Route 101, on the northern end of the Reservation and State Route (SR) 96 on the southern end. SR 96 intersects State Highway 299, not shown on map, in the town of Willow Creek and continues northwest to intersect with Interstate Highway 5. SR 169 is a narrow, one to two lane, discontinuous route intersecting U.S. 101 in the north and SR 96 to the south with an approximately 10 mile gap in the center, which will likely never be joined. Bald Hills Road is a narrow, two-lane, partially paved, arterial route connecting the two ends of the reservation. The YIR area is geologically active and prone to inclement weather which can make roads impassable.

Vegetation Types

The vegetation types for the YIR and surrounding land acquisitions were determined by using the Calveg (acronym described in previous section) data set. This data set was derived using remotely sensed satellite imagery in conjunction with slope, aspect, and soil data to model vegetation types and yields a minimum of 2.5 acre vegetation type polygons. The Calveg data is cross-walked with the CWHR (acronym described in previous section) data (See Appendix for CWHR type and cross-walk) and provides a general idea of the vegetative types and habitats for the Yurok land base.

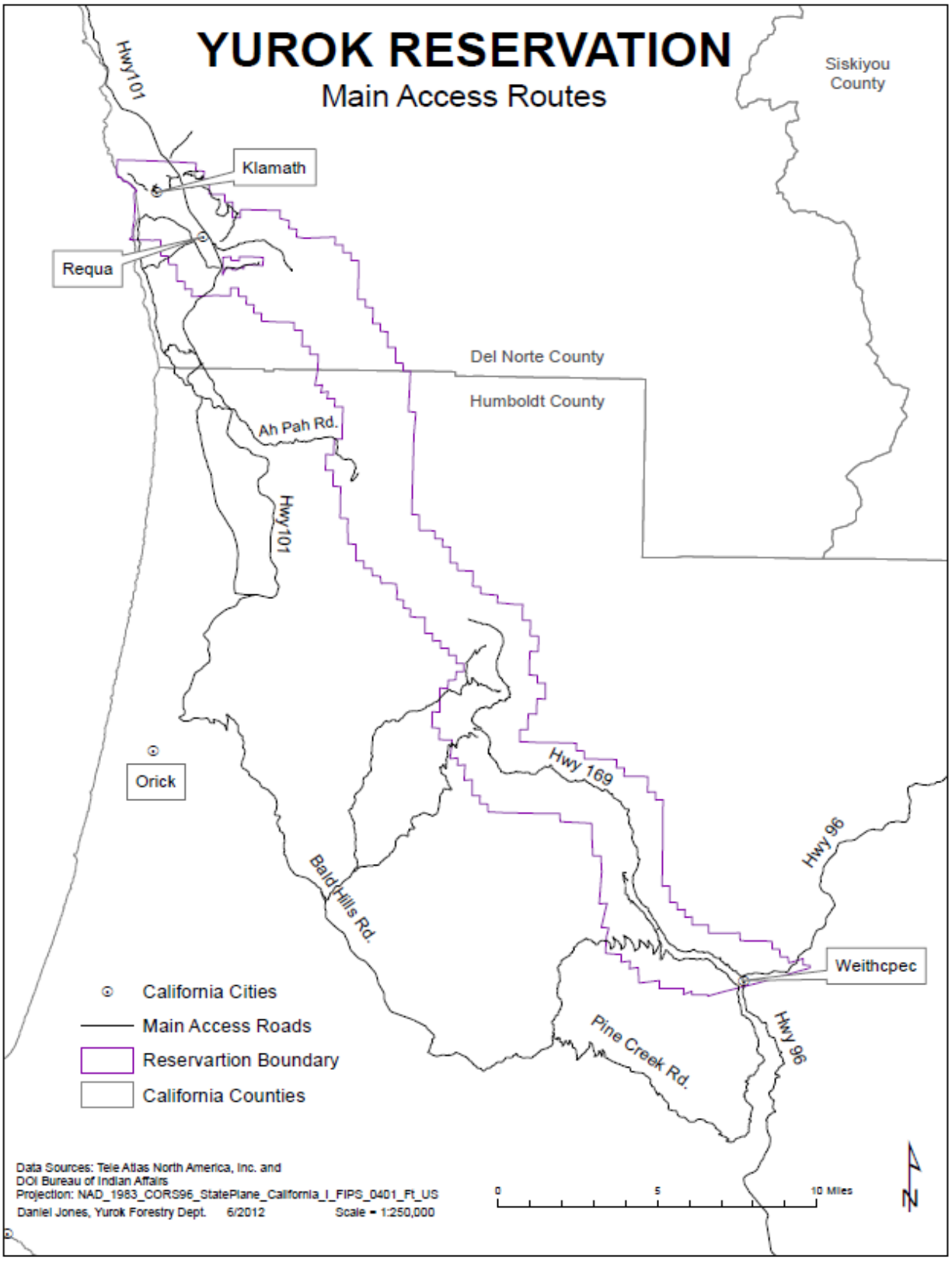
Slope Classification

A rudimentary slope classification* of the Yurok Tribe's land holdings was performed in order to establish timber land topography. Slope breaks consistent with California Forest Practice Rules (FPR) - 30%, 50%, and 65% rise - were used in the analysis. The ten meter digital elevation model used for the slope classification shows that the majority (approximately 81%) of the land base is easily capable of being operated on with tractors with another 13% of the land being site dependent. Approximately 38% of the lands have slopes between 0% and 30% rise, approximately 43% have slopes between 30% and 50% rise, approximately 13% have slopes between 50% and 65% rise, and approximately 6% have slopes greater than 65% rise. Only 6% of the land is restricted solely to cable or helicopter operations.

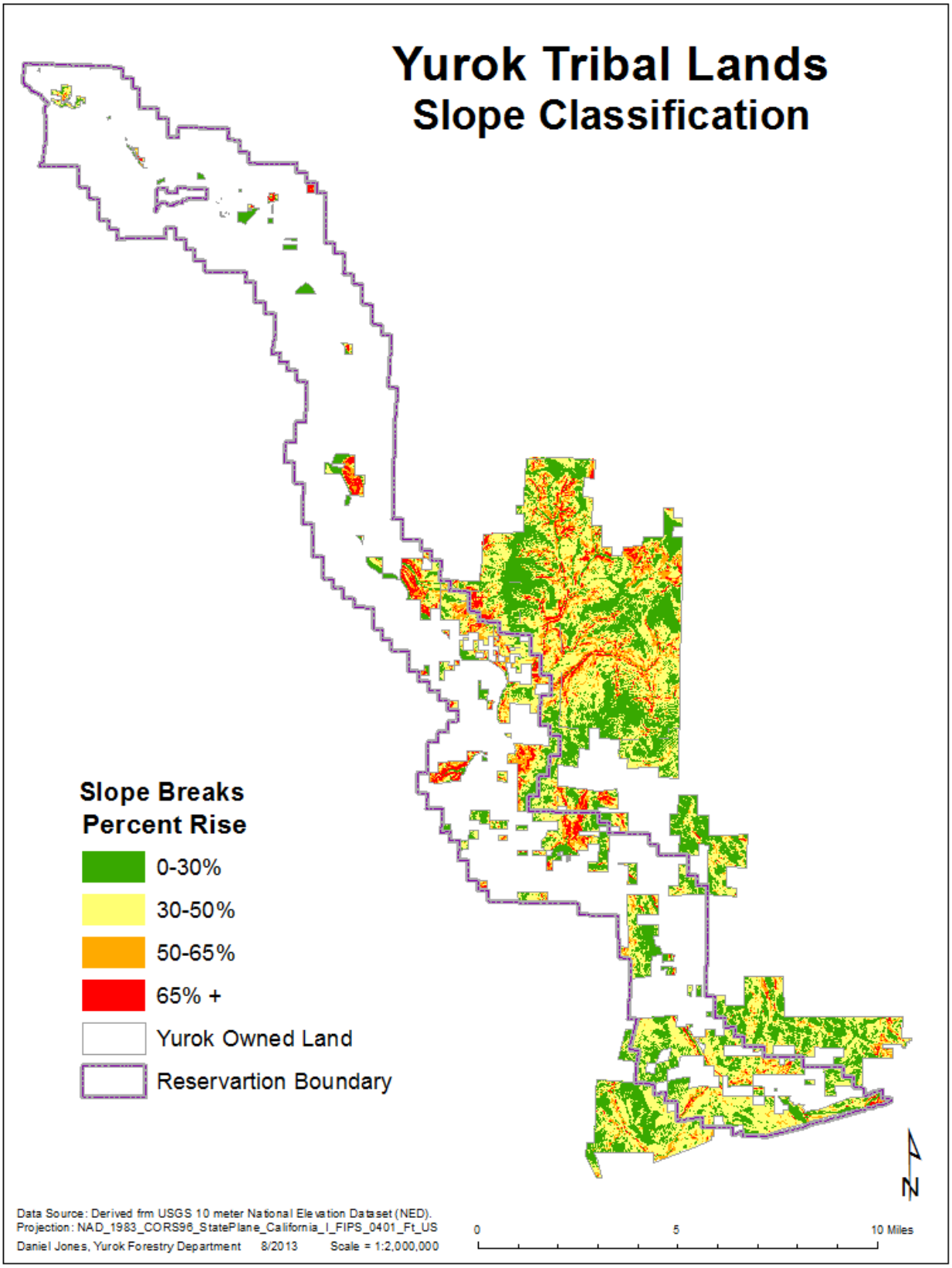
Table 2: Slope Classification and Acreage (FPR breaks)

Slope Percent Rise	Slope Acres	Percentage of Land Base
0 - 30%	13,920	38%
30% - 50%	15,953	43%
50% - 65%	4,627	13%
65% +	2,395	6%
Totals	**36,895**	**100%**

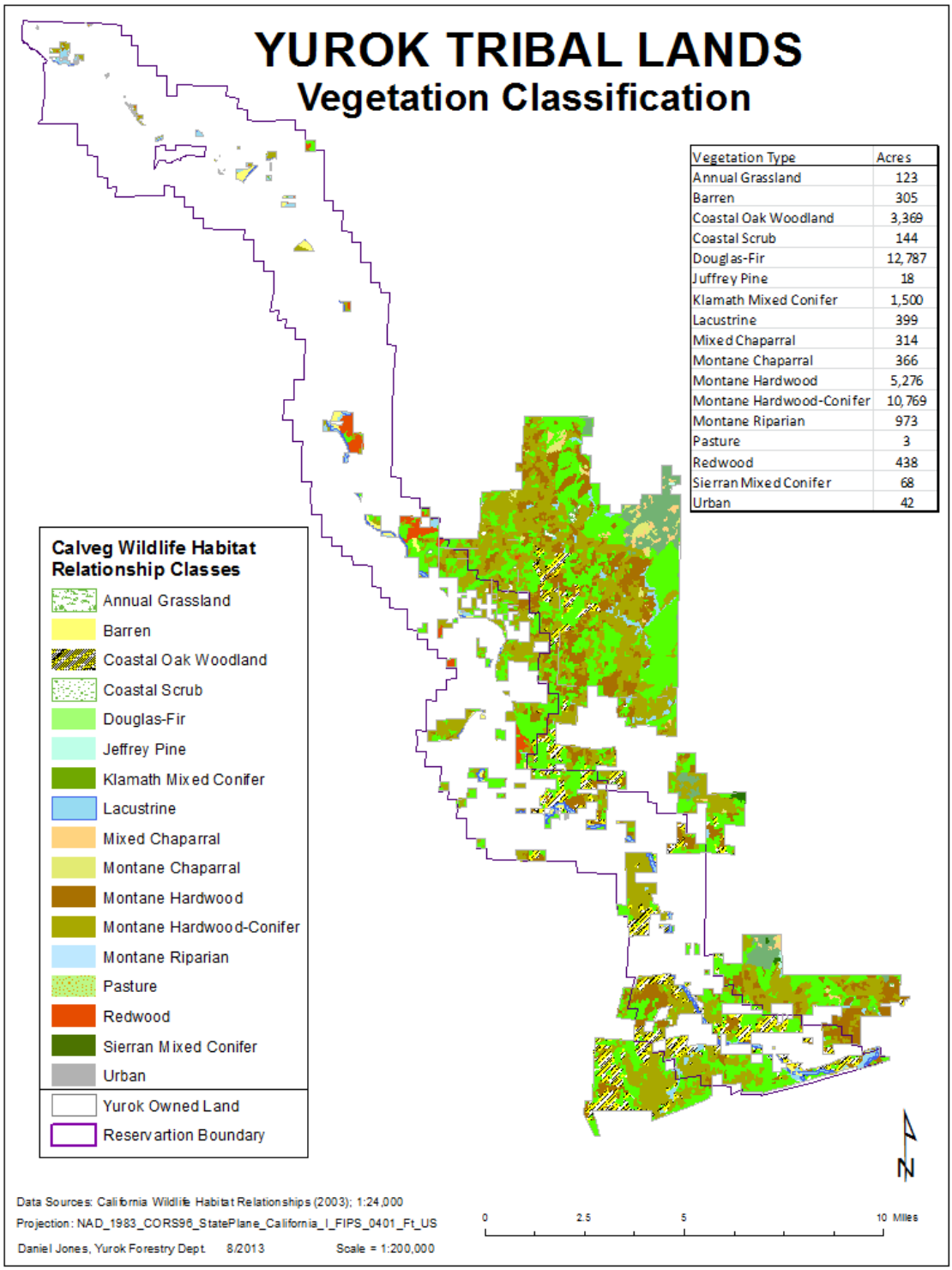
*Note: This slope classification is for general planning only. For site specific projects, finer resolution data (i.e. one meter LiDAR) are used in conjunction with field verification.



Map 2: Yurok Tribal Lands Primary Infrastructure



Map 3: Yurok Tribal Lands Slope Classification



Vegetation Type	Acres
Annual Grassland	123
Barren	305
Coastal Oak Woodland	3,369
Coastal Scrub	144
Douglas-Fir	12,787
Juffrey Pine	18
Klamath Mixed Conifer	1,500
Lacustrine	399
Mixed Chaparral	314
Montane Chaparral	366
Montane Hardwood	5,276
Montane Hardwood-Conifer	10,769
Montane Riparian	973
Pasture	3
Redwood	438
Sierran Mixed Conifer	68
Urban	42

Map 4: Calveg Timber Land Classification

RESOURCE PROTECTION PLAN

This portion of the FMP addresses the protection of reservation resources from fire, insects and diseases, and trespass. Responses to these potential risks are also discussed.

Resource Inventory:

Water quality, cultural sites, structures, adjacent out buildings, fences, timber, wildlife habitat, and game animals are all YIR resources vulnerable to fire, trespass, and insect and disease damage.

Tribal Ordinances and Standards (O & S)

Although it is the intention of the Tribe to fully protect these resources, there are only limited current YIR Tribal O&S that pertain directly to resource protection. Public Law 280, 101-630, 25 (USCA) 3101 et. seq. provides the Tribe with a means to prosecute cases of theft and arson. Other ordinances that have been implemented include:

Water Quality Control Plan

This is a regulatory document prohibiting the discharge of pollutants into the waters of the Yurok Indian Reservation. The purpose of this Ordinance is to exercise comprehensive Tribal regulatory authority over all surface and groundwater matters, and to protect fundamental cultural, ceremonial, religious, fisheries, subsistence, seasonal residential, public health and safety, and water quality issues by ensuring adequate drinking water, protecting beneficial uses, prohibiting all point source discharges and restricting non-point source discharges of pollutants within the exterior boundaries of the YIR (see Appendix for Water Quality Control Plan). When the Non-Point Source Pollution Assessment and Management Plan is implemented, it will supercede the Water Quality Control Plan.

Personal Use Firewood Regulation

Personal use firewood is available on designated landings in timber sale and designated locations outside of sale boundaries. Approximately 100 thousand board feet (MBF) gross scale will be made available annually. Only Tribal members can cut and gather firewood. All firewood is for personal use only and cannot be bartered, sold, or given away. All cutting shall be by Tribal permit only. YTFD will provide maps of the areas and times where firewood may be obtained for personal use. All permits will be subject to the provisions of the Yurok Tribal Council and 25CFR 163.26(b) (see Appendix for Firewood Policy and Permit).

Redwood Distribution Policy

Redwood distributed under this policy can only be used for traditional purpose such as canoes, planks, and posts or railing for ceremonial sites. Products made from redwood cannot be sold. Commercial sale of salvage material may be permitted depending on source of the wood and will be documented at the time of wood release. Donated wood, no matter where the wood sits during fashioning or where the finished product is kept remains the property of the Yurok Tribe. When wood becomes available, the Culture Committee will review the quality of the wood and the list of interested tribal members and provide the Tribal Council with advice on who should be prioritized to receive wood and under what conditions. Council will make the final decision on wood distribution taking into consideration Culture Committee advice.

Fire

There is a long tradition of fire management by the Yurok for the purposes of increasing acorn producing hardwood areas, basket material gathering sites, maintaining fuel breaks around villages and houses, and maintaining open prairies for insect population management, and agricultural areas. Federal authorities in the early 1900's forced the end of these practices, and the forest has, for the most part, invaded most open areas. Not only has this reduced the availability of basketry materials and food sources, but has increased the risks of both structural and timber losses to wildfires. Given this exclusion of fire, it is likely that some hardwood stands may be now slowly converting to conifer cover types. Despite the increased risks, the generally wet climate of the Klamath basin makes wildfires fairly uncommon. Man-caused fires (arson and accidental) are more common, (up to 30 reported fires per year) but are generally suppressed quickly. One such fire was the 30 acre Salmon Fire in 1975 near Cappell Creek which burned some tribal lands and was later aerially seeded.

The BIA is party to the CALIFORNIA MASTER COOPERATIVE WILDLAND FIRE MANAGEMENT AND STAFFORD ACT RESPONSE AGREEMENT for fire suppression responsibilities. The California Department of Forestry and Fire Protection (Cal Fire) provides fire suppression protection for the Yurok Indian Sustained Yield Lands and maintains stations at Elk Camp, Fortuna, Trinidad, Klamath and Crescent City. In addition, the Hoopa Tribe maintains a fire station and full radio communications network. A Fire Management Plan Analysis (FMPA) that addresses the protection of all trust lands included the Yurok Reservation as part of the Northern California Agency analysis. Lookouts on Big Hill, Schoolhouse Peak and Brush Mountain provide detection services to the YIR. The Yurok Tribe maintains a wildland fire crew at the Tully Creek Wildland Fire Station providing supplementary fire protection through a commercial agreement with the BIA.

All timber harvesting operations require fuel treatments such as lop and scatter, pile and burning, and broadcast burning to reduce levels of combustible logging slash. Small scale permit cutting needs to be monitored to minimize slash build-up and concentration.

All burned areas should be evaluated to determine if opportunities exist to allow culturally important vegetation such as bear grass to colonize the site.

Using fire as a management tool requires a BIA approved, written burn plan to be implemented by a qualified burn boss, whereas, domestic/recreational/ceremonial burning on Tribal Trust land requires a BIA burn permit. The Tribe has adopted the BIA permitting process and Yurok Tribe Environmental Program issues domestic/recreational/ceremonial burn permits for Tribal persons for use on Tribal lands in pursuance with the Tribal Smoke Management Plan. The BIA burn permitting system document, the Tribe's burn permit, and the Tribe's Smoke Management Plan can be found in the Appendix.

Insect and Diseases

No significant insect or disease problems have been reported on the YIR. Forest health issues to be aware of in the North Coast region are described here by species.

Redwood: This species is fairly impervious to insect and disease problems. Termites and some forms of cubical rot can be found on fire damaged, and moisture stressed trees. Black bears, stripping bark cambium for food or marking territories, can cause significant localized damage to pole and small sized redwood.

Douglas-fir: Young stands of this species are especially vulnerable to black stain root disease (Leptographium wageneri), which is often found in association with flathead fir borer attacks (Melanophila californica). Black bears, stripping bark cambium for food or marking territories, can also cause significant localized damage to pole and small sized stands. Other pests associated with this species are Douglas-fir engraver beetle (Scolytus unispinosus), Douglas-fir pole beetle (Pseudohylesinus nebulosus), and Douglas-fir beetle (Dendroctonus pseudotsugae). Old growth Douglas-fir trees, of which there are a significant number on the YIR, are especially vulnerable to Fomes root rot (Fomes pini).

Port-Orford-cedar: This species only has one known serious pathogen, Port-Orford-cedar root disease (Phytopthora lateralis). The range of this fungus is limited to Oregon and Northwest California, and is not known to be present on the YIR. This fungus is reported to be spreading southward, and treatments are not currently known. The individual value of these trees makes it important to monitor conditions.

Madrone: Madrone canker disease (Fusicoccum aesculi) and a leaf miner insect (Coptodisea arbutiella) are the only significant factors affecting this species, and rarely cause death.

Tanoak: No significant insect or diseases are known to be affecting this species on the YIR or region at this time.

Detection:

The forestry staff should be responsible for monitoring forest health. Any outbreaks of insects or disease should be reported to the Forestry Director and the BIA forester at the Pacific Region Office. If outbreaks observed on the ground appear to be fairly extensive, an aerial survey could be implemented to determine the full extent and severity. The Tribe utilizes the United States Forest Service (USFS) Technical Service Providers for all insect and disease detection expertise.

Control:

Integrated Pest Management (IPM) is a systematic approach to insect and disease agent control that applies one or more combinations of methods to reduce pest impacts while limiting environmental impacts. These methods are presented **FOR INFORMATIVE PURPOSES** and include:

(1) Biological agents such as introduced natural or exotic predators or parasites, viruses, bacterial agents, and genetically resistant crop trees.

(2) Cultural practices such as harvesting high risk trees, timing harvests, treating slash and brood material, and avoiding inappropriate silviculture.

(3) Chemical treatments of individual high value trees, ground applications in recreational or community areas.

(4) Mechanical methods such as peeling, bucking, and chipping in order to minimize conditions favorable to pests.

An IPM approach should be considered if significant pest problems develop in the future.

In general, early detection and treatment/salvage of any outbreaks should be performed to reduce spread to healthy stands. Treatment of affected logs and brood material should be treated as follows:

(1) All branches larger than 3" in diameter shall be either piled and burned or lopped and scattered.

(2) Larger logs shall either be debarked and removed from the site or periodically rolled for maximum exposure to the sun.

(3) All Douglas-fir cut stumps should be treated with borate to reduce root rot infection and spread.

Most of the pest and pathogen problems on the North Coast are difficult to treat. Promoting diligent harvesting practices is the best way to protect timber from these pests and pathogens. To remain current with pest issues in the Klamath Basin, it is highly recommended that the Yurok forestry staff periodically communicate and conduct training or field trips with qualified entomologists from the USFS. The USFS pest detection form (R5-3400-1) is located in the FMP appendix.

Sudden Oak Death (SOD)

<u>Background</u>

Sudden Oak Death is a disease of oak trees caused by an invasive plant pathogen, *Phytophthora ramorum*. It currently occurs in coastal California counties from Monterey to Humboldt and in a small portion of southwest Oregon. Tanoak is highly susceptible to *P. ramorum*, and the disease can infect and kill all sizes and ages—seedlings, saplings, and mature trees. *P. ramorum* infects trunks, branches, twigs, leaves, and leaf petioles (the slender stems that support leaves). I t is estimated to have killed more than 1 million oak and tanoak trees during the last decade.

Figure 2: SOD Killed Timber Stand

In addition, more than 100 other plant species are susceptible to the pathogen. California bay laurels, or Pepperwood, are not thought to die from *P. ramorum* infection, but these trees play a major role in spreading the disease to other plants. Once Sudden Oak Death infects oak trees, there is no known way to cure them. Therefore, most of the management practices are directed at preventing the spread of the disease to new plants or areas and protecting susceptible trees before they are infected.

Phytophthora ramorum canker disease of oak has been called “Sudden Oak Death” due to the rapid (2 to 4 weeks) and complete browning of the crown observed on numerous trees at their death. In these cases, the dead foliage appears without a prolonged period of visible decline. While this sudden

browning may occur, death of the tree due to P. ramorum infection usually takes place after an extended period of disease and perhaps more than two years from the onset of infection. The crown of the tree can appear healthy in early stages of the disease although a bleeding canker is present on the trunk. The browning may occur several months to over a year after the pathogen has effectively girdled the whole stem. Some infected trees may experience gradual leaf loss and death rather than a sudden browning of the crown. Tanoak is the most susceptible of the known hosts to P. ramorum. Non-wound inoculation experiments indicate that P. ramorum can kill tanoaks within one year from onset of infection (J. M. Davidson, unpublished data). Increasing numbers of sites in California have dramatic mortality of tanoaks (e.g., Muir Woods National Monument, Pfeiffer Big Sur State Park, and Marin Municipal Water District). All size classes (seedlings, saplings, mature trees) of tanoak are infected and can be killed by the disease.

Phytophthora ramorum is the cause of both Sudden Oak Death, a forest disease that has resulted in widespread dieback of several tree species in California and Oregon forests, and Ramorum blight, which affects the leaves and twigs of numerous other plants in forests and nurseries.

Since the mid-1990s, *P. ramorum* has caused substantial mortality in tanoak trees and several oak tree species (coast live oak, California black oak, Shreve oak, and canyon live oak), as well as twig and foliar diseases in numerous other plant species, including California bay laurel, Douglas-fir, and coast redwood. The pathogen was also discovered in European nurseries in the mid-1990s, and it has since spread to wildland trees in the U.K. and the Netherlands. Although the first *P. ramorum*-infested California nursery stock was identified in 2001, possible threats include a change in species composition in infested forests and therefore, in ecosystem functioning; loss of food sources for wildlife; a change in fire frequency or intensity; and decreased water quality due to an increase in exposed soil surfaces. P. ramorum thrives in cool, wet climates. In California, coastal evergreen forests and tanoak/redwood forests within the fog belt are the primary habitat. Research in California forests has shown that the greatest predictor of P. ramorum is the presence of California bay laurel (Umbellularia californica).

There are two categories of hosts for Phytophthora ramorum: bark canker hosts and foliar hosts. The bark canker hosts are tanoaks and oaks that become infected on the woody portions of a tree. Cankers on the trunk of these trees are the most damaging, and often lead to death. Additionally, diseased oak and tanoak trees are often attacked by other organisms once they are weakened by P. ramorum. These secondary invaders can also kill the tree, and include such organisms as Hypoxylon thourasianum (a fungus that decays sapwood), and bark beetles. In foliar and twig hosts, symptoms can range from leaf spots to twig dieback, but these hosts rarely die from the infection.

Accurate disease diagnosis can be difficult because the symptoms caused by Phytophthora ramorum are very similar to those caused by other fungi, insects, or adverse environmental conditions. The only way to confirm a P. ramorum or Sudden Oak Death infection is to take a sample and analyze the affected plant tissue in a laboratory. In oaks, only adult plants are significantly affected. Infection of seedlings is unreported in nature, and infection of saplings appears to be extremely rare. The most useful diagnostic symptom for P. ramorum is the development of cankers on the trunk. Cankers have red-brown to black discoloration and seep dark black to red or amber sap. They usually develop 1 to 2 m off of the ground,

although they can be at soil level, or as high as 4 m or greater. Evidence to date suggests that cankers do not extend into the roots below the soil line. Cankers will occasionally extend onto portions of buttress roots if the roots are above the soil line.

Oaks: Only oaks in the red or intermediate groups have been found infected – oaks from the white group are not thought to be susceptible. Only larger, > 4 in diameter at breast height (DBH), adult plants show symptoms and infections of smaller saplings have never been seen in nature. The most obvious and useful symptom to look for on oaks is a canker on the trunk. Cankers have red-brown to black discoloration and seep dark black to red or amber sap. They usually develop 1 to 2 m off of the ground, although they can be at soil level, or as high as 4 m or greater; they are not thought to extend below the soil line. Bleeding sap initially appears on intact bark, absent any obvious holes or wounds, though, in later stages of the disease, the bark may split. Infections by Phytophthora ramorum on oaks were originally called "Sudden Oak Death" because of the rapid (2 to 4 weeks) browning of leaves without an apparent prolonged period of visible decline. While this sudden browning may occur, death of the tree due to P. ramorum infection usually takes place after an extended period of disease and perhaps more than two years from the onset of infection. A number of other organisms tend to colonize oaks with P. ramorum infections, including ambrosia beetles (Monarthrum scutellare and M. dentiger), bark beetles (Pseudopityophthorus pubipennis), and a decay fungus, Hypoxylon thouarsianum. Though these attacks are secondary to the original P. ramorum infection, they act to further weaken the trunk and may hasten the death of the tree.

Tanoak: Tanoak is the most susceptible of the known hosts to P. ramorum. All sizes and ages of tanoaks (seedlings, saplings, and mature trees) can be infected and killed by the disease. P. ramorum also infects trunks, branches, twigs, leaves, and leaf petioles of adult trees. Experiments on tanoak trees revealed that they could be infected without showing cankers or bleeding symptoms; diagnosis of tanoak can be difficult because of this. Trunk cankers are similar to those of the red oak group. As with the red oaks, death can occur with a sudden browning of the leaves, or over time with gradual leaf loss. P. ramorum infection in twigs can lead to shoot tip dieback and a Shepherd's crook. Leaf flagging is a particularly good indicator of disease. Secondary organisms are likely to attack weakened and dying trees.

Madrone (Arbutus menziesii): Symptoms and disease progression on madrone are similar to that seen on rhododendron with leaf spots, leaf death, and branch dieback commonly associated with infection by P. ramorum. P. ramorum forms very dark lesions on leaves, often extending down petioles and into the twig. On stems, the lesions initially are difficult to find and appear as slight water soaking or darkening of the bark that travels very quickly throughout the stem and kills the tissue, creating a dark lesion. Necrosis may progress from infected stems into leaves.

Evergreen huckleberry (Vaccinium ovatum): The most distinctive symptoms of P. ramorum on huckleberry are small cankers on the stems and cane dieback. Cankers on the stems are dark and tend to be confined to the outer bark. On larger stems with dieback, the use of a knife to peel outer bark back from the edge of a canker will often reveal yellow discoloration in the pith. Observations of huckleberry plants in areas of P. ramorum infection suggest that stem dieback may kill the plant, although disease progression has not been extensively followed. Laboratory inoculation experiments show that P.

ramorum can infect and cause lesions on leaves. However, P. ramorum has not been isolated from leaf spots in the field, perhaps because infected leaves often abscise quickly after infection. Although entire plants can be killed, it is more common to observe patches of dead and live branches.

Bay laurel (Oregon myrtle) (Umbellularia californica): Phytophthora ramorum causes leaf lesions on bay laurel. Lesions are brown and often, but not always, are delimited by a chlorotic (i.e., yellow) zone. Lesions typically occur where water collects on the leaf, generally on the leaf tip. On leaves that are flat or carried with the tip upwards, a lesion can develop in the middle section, especially around the edges, or at the base of the petiole. These types of leaf spots can also be caused by anthracnose (Colletotrichum gloeosporioides); therefore pathogen isolation is necessary to verify the presence of P. ramorum. An as yet unnamed Phytophthora species, closely related to P. ilicis, is commonly isolated from bay leaves in tanoak-redwood forests in California and Oregon and causes identical symptoms. Some branch dieback has been observed in trees infected by P. ramorum, but it is still uncertain whether P. ramorum is responsible for the development of this symptom because the pathogen has not been recovered from dying branches. Mortality of bay laurel due to infection by P. ramorum has never been reported. Bay trees are thought to be important reservoirs of inoculum because the pathogen readily sporulates on water-moistened bay leaves.

Big leaf maple (Acer macrophyllum): In this tree species, P. ramorum infection appears more like a scorch, normally starting from the edges of the leaf. In general, the scorching will have irregular borders that do not precisely follow leaf contour. The discoloration can be variable in color with hues ranging from orange to brown. In artificial inoculations, very dark necrotic lesions are formed, often at the base or the tip of the leaf blade where water accumulates. Once naturally infected leaves senesce and yellow, the discoloration is often still visible for some time. Branch die-back has been observed in areas infested by P. ramorum, but a clear cause-and-effect relationship has not been determined yet.

Douglas-fir (Pseudotsuga menziesii): On Douglas-fir saplings, P. ramorum causes cankers on small branches that result in wilting of new shoots, dieback of branches, and loss of needles. On small saplings, (<1 m in height), infection by P. ramorum can kill the leader shoot and top several whorls of branches. To date, disease symptoms have not been observed on adult trees. Studies are underway to characterize disease progression on Douglas-fir and determine whether terminal branch infections lead to decreased growth or main trunk infections.

Redwood (Sequoia sempervirens): P. ramorum causes leaf lesions, cankers on small branches, and dieback of epicormic sprouts on redwood saplings and adults. Leaf lesions may have a darkened zone line between necrotic and live tissue. Cankers on branches may be noticeable due to browning and needle loss at the tip or middle of a branch. Dieback of stump sprouts results in blackened, withered tips that become brown as they dry out. The effect of infection on redwood currently is unknown. However, P. ramorum appears to kill sprouts and cause loss of vigor in saplings. To date, disease symptoms have not been observed on adult tree trunks.

Response Planning

To prepare for rapid response to new forest pest detections, we have compiled a list of sample invasive species response plans and other resources. Advanced preparation through mock detection exercises can also help clarify the roles and responsibilities of federal, state, and local cooperators and fine-tune how the Tribal Forestry, Fisheries (Natural Resources Division), and Watershed departments would interact in the event of forest pest detection. Homeland Security Presidential Directive 5 makes adoption of the National Incident Management System (NIMS) a condition for Federal preparedness assistance and NIMS highly encourages the use of the Incident Command System (ICS). ICS is flexible and can be used for incidents of any type, scope, and complexity.

Response Team Development

Should the disease be detected or established on Tribal lands an Incident Command System (ICS) structure shall be established in order to adequately confront the operational, environmental, and logistical needs of the project.

1. Create new ICS Team to address if one is not already in place.

2. Add to members of the response team under an ICS type organization. This should include a public information officer (PIO) perhaps from an emergency management agency that is well versed in ICS.

3. Develop a response plan. The response may be no action or more detections if the pest has already been addressed or is an isolated introduction.

4. Determine any research, regulatory, or treatment needs including permits and consultations for treatments or other management activities.

5. Determine funding needs for action and possible sources. If the event is going to be long-term initial legislative processes for long term financing needs.

6. ICS team for this event or pest will expand or contract depending on the success of the response or may be dependent on life cycles or other biological influences.

Sanitation and Reducing Spread

If you travel to, work in, or live in an area infested with Phytophthora ramorum, there is a chance that you could unwittingly spread the pathogen to other areas. Below are some helpful details on sanitation measures to reduce the risk of spreading the pathogen.

Higher Risk Activities

Movement of infected plants or plant parts constitutes a high risk activity. If infected plants are transported to a suitable environment with suitable hosts, chances are very high that the pathogen will become established. The rainy season is the time when the pathogen is actively producing spores and spreading naturally. Detached plant leaves, organic material, and soil (which may harbor spores of the pathogen) are more likely to stick to persons, pets, vehicles, and equipment when they are wet. Contamination is more likely in settings where native hosts of *Phytophthora ramorum* are common, such as wildlands and developed areas that are within or adjacent to areas of native vegetation.

Lower Risk Activities

The pathogen does not readily produce spores or spread naturally under dry conditions. Dry soil and organic material will not readily stick to you, your pet, or your equipment.

Sudden Oak Death is not common in urban settings or suburban areas where native vegetation has largely been removed.

Preventing Spread

Take precautions to avoid becoming contaminated with the pathogen, such as:

- Stay out of infested wildlands during high risk times altogether.
- Don't collect or transport host plant material from an infested or quarantined area.
- Avoid entering infested areas during wet conditions.
- Keep vehicles on paved and graveled surfaces when conditions are wet.
- Stay out of areas of wet soil and mud.
- If you do enter an infested area during wet conditions, check yourself, vehicle and equipment for accumulations of mud, soil, organic material, and detached plant leaves. Remove these accumulations before traveling to an area that is not infested.
- If you live in an area infested with Phytophthora ramorum, chances are some of your belongings may be contaminated by the pathogen. If you travel to an area that does not have the disease, be sure that the belongings that you take with you are clean – shoes, bicycles, pets, vehicle, etc.

Sanitation measures to minimize pathogen spread

As a precaution against spreading the pathogen, clean and disinfect pruning tools after use on confirmed or suspected infested trees or in known infested areas. Sanitize pruning tools before pruning healthy trees or working in a pathogen-free area. Clean chippers and other vehicles of mud, dirt, leaves, and woody debris before leaving a P. ramorum-infested site and before entering a site with susceptible hosts.

1. Before working:

Inform crews about the arboricultural implications of P. ramorum and sanitation practices when they are working in infested areas.

• Provide crews with sanitations kits. (Sanitation kits should contain the following: Chlorine bleach [10/90 mixture bleach to water], or Clorox Clean-up®, scrub-brush, metal scraper, boot brush and plastic gloves).

• Sanitize shoes, pruning gear and other equipment before working in an area with susceptible species.

2. While working:

• When possible, work on P. ramorum-infected and susceptible species during the dry season (June - October), or ask customers to allow flexible scheduling so work may be done during dry spells. When working in wet conditions, keep equipment on paved or dry surfaces and avoid mud.

• Work in disease-free areas before proceeding to infested areas.

• Do not collect soil or plant material (wood, brush, leaves and litter) from host trees in the regulated area without first contacting your local agricultural commissioner. Within the regulated area, host material (e.g. wood, bark, brush, chips, leaves, or firewood) from tree removals or pruning of symptomatic or non-symptomatic plants should remain on site to minimize pathogen spread.

3. After working:

• Use all reasonable methods to sanitize personal gear and crew equipment before leaving a P. ramorum-infested site. Scrape, brush and/or hose off accumulated soil and mud from clothing, gloves, boots and shoes. Remove mud and plant debris by blowing it out or power washing chipper trucks, chippers, bucket trucks, fertilization and soil aeration equipment, cranes, and other vehicles.

• Restrict the movement of soil and leaf litter under and around infected trees as spores may be found there. Contaminated soil, particularly mud, on vehicle tires, workers' boots, shovels, stump grinders, trenchers, etc., may result in pathogen spread if moved to a new, uninfested site. Remove or wash off soil and mud from these items before use at another site. If complete on-site sanitation is not possible, complete the work at a local power wash facility or an isolation area in your equipment yard. Clean, orderly vehicles and equipment are good business, and prevent pathogen and insect spread.

• Tools used in tree removal/pruning may become contaminated and should be disinfected with Lysol® spray, a 70% or greater solution of alcohol, or a Clorox® solution (1 part Chlorox® (bleach) to 9 parts water or Clorox Clean-up®). Remember that these products are corrosive to metal and fabric. Rinse your gear after sanitation.

SOD Management

The following management practices were collected from the University of California Agriculture and Natural Resources Statewide Integrated Pest Management Program. Management practices include, but aren't limited to: inspecting nursery plants before purchasing, removing infected oaks, removing non-oak host trees, disposing of plant debris, sanitation measures to minimize pathogen spread, replanting after removing an infected tree, and preventative phosphonate (Agi-Fos) treatments.

Inspecting Nursery Plants Before Making a Purchase

Many common ornamental plants are hosts for P. ramorum, and nurseries in California, other states, and other countries have found the pathogen on their plants. Carefully inspect the leaves of host plants for symptoms before making a purchase. Nurseries often use general fungicides that can mask P. ramorum symptoms, and some plants might have asymptomatic or latent infections that might not be visible at the time of purchase. Even if signs of infections are not seen at the time of purchase, consider quarantining the new plant in a moist area for up to 8 weeks to see if symptoms manifest before transplanting. If it is possible, refrain from planting any host species near susceptible oaks on Yurok lands.

Tree Removal and Disposal

A tree with P. ramorum needs to be viewed and treated differently than a tree without the disease, but the disease alone is not justification for removing a tree. An important consideration with respect to any tree is whether or not it presents a hazard to life or property. All trees present some hazard, depending on the tree's structural integrity, and its potential to do harm should it fail and break off or fall down. Preliminary observations suggest that P. ramorum increases the risk of tree failure by providing an opportunity for sapwood decay fungi to enter the tree. Since heartwood decay is common in many older trees, sound sapwood is essential to the tree's structural integrity. If both the sapwood and heartwood are decayed, tree failure may be imminent. The decision to remove a hazardous tree ultimately lies with the property owner. In order to get an assessment of hazard, contact a certified arborist or other qualified professional. Any dead tree has an increased risk of failure, but even dead trees have value, and if there is not a risk to life or property, consider leaving it standing. Standing dead trees provide important wildlife habitat and after they fall and decay, are a source of nutrients to be recycled in to the soil.

The threat of spread is generally not a valid reason for removing an oak tree with *P. ramorum.* Current information indicates that non-oak shrubs and trees contribute the most to disease spread. If an oak tree is infected, it will likely be surrounded by many other trees and plants that also harbor the pathogen. Hence, removing one or even a handful of infected trees will probably have little or no impact on local disease levels and spread. Eradication or suppression efforts would only be considered under very limited conditions — if the pathogen were newly established in an area, the infestation was small, and the area was well removed from any other infestations.

Removing Infected Oaks

A tree with Sudden Oak Death needs to be considered and treated differently than a tree without the disease, but the disease alone is not justification for removal. In some cases, oak trees infected with the disease can remain relatively healthy for some time. Since data indicate non-oak foliar hosts actually spread the pathogen, removing infected oak trees probably will have little or no impact on local disease levels and spread. However, an important consideration with respect to any tree is whether it presents a hazard to life or property. All trees present some hazard, depending on the tree's structural integrity and its potential to do harm should it die or portions of it break off. Preliminary research has shown that

trees *P. ramorum* has infected or killed are prone to rapid decay and unpredictable failure. Green infected trees and trees already dead from *P. ramorum* and/or secondary pests are at an increased risk of trunk and limb breakage.

The decision to remove a hazardous tree ultimately lies with the property owner. In order to get an objective assessment of hazardous conditions, YTFD may consult with a certified arborist or other qualified professional. While a dead tree has an increased risk of causing damage, consider leaving it standing if there is not a risk to life or property, such as when the tree is in a natural area. Standing dead trees provide important wildlife habitat, and after they fall and decay, they are a source of nutrients to be recycled into the soil. In any case, YTFD will ultimately ensure that actions are taken in accordance with Tribal and "Indian Rules" and/or provisions in the Yurok Aquatic Habitat Conservation Plan (YHCP) where applicable.

Disposing of Plant Debris

Since P. ramorum has been present in many areas of coastal California for a decade or longer, complete eradication is impossible. However, the disease is not uniformly distributed, and there are still many areas that remain uninfested. If infested plant materials are moved, they inadvertently can transfer the pathogen to uninfested areas. Disposal of infested material is extremely important, because branches, twigs, and leaves from California bay laurel, rhododendron, and other host plants can harbor P. ramorum, even after they are removed from the plant. In infested areas, the best option is to leave infested material on site, chipping the small material for use as ground cover and using larger pieces for firewood. Since inoculum levels already are thought to be high in these infested areas, leaving the additional inoculum from the infested plant material on site will not significantly worsen local disease conditions. Composting also can successfully kill the pathogen, but the compost must reach temperatures that probably are not possible or practical in a home-composting site.

Removing plant debris from the property is recommended only if it is the first infected tree detected in the area or if fire risk is high. If infected wood is removed from your property, make sure it is utilized or disposed of in a way that does not spread the disease. Avoid leaving wood next to roads where it could be picked up and transported off site by unauthorized parties. Regulations prohibit the movement of host plants and plant parts out of the quarantined area. If you have infected trees cut down, make sure the wood and other tree parts are not moved outside of the quarantine area.

Preventative Phosphonate Treatments

One phosphonate fungicide, Agri-Fos, is registered as a preventative treatment for P. ramorum for use on individual, high-value tanoak and oak trees. Treatment is not recommended in areas where infested plants are not already present. This treatment is not a cure, but it can help protect trees from infection and suppress disease progression in very early infections. The phosphonate compound can be injected or mixed with a surfactant and sprayed on the trunk for absorption through the bark. Booster treatments need to be made every 1 to 2 years.

Since the treatment must be made to healthy trees and the pathogen's distribution and activity is patchy and somewhat unpredictable, it is difficult to determine which trees need treatment. Generally, you should consider treating healthy, high-value oak or tanoak trees within 150 feet of other infested plants. You also might want to treat healthy, high-value oaks or tanoaks if they are surrounded by healthy California bay laurel and there are known infections within 150 to 1,000 feet. For more information, see Sudden Oak Death and Residential Oak Care: Protecting Trees in Advance of Local Disease Establishment (Lee, Valachovic, and Garbelotto 2010).

Animals

Black Bears

Bears can cause considerable damage to a timber stand. It is the intent of this FMP to enhance the productivity of a timber stand and at the same time capture some of the mortality caused by the animals. Tree damage is generally found in one of two locations within a tree. The majority of the damaged trees are affected around the stump. Bears strip off the bark from around the base of the tree which in time causes rot to enter the tree. The rot location expands around the tree killing it or causing significant butt rot damage to the first log in the tree. Without salvage of the tree it will become weaken and fall over. The second damaged location is generally found up the bole of the tree, up the tree 1/2 to 2/3 of the height of the tree. Bark is stripped off of the tree allowing rot to enter and cause decay. This decay site then becomes weakened over time and results in the loss of the top of the tree above the affected site. Means of controlling the bear damage is limited to deprivation permits. Adjacent owners, both industrial landowners and small fee land holders have a similar problem and have not been successful in reducing bear damage to their forested areas.

Because trees are already producing sugars (carbohydrates) during the early spring, bears strip the bark and eat the newly formed wood underneath. Bears use their claws to strip bark from a tree, then feed on the sapwood (newly formed outer wood) by scraping it from the heartwood (older central wood) with their teeth. Scattered remnants of bark strewn at the base of a tree and vertical tooth marks indicate bear activity.

Tree species stripped by bears vary depending on the location, probably reflecting the species available. In the Pacific Northwest, bears frequently girdle (strip bark all the way around the trunk) of Douglas firs, primarily immature smooth-barked trees ranging from 15 to 30 years old. Girdled trees die because they cannot transport nutrients from the branches to the roots. Trees of any age are vulnerable to bear damage.

Figure 3: Black Bear

Bears often strip the most vigorous trees. Damage frequently occurs after stand improvements, such as thinning. Three primary options are available to reduce bear damage:

- Eliminate or remove the problem animals or reduce the overall bear population.
- Apply silvicultural practices that minimize the attractiveness and vulnerability of the trees.
- Provide an artificial alternative food source during the spring.

Figure 4: Bear Killed Redwood Trees in Cappell Creek

Bears are selective when choosing the areas where they forage and the trees they strip. Several trees within a stand may be stripped while adjacent trees are ignored or barely damaged. Bears select the healthiest, fastest growing trees. Damage occurs more frequently after certain silvicultural practices. Thinned stands tend to be more vulnerable than dense stands.

Private timber managers began investigating alternative damage control techniques. Feeding stations (Figure 3) are constructed from 55-gallon (250-liter) metal or plastic drums. An opening in the front provides access to pellets. A simple self-feeding delivery system prevents bears from spilling pellets. A foam-insulated plywood roof keeps pellets dry. A single feeder holds about 90 kilograms of pellets. Commercial pellets are about 0.6 centimeter in diameter and 1.3 centimeters long. They resemble dry commercial dog food, but are greenish. The sugar concentration in pellets is high (about 20 percent) and provides at least four times the concentration of sugar found in the vascular tissue of Douglas-fir trees during the spring. The pellets include fats, proteins, vitamins, and minerals to provide the bears a nutritionally balanced diet. Feeders normally are placed near a road so they can be restocked easily, but away from public areas to avoid possible conflicts with people. All feeders are removed from the forest at the end of the feeding season, sometime during the middle of July. Bears normally wean themselves from feeders once alternative foods (such as berries) become available. When feeding stations are no longer being used, they are removed to reduce vandalism and the perception that feeders could serve as bait stations for persons hunting bears. The supplemental feeding program appeared to be effective in reducing bear damage in particular timber stands. Bears generally girdle fewer trees after they start consuming pellets. However, limited empirical evidence was available to document these observations. In addition, the effect of supplemental feeding on bear behavior is largely unknown. Several studies were conducted to learn more about supplemental feeding and its effects.

A combination of methods will probably be needed for animal damage managers to meet their objectives while maintaining viable wildlife populations. Removing bears can stop immediate problems and reduce problems over the long term. Fewer bears will peel fewer trees. Lower populations reduce

competition for alternative foods. Silvicultural practices can play a role in managing this problem. Delaying thinning or maintaining higher stocking rates should reduce the number of trees that bears strip. Pruning trees also appears to reduce damage. Stand improvements, such as thinning or fertilizing, increase the potential for damage. Altering silvicultural practices may encourage bears to feed elsewhere, but will not stop them from stripping trees. Providing bears an alternative food may reduce damage to timber resources, but will not eliminate it. Even with supplemental feeding, extensive damage may occur on some sites. Other proposed approaches to reduce the number of trees stripped by bears are impractical for timber plantations.

In order to prevent damage, the timber resource on the YIR a bear control program should be investigated. This project could be undertaken in conjunction with the Tribal Wildlife Program.

Trespass

18 USC § §1855-1856 PL 101-630 and 25 CFR 163, 53 IAM 7 and handbook, and 90 IAM 1.4C (6)-H provide procedures for the investigation of fire and timber trespass, and the process by which to reach settlements.

Fire Trespass

Fire trespass can be divided into three types: accidental ignition (unintentional), out of control brush fire burning (negligent), and arson (willful). Depending on the strength of the evidence, arson can be very difficult to prove and prosecute, while negligence is generally fairly easy to establish when a brush fire jumps the line. Fire trespass has not been a major problem on the YIR, but the risk will generally increase as more roads are opened, and fuels are generated from timber management activities.

Timber Trespass

Timber trespass can be divided into three general types: Innocent, inadvertent, and willful.

Innocent timber trespass occurs when the trespasser relies on generally accepted survey data collected by a licensed surveyor, which end up being inaccurate. Damages for this trespass usually are determined by Civil Code.

Inadvertent trespass occurs when the trespasser fails to adequately locate the property line defining the edge of the cutting unit. Damages for this trespass usually are determined by Civil Code, and are equal to twice the stumpage rate for the timber products removed.

Willful timber trespass constitutes theft. If proven, damages are typically triple the stumpage value of timber products removed.

To minimize timber trespass, prior to operations, timber sales should be reviewed on paper and on-site with abutting landowners to ensure mutual agreement as to property line locations. Active operations should be monitored through completion to protect tribal interests, and to avoid inadvertent trespass. The responsibility and reporting procedure for trespass should be that of the tribal forester. Because California is a Public Law 280 state, all trespass incidents should be reported to the local sheriff as well as the BIA.

Emergency Rehabilitation

A site-specific Burn Area Emergency Rehabilitation (BAER) Plan should be developed for a burned area if emergency rehabilitation treatment is required. This Plan should be initiated during suppression efforts or immediately thereafter depending on the availability of planning personnel and resources.

The purpose of the Interagency Burned Area Rehabilitation Guidebook (Guidebook) is to provide general operational guidance for the Department of the Interior Burned Area Rehabilitation (BAR) activities after a wildfire. In conjunction with departmental and agency policy, it is designed to provide agency administrators and BAR specialists with sufficient information to:

- Understand BAR policy, standards, and procedures.
- Assess wildfire damage and develop a cost effective plan or report.
- Assess and report accomplishments.

Internal/external coordination can be an important process in the successful implementation and completion of all phases of BAR.

The Tribal staff should:

- Identify key external agency contacts prior to the wildfire season.
- Jointly review the rehabilitation and restoration section of the Fire Management Plan (FMP).
- Identify potential treatments for BAR within a unit's Fire Management Plan.
- Identify in advance suppliers, equipment, storage facilities and identifying seed mixes and implementation personnel.
- Meet with all BAR technical specialists, wildland fire management staff, and other appropriate staff to discuss roles and responsibilities and to clarify areas of disagreement and/or confusion.

<u>Burned Area Rehabilitation Plan (BAR Plan):</u>

This is a document that specifies treatments required to implement post-fire rehabilitation policies. This plan may be programmatic (prepared in advance) and applicable to clearly defined types of incidents and situations, or prepared by an interdisciplinary team of specialists during or immediately following the containment of a wildland fire. BAER objectives are to:

1. Determine if an emergency condition exists after the fire.
2. Alleviate emergency conditions to help stabilize soil; control water, sediment and debris movement; prevent impairment of ecosystems; mitigate significant threats to health, safety, life property and downstream values at risk.
3. Monitor the implementation and effectiveness of emergency treatments.

BAER is "first aid" – immediate stabilization that often begins before a fire is fully contained. BAER does not seek to replace what is damaged by fire, but to reduce further damage due to the land being temporarily exposed in a fragile condition.

Wildland Fire:
Definition - any non-structure fire that occurs in the wildland. Three distinct types of wildland fire have been defined and include wildfire, wildland fire use, and prescribed fire.

- Wildfire – An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the wildfire out.
- Wildland Fire Use – The application of the appropriate management response to naturally-ignited wildland fires to accomplish specific resource management objectives in pre-defined designated areas outlined in Fire Management Plans. Operational management is described in the Wildland Fire Implementation Plan (WFIP).
- Prescribed Fire – Any wildland fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements (where applicable) must be met, prior to ignition.

Consultation and evaluation of forest resources impacted by wildland fire:
As a minimum, the following sources are consulted in obtaining baseline information for developing resource issues, field inventory priorities, and emergency stabilization and burned area rehabilitation recommendations:

- Local resource professionals and organizations with management responsibilities including: agency foresters, botanists, resource specialists, Native Plant Society members, Natural Resource Conservation Service (NRCS), and researchers.
- Resource Management Plans: integrated resource management plans, forest management plans, soil surveys, vegetation inventories, aerial photographs, spectral imagery, and geographic information system database, research projects.
- Literature: historical documents including management plans, study plots, published text describing plant community and habitat types, and documentation of past management practices.

Data Requirements: Following cursory aerial reconnaissance and the identification of forest resources affected, field inventories can be conducted to identify, map and gather data on fire related impacts related to:

Acreage burned and forest areas impacted by fire.

- Mapped locations of damaged trees which may pose a threat to public safety or improvements. Individual hazard trees will be evaluated according to the National Park Service hazard tree rating system.
- Mapped locations of visually undesirable concentrations of fire-related slash.

Management considerations may include:

- Alternative methods for mitigating tree hazards, public safety and effects on other resources.
- Determine costs of recommended treatments, as well as equipment and labor sources.
- Specify methods for contour falling of trees to stabilize slopes where determined necessary.
- Identify costs and sources of labor and equipment.
- In areas of high tree mortality, assess anticipated vegetative response of shrubs and trees.
- Develop prescriptions for artificial regeneration as determined necessary to meet agency direction.
- Assess the effects of any proposed slope stabilization seeding on anticipated natural or artificial regeneration.
- Make observations of pre-fire forest health (tree condition, disease levels), and predict post-fire trends.

- Assess the fire's effects on populations of undesirable shrubs and trees, particularly exotic species.
- Develop alternative methods of controlling their spread if provided in agency direction.
- Determine costs of recommended treatments.

Exotic Plants and Weeds

Several exotic plants have been observed within the YIR. These plants are being addressed within this FMP because they do pose a threat to the long-term hearth and productivity of the Tribal timberland. These exotic plants do not have any natural control agents that would keep them in control and reduce their sizeable population to an acceptable level. Most of the literature and research material suggests that chemical control be utilized on these species for control efforts. This aspect of control, although discussed below, was not considered a viable control tool.

Figure 5: Scotch Broom in Flower

<u>Scotch Broom</u>

Scotch broom (Cytisus scoparius (L.) Link), a native of Europe and North Africa, was introduced into the United Stated in the 1800's. It forms dense stands which crowd out native species and destroy wildlife habitat.

Scotch broom was initially introduced as an ornamental, and later to control erosion and stabilize coastal dunes. Established infestations are difficult to eliminate because large, long-lived seed banks typically accumulate. Scotch broom may reproduce vegetatively or by seed. Six to eight years of growth is followed by degeneration accompanied by an increase in the ratio of woody to green to material, reduction in seed production and finally death. Bushes rarely die in one year, but as "the habitat begins to disintegrate", a mosaic of dead, partly dead and living plants form. Broom bushes can live up to twenty-five years. However, they have an average lifespan of seventeen years.

Figure 6: Scotch Broom

Habitat: Scotch brooms have a high tolerance for most soil conditions, as a result of their ability to fix nitrogen from the atmosphere. They grow best in dry sandy soils in full sunlight. Brooms initially invade open sites such as logging roads,

landings, roadsides, skid trails, and harvest areas.

Control Methods:
Mechanical**:** Young Scotch broom can be eradicated by hand pulling, if the infestation is relatively small. Hand pulling is easily done after a rain when the soil is loose. This facilitates removal of the root system, which may resprout if left in the ground. Mowing is also effective when broom is under drought stress. Cutting Scotch broom shrubs to ground level at the end of the dry season can help reduce resprouting from the crown. Minimize soil disturbance as much as possible.

Biological: Although insects exist that impact Scotch broom, no biological agents are yet approved for release on Scotch broom. Several are under-going investigation. Planting native trees and shrubs in and around broom stands can eventually help minimize infestations by shading.

Chemical: Although chemical control is outlined here it is presented as information only. Herbicide use is not permitted within the YIR or the YHCP area. There are many herbicides available to control Scotch broom. Always carefully read and follow the label directions. Proper timing and rate are important, and varies depending on the product. Contact the Department of Agriculture to determine the best herbicide for your situation.

Pampas Grass

Cortaderia selloana (pampasgrass) is a large perennial grass (family Poaceae) found along the coast of California, and in the Coast Ranges, Central Valley, Western Transverse Ranges, and Mojave Desert. Pampasgrass favors dunes, bluffs, coastal shrublands and marshes, inland riparian areas, and disturbed areas. It was introduced as an ornamental plant and for erosion control. Each plume produces up to 100,000 seeds that are widely dispersed by wind and develop without fertilization. Pampasgrass quickly colonizes bare ground, but establishment is generally poor where the seedlings must compete with other grasses or sedges. The grass is a perennial grass that ranges six to twenty-three feet tall. Plants have long leaves arising from a tufted base or tussock. The flower cluster is a plumed panicle at the end of a very long stem. Stems generally are at least twice as long as the tussock. Plumes consist of hairy female flowers, deep violet when immature, turning pinkish or tawny cream-white at maturity. Jubata grass is easily confused with pampas grass (Cortaderia selloana). The two species are distinguished by stem height, leaf, plume, and spikelet color, florets, leaf tip, and presence

Figure 7: Pampas Grass

of viable seed. The tussocks of jubata grass are less erect and more spreading and not fountain-like, when compared to tussocks of Cortaderia selloana. Jubata grass is native to northern Argentina and the Andes of Bolivia, Peru, Chile, and Ecuador. In its native range it can be found from sea level to elevations greater than 11,000 feet. It was first cultivated in France and Ireland from seed collected in Ecuador. Jubata grass has the potential to greatly impact Oregon's coastal ecosystems. Escaped plants crowd out native vegetation and are very competitive in forestry operations. In forests, jubata grass can out-compete seedling trees and retard their establishment and growth. It creates a fire hazard with excessive build-up of dry leaves, leaf bases, and flowering stalks.

Control of pampas grass is similar to that of jubata grass. Few strategies are available for the control of Cortaderia selloana. Burning does not provide long-term control, as plants resprout shortly thereafter. Infestations sometimes can be averted by overseeding open grass disturbed sites with desirable vegetation to prevent establishment of seedlings. Manual methods: Pulling or hand grubbing Cortaderia selloana seedlings is highly effective. For larger plants however, a pulaski, mattock, or shovel are the safest and most effective tools for removing established clumps. To prevent resprouting, it is important to remove the entire crown and top section of the roots. Detached plants left lying on the soil surface may take root and reestablish under moist soil conditions. A large chainsaw or weed eater can expose the base of the plant, allow better access for removal of the crown, and make disposal of the detached plant more manageable. Cutting and removing or burning the inflorescence prior to seed maturation in late summer may be important if seed production occurs in escaped populations of pampas grass. To reduce labor, the top of the foliage can be removed and the remaining crown treated with diesel oil.

Figure 8: Hillside of Pampas Grass

Knapweed

Knapweed (Centaurea pratensis) is a noxious perennial to 1 m tall, with dark, creeping rhizomes. Plants exhibit allelopathic effects and are aggressively competitive, facilitating rapid colonization and development of dense stands. Infestations can be extremely long-lived due to extensive root and rhizome systems. Stems dieback after flowering in summer, and new shoots are generated in spring. Introduced from Central Asia, like yellow starthistle [Centaurea solstitialis L.], Russian knapweed is toxic to horses, causing nigropallidal encephalomalacia or "chewing disease" when sufficient quantities are consumed. Under most circumstances livestock will avoid grazing Russian knapweed because of its bitter taste. Meadow knapweed can be found in Humboldt County in the Weitchpec area. In Del Norte County this weed can be found in and around Crescent City, along Forest Service routes, and around five acres of a wilderness trailhead. This project exemplifies a bi-county, early detection and treatment approach to managing an A-rated pest, meadow knapweed. The spread of meadow knapweed is being addressed at an early stage to protect habitats and high-value sites such as pasture land, oak woodland communities, riparian areas, river bars, a botanic area, designated wilderness, and designated Wild & Scenic Rivers. Meadow knapweed out-competes grasses and other pasture species, causing productivity to decline. It is susceptible to herbicide treatments, but control efforts must persist for the long-term. It has the potential to invade native prairie and oak savannah. Meadow knapweed favors moist roadsides, sand or gravel bars, river banks, irrigated pastures, moist meadows, and forest openings. It also can invade industrial sites, tree farms, and grasslands.

Figure 9: Knapweed in Flower

Meadow knapweed blooms in midsummer to fall. It grows from woody root crown and up to 3 1/2 feet tall. The lower leaves are long-stalked, upper leaves have no stalk. Stems are many-branched and tipped by a solitary flower head up to one inch wide. Flower heads are pink to reddish purple, oval or almost

globe-shaped. A key identifying feature is the fringed bracts on the flower head. A hybrid of black and brown knapweeds, its foliage is coarse and tough. However, because meadow knapweed is a hybrid, its traits can very.

English Ivy

Figure 10: English Ivy growing up the Boles of Conifer Trees

Hedera spp. (Hedera helix = English ivy, Hedera canariensis = Algerian ivy) are perennials (family Araliaceae) that grow as evergreen woody vines. Both plants are found throughout California along the coast, as well as in Shasta and Butte Counties. Hedera spp. grows vigorously in forests where nothing else seems able to compete and inhibits regeneration of understory plants, including forest wildflowers and new trees and shrubs. English ivy (Hedera helix) is the familiar vining plant often allowed to grow up building walls. It has two forms: an evergreen woody vine and an evergreen shrub. Both forms have deep green, glossy, leathery leaves. Vining plants do not produce flowers or fruits, and their leaves have lighter-colored veins and three to five lobes. Upright shrubby plants may produce flowers and fruits, and their leaves are ovate rather than lobed. In both forms the leaves may have a strong odor when crushed. The white flowers are in clusters on the ends of stems produced in fall, and the fruits are dark blue or purplish drupes. English ivy may be distinguished from grape vines (Vitis sp.) and Ampelopsis species by its evergreen leaves, which are not hairy or fuzzy (pubescent), and by vines that have no tendrils. It differs from cape ivy (Delairea odorata) in having leaves that are evergreen in all climates, with a deep cleft at the leaf base that makes the lower lobes appear larger than the others.

English ivy is found in northern California forests south to at least Santa Cruz. It has also been observed in Shasta and Butte counties and along the south coast from Santa Barbara County to San Diego. It is a serious problem in the coastal Pacific Northwest from central Oregon into British Columbia. On the

eastern seaboard it also spreads into woods, particularly from Virginia north to New York. English ivy is generally found in open forests, especially those with a deciduous component, from sea level to 3,300 feet elevation. It is especially common in forests near urban areas. It climbs up tree trunks and along branches into the canopy and may also cover the ground. English ivy will invade riparian zones where flooding has disturbed the soil, but it does not grow well in areas where the water table is high and soil is waterlogged.

English ivy can alter natural succession patterns in forests. It forms vigorous vines in forests where nothing else seems able to compete. It inhibits regeneration of understory plants, including forest wildflowers and new trees and shrubs. By blocking regeneration in forests, it jeopardizes their long-term persistence. English ivy also kills trees in the understory and overstory by shading them out (Thomas 1980). It tends to grow up tree trunks into branches, especially those of deciduous trees. The increased winter light under deciduous trees apparently allows this evergreen vine to grow rapidly upward in winter. Once in the canopy, English ivy can shade out deciduous foliage during summer months, suppressing the growth of the tree that supports it. As the tree dies back, its increasingly open crown allows the vine to grow even more (Thomas 1980). In addition to shading, the additional weight of water and/or ice on the evergreen ivy leaves may increase storm damage to trees, especially in the presence of high winds. This effect has been observed in trees infested with Vitis sp.

English ivy may replace species used by native wildlife. Its leaf litter adds nitrogen to the soil, which may disadvantage native species that compete best under lower nutrient. The sap can cause dermatitis in some people, and both berries and leaves are toxic.

Manual/mechanical: The best method for controlling English ivy may be hand removal of vines using pruners to cut the vines and then pulling the plants up from the forest floor and down from the trees. Removing and killing vines that spread up into trees is especially important because the fertile branches grow primarily on upright portions of the vine. If vines are cut at the base of the tree the upper portions will die quickly but may persist on the tree for some time; vines on the ground around the tree should also be removed to prevent regrowth up the tree. Care should be taken to minimize disturbance during removal. If the forest floor becomes disrupted, appropriate native species should be planted on the site to inhibit reinfestation by English ivy or another invader. Prescribed burning: An extreme method that has been used with some success is to burn ivy plants and resprouts with a blow torch at regular intervals; the energy used by the plant to regrow will eventually be depleted. Obviously, this approach requires considerable caution.

Wildlife

Generally, protections for threatened and endangered (T&E) species are negotiated through federal agencies as per the direction below. Ideally, there will be one over-arching agreement for all properties at some point in the future. All T&E species protections are as prescribed in the written Biological Assessment that accompanies the timber sale or other ground disturbing action as concurred to by NOAA Fisheries, USFWS and BIA or CDFW as appropriate.

- Old growth habitat is concentrated on Tribal lands and special considerations are made including limitations to harvesting for wildlife species such as the northern spotted owl (NSO) and marbled murrelet (MAMU).
- The main objective is to avoid the direct take of T&E species and reduce the chance for obliteration of habitat critical to traditional species. Beyond this main objective this alternative would strive to maintain viable populations of all species and enhance deer populations through habitat improvement
- These objectives would be achieved through intensive surveys for T&E and selected traditional species and then dedicating no cut activity centers around all T&E species sites and most traditional species nest/roost/den sites.
- The management objective for NSO activity centers would be to maintain all activity centers as no harvest reserves for the benefit of late seral cultural, sensitive and listed species. These centers protect the roost/nest sites of northern spotted owls and are a minimum of 60 acres of the best existing spotted owl habitat as determined by a “qualified” (Office of Personnel Management) wildlife biologist. The harvest prescription for these activity centers would be no harvest.
- Seasonal restrictions may be required on disturbance activities within 0.25 mile of northern spotted owl nest.

Wild and Scenic River Management

Those rivers or segments of rivers included in the system shall be classified as one of the following:

(a) Wild rivers, which are those rivers or segments of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted.

(b) Scenic rivers, which are those rivers or segments of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

(c) Recreational rivers, which are those rivers or segments of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

As per the above listed classifications the Klamath River from the Trinity River confluence to the river mouth at the Pacific Ocean is classed as recreational. The Trinity River from the west boundary of Section 2 T8N R4E to the confluence with the Klamath River at Weitchpec is classed as scenic. The YTFD does not discriminate between designations, considering them all "major rivers" (see Map9: Lake & Waterway Protection Zones, p.86).

- The State and Federally designated Wild and Scenic River corridor is 200 feet on each side of the river, along the entire length of the river. Practices within the corridor are modified to protect the beneficial values for which the River was designated. This zone is measured from the watercourse transition line. YTFD allows for 300 feet on each side of the river.
- The overall objective is to provide the maximum timber possible consistent with allowing only a slight decline in visual quality within the corridor, as determined by Council and the BIA.
- The only harvest prescriptions allowed would be sanitation salvage, single tree and group selection with groups less than 2.5 acres, and shelterwood.

TIMBER MANAGEMENT PLAN

This portion of the FMP addresses the inventory, silviculture, harvest policy, allowable cut and management alternatives of the commercial forest resource.

Forest Harvesting Policy

The Tribe has indicated a strong desire to limit clearcutting (except in rare cases) and prohibit the use of herbicides. When appropriate, clearcuts should be less than twenty (20) acres in size. Clearcuts are prohibited on Phase I lands. Furthermore management of the Tribe's forest resources should be provided for multiple use, sustain yield, maximum benefit and in a cost effective and efficient manner. This indicates the application of both even-and uneven-aged management practices. The Tribe has also acquired land in order to both expand contiguous holdings and increase overall reservation acreage.

A potential conflict could develop in terms of what the Tribe considers appropriate forestry practices, and what some allottees feel is their right to harvest as they wish - including larger clearcuts. Alternatives are proposed in the Environmental Assessment to address this issue.

Resource Inventory

The BIA's 2007 Forest Inventory Analysis (FIA) identified 3,380 acres of tribal timber lands, and 2,220 acres of allotted timber lands. These acres were divided into seven timber type strata as follows:

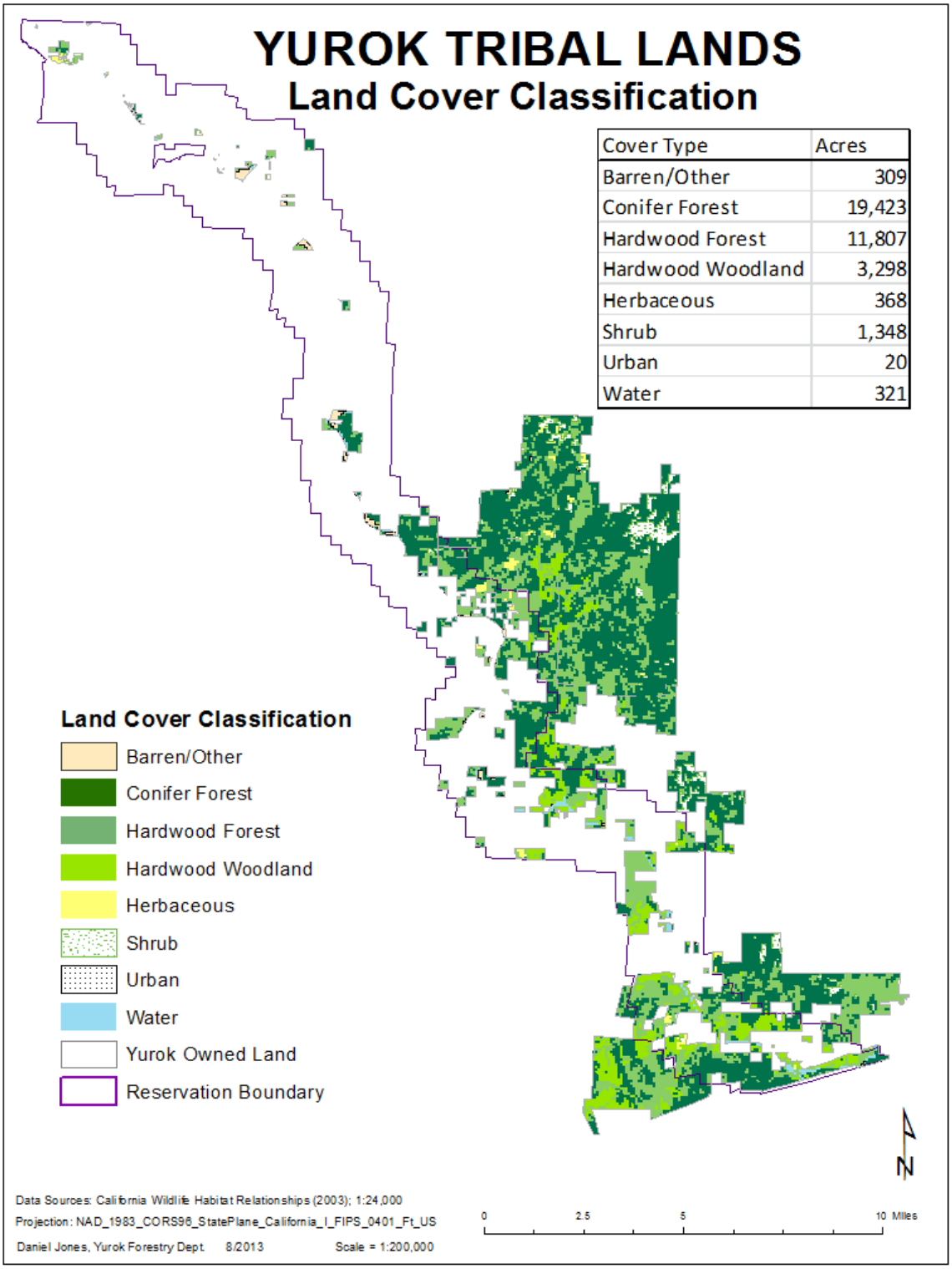
This amounts to approximately 5580 acres of commercial trust and allotment lands. There are approximately 2,200 acres of allotted lands and 3380 trust acres. The estimated net conifer volume on tribal lands in 2007 was 110 million board feet, and the estimated net conifer volume on allotments in 2007 was 71.5 million board feet. Overall growth on these lands was estimated at approximately 4.1 million board feet per year. The annual growth is divided between trust land with 2.5 million board feet (MMBF) on trust land and approximately 1.6 MMBF found on allotment lands. This is gross timber volume for these lands.

The following table shows the gross amount of timber volume on all of the land classes covered by this Forest Management Plan. This gross volume amount included both conifer and hardwood volumes.

Table 3: Gross Timber Volume for Tribal lands in Thousands (M) and Millions (MM) of Board Feet (BF)

Gross Timber Volume by Land Class					
Land Class	**Acres**	**Conifer Vol (MMBF)**	**Hardwood Vol (MMBF)**	**Total Volume (MMBF)**	**Avg. (MBF) Volume/Ac**
Trust Land	3,290	116.56	10.58	127.15	37.62
Allotments	2,201	75.87	6.89	82.76	37.47
Phase I Fee	22,495	271.91	127.67	399.58	17.8
CKGG Fee	8,909	57.94	80.71	138.65	15.56
TOTAL	36,895	495.63	191.52	687.16	18.6

Note: Decimal is a place holder and does not indicate significant figures.



Map 5: Vegetation Classification for the YIR

Data Collection

As defined, the YIR is a Category One (1) reservation, and therefore requires a precision level of 5% error at one Standard Deviation. The current Forest Inventory Analysis completed in 2010, for the year 2007 measurement period, states that this precision level was not met due to under sampling. There are 191 permanent sampling plots on the YIR. To meet a precision level of 5% error at one Standard Deviation, there need to be 174 plots for basal area, 286 plots for cubic measure, and 381 plots for board measure. Therefore, only the basal area analysis meets the required precision level. However, this is the best data available at this time, and does not preclude the development of a Forest Management Plan and calculation of allowable cuts. The next timber inventory on the YIR, which will probably be performed in ten (10) years, must achieve the required precision level, after which, allowable cut calculations will need to be checked and adjusted as needed. In order to do this the YTFD will have to double the amount of sampling plots.

Data collection and analysis for the Phase I and CKGG SYU's is discussed in the Forest Carbon Projects section.

Timber Size Class Distribution

The inventory data illustrates a distinct bi-modal size class distribution on all Trust lands. In other words, most of the trees are either small sawtimber or large old growth. When examined separately, Tribal and allotment stands differ considerably.

About 55% of the entire 3,380 Tribal trust acres contain large sawtimber, while the other 45% contains small sawtimber and pole stands. Size-class distribution on allotment lands is more heavily weighted towards small sawtimber classes. Approximately 60% of the entire 2209 allotment acres contain large sawtimber, while the other 40% contain small sawtimber, poles and plantations. This difference in size distribution is a direct result of the absence of harvesting on Tribal lands, and sporadic cutting on allotments.

Another distinct feature of the timber resource on both ownerships is the conspicuous absence of medium-sized trees and plantations. This age gap will have implications to the long term management of timber stands.

Stand Exams

Currently there is not an organized stand exam program. Stand exams, particularly in the hardwood (I) and plantation (II) types need to be done to determine the needs for additional treatments such as brush removal, pre-commercial thinning, and interplanting. A stand exam data and information data base need to be developed for the purpose of tracking individual management units. The data base system could also be used for completing forest development plans, fuel reduction work, and providing data for forest simulation forecasts.

Stand examination is used for determining project opportunities for timber, wildlife, and recreation. Stand examinations and detailed silvicultural prescriptions are activities to be recorded. This system involves measuring the trees, or other resources, in specific stands and compartments in order to prescribe resource treatments. An example of this would be measuring several plots of trees to determine if a spruce stand has enough stems per acre to be thinned for a timber sale. Special conditions may also be inventoried, such as springs, wildlife habitat, or unique plants or geological

features. Stand exam data should not be used for determining annual allowable cut. It should be used for determining where timber can be cut.

Data Collection Levels

There are three stand examination data collection levels: quick plot, extensive, intensive.

Quick Plot

A quick plot exam may group trees by species, diameter, heights, and/or damage classes on both large and small plots. These exams collect stand structural data using measurement tolerances that are relaxed to allow for ocular estimation of many parameters. Diameters of live trees may be estimated in 2-inch DBH classes. Standing dead tree heights are recorded in 10-foot classes. Limited tree defect information is collected; growth data are not collected. Limiting the amount of information gathered and reducing measurement accuracy standards may minimize cost. Quick plot uses include:

- Cover and stand structure estimates by vegetative layer
- Exams in single species or single storied stands
- Timber stand improvement inspections
- Post treatment examinations
- General surveys such as dwarf mistletoe surveys
- Supplemental cruise plots to reduce costs for timber sale preparation

Extensive

An extensive exam collects accurate tree measurements to tolerance standards tighter than a quick plot, but not as tight as an intensive exam. Trees on the large plot are recorded individually, but trees on the small plot may be recorded in groups. Diameters are measured to the nearest 1-inch class. Some tree defect information is collected. The main uses of an extensive exam are:

- Minimum data required to execute growth and yield models
- Exams in multi-storied stands
- Silvicultural prescriptions Extensive

Intensive

An intensive exam collects accurate tree measurements to tight tolerance standards. It provides a comprehensive inventory for unique stands. Trees on the large plot are recorded individually, but trees on the small plot may be recorded in groups. Diameters are measured to the nearest 1/10th of an inch. Heights are measured to the nearest foot. Detailed tree defects are collected. The main uses of an intensive exam are:

- Stand volume, defect, and mortality
- Exams in complex stands in terms of species and size
- Tree growth information for use in tree models, and growth and yield studies
- Silvicultural prescriptions

Silviculture

Silviculture is the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis. The silviculture practiced on the YIR must be designed to meet several general goals:

(1) Protect non-timber resources identified by the Tribe such as cultural features, wildlife, water qualities, aesthetics, and soil.

(2) Generate timber revenues at a sustainable harvest level.

(3) Emphasize the application of uneven aged management principles.

(4) Offer economically feasible timber sales.

(5) Provide flexibility for allottees.

(6) Maintain the health and vigor of timber stands.

The choice of specific silvicultural prescriptions to be applied is highly dependent on five factors: (1) the current condition of the forest stand; (2) the desired future condition of the forest stand; (3) constraints such as tribal concerns, wildlife issues, etc.; (4) geographical location which can cause windfall and snow damage; and (5) Federal or California State laws where applicable.

A silviculture prescription is a planned series of treatments designed to change current stand structure to one that meets management goals. The prescription is the site or stand specific document that prescribes vegetation altering treatments to modify existing vegetation to meet current and future targeted/desired conditions as outlined in supporting planning documents such as FMPs and project environmental assessments. Individual prescriptions, at a minimum, will address the current stand diagnosis, prescribed treatments, implementation guides, and monitoring requirements. The development of individual prescriptions must take ecological, economic, and societal constraints into consideration. In effect, the silvicultural prescription is a part of the silvicultural process. The BIA maintains a manual and handbook for silviculture but these practices cross over to a number of BIA manuals and handbooks as silvicultural practices are an integral part of forest management. The 53 Indian affairs manual (IAM) 9 and its associated handbook provide silvicultural guidance that the YTFD can utilize.

Current Stand Conditions

The current overall condition of both Tribal and allotment timberlands can best be generalized as being bi-modal in size class distribution, which means that there are very few trees in the medium size classes. Forest health is generally good. The mature trees have long passed culmination of mean annual increment, and show signs of natural decline from fungal agents. Review of these stands indicates that most pole and small sawtimber stands are well stocked and appear to be growing at reasonable rates. It is important to note that most of the large sawtimber is located on trust timberlands, while most of the timber on the allotments is smaller, second-growth.

The single most significant influence on current stand structure besides past logging, is the exclusion of fire (both prescribed and wildfire) since the early 1900's. This condition has resulted in a conversion of many open prairie areas to Douglas-fir stands, and a possible increase in conifer stocking in hardwood stands. The silvics of this species are discussed in the “Silvics of Dominant Tree Species” section.

Insect and disease issues are described earlier in the Resource Protection Plan, but the most significant concern with regard to silviculture is black stain in young growth Douglas-fir, fomes in old growth Douglas-fir, and Port Orford cedar root disease.

Future Stand Conditions and Silvicultural Options

For long-term sustainable forestry to be practiced, a range of age classes must be present in the future "regulated" forest. In uneven aged management, stands need to approximate a size class distribution that is traditionally represented as a "negative exponential" distribution, or "inverse j-shaped" distribution. In essence, tree sizes should be most numerous in the smallest size classes, and least numerous in the largest. In this model, commercial timber is removed from the larger sized trees as younger trees grow into those classes, and reach "rotation age" (age at which the increment of average annual growth culminates). In even aged management, these size classes should be present in individual even aged stands across the entire timbered land base. In this model, whole stands are harvested when they reach rotation age.

Depending on the mix of even and uneven aged management practices applied, future stands can approach very different conditions. There are multiple approaches for uneven aged management and management must remain flexible. For more information on uneven aged management refer to: http://ucanr.edu/sites/forestry/Webinars/Current_Research_at_UC_Berkeley_webinar_series/February_25,_2013_Dr_Kevin_OHara/. Management activities are recorded as either planned or accomplished.

Tree Designation Guidelines

Tree designation is the denoting of individual trees for treatment (cutting, leaving, or pruning) using paint or some other descriptive means. Many considerations must be taken into account before a tree is designated for harvest within a given silvicultural system. Significant considerations should be:

(1) Vigor and form class of tree (i.e., live crown ratio, forking, foliage condition, etc.).

(2) Canopy classification (i.e., dominant, intermediate, codominant, suppressed).

(3) Age / growth rate of the tree.

(4) Defect.

(5) Accessibility to skidding and yarding equipment.

(6) Falling limitations, potential breakage to logs.

(7) Tree spacing.

(8) Amount of reproduction present.

(9) Species distribution.

(10) Proximity to streams, roads, sensitive areas, etc.

(11) Merchantability (i.e., culls should be left as seed sources and/or wildlife trees unless they are infected with pests).

(12) Seed sources.

(13) Potential for windthrow (i.e., on edge of opening).

(14) Species or individual tree of cultural significance.

(15) Preservation of wildlife uses (denning, nesting, etc.)

A Registered Professional Forester (RPF), or person of equivalent experience with experience in the coastal timber types, should be required to ensure adequate residual basal area stocking and phenotypes, and recognition of local pathogenic and insect presence.

Supervision and quality control must be applied if the proposed prescriptions are to be affective. The Forest Officer in Charge (FOC) should inspect the mark, and confirm that treatments are followed through.

Silvicultural Options

As mentioned earlier, the Tribe has clearly stated that uneven-aged management (single-tree selection and group-selection) is the preferred method to be employed as the standard management method on all timberlands, except in rare instances. The goal for even-aged management (clearcutting, shelterwood, etc.) is to limit the size to 20 acres or less and should be utilized as a limited management practice. Herbicide use will be allowed only on trust lands and only when approved by Tribal, or General Council Resolution, and must also follow Federal standards and BIA guidelines. It is recommended that the Council seriously consider the appropriate use of herbicides so that silvicultural options are not limited in the future.

Silvics of Dominant Tree Species

Douglas-fir

Average annual precipitation for sites occupied by Douglas-fir varies from 35 to over 200 inches. Cone production is generally irregular, but light crops or better can be expected about 2 out of every 10 years in the southern portion of its range (coastal California). Coast Douglas-fir is considered a subclimax species, which if left untouched will eventually be succeeded by even more shade- tolerant species such as western hemlock. Fire is known to leave larger trees unharmed, reduce thin barked competitors, and increase seedling production and establishment. Historically, wildfires have burned large areas, giving rise to extensive even-aged stands.

Douglas-fir is medium in shade tolerance. Young trees require about one third sunlight exposure to achieve maximum photosynthesis, and will respond to release. However, older saplings can suffer from sun scald and windthrow

Forestry research has shown that single tree selection used in uneven-aged management is difficult in this forest type. The problem has been a loss of site to hardwoods and other less commercially valuable species, and a decline in Douglas-fir regeneration. Therefore, funds must be retained or acquired for cultural treatments (hardwood removal, brush removal, tree planting) if single tree selection is stipulated. It may be that group selection (see below) is more practical in this type. However, most research and experience indicate that the shade tolerance of Douglas-fir justifies all forms of uneven-aged methods (except the seed-tree method in old-growth stands which can result in wind fall). With regard to even-aged management, shelterwood is probably the most visually pleasing harvest method,

and clearcutting the least. In most cases, tree planting and the use of herbicides or manual methods are required to insure stocking.

The desire to practice uneven-aged silviculture, in this forest type, must be considered against the trade-offs described above. Group selection cuts, shelterwood methods, or other even aged cutting methods may be more appropriate while still meeting the goals of the Tribe while also maintaining or enhancing the growth potential of the forest.

Tanoak

Tanoak is a major component of the forest structure within the YIR, sometimes forming pure stands. Tanoak is most abundant and, in general, attains its largest sizes in between elevations of 500 to 3,000 ft. More often it is an understory tree with Douglas-fir or is a component of hardwood stands or mixed hardwood-conifer forests. High-site soils for redwood or Douglas-fir), such as the Hugo, Sheetiron, Josephine, Empire, Larabee, Sites, and Melbourne series, are also well suited for the growth of tanoak. These soils have been derived from either consolidated or soft sedimentary rocks. They are light grayish brown or light reddish brown to brown in color and are moderately to strongly acidic. Soil textures grade through gravelly loam, sandy loam, fine sandy loam, loam, silt loam, to clay loam. Soil orders are mostly Inceptisols and Alfisols. Besides growing well on deep soils, tanoak also thrives on stony and shallow soils that are less suitable for conifers. Yet tanoak requires more moisture than many other hardwoods. It will grow well on the shallow and stony soils of north slopes, for example, but will be supplanted by Pacific madrone (Arbutus menziesii), Oregon white oak Quercus garryana), or California black oak (Q. kelloggii) on the warmer, drier south slopes. Tanoak sprouts often quickly dominate the vegetational cover after logging or fire. Although this ability helps reduce soil erosion, tanoak sprouts often provide severe competition to conifer reproduction and may suppress it. The thick, stiff, flat, leathery leaves often cover young conifer seedlings or cover the ground so thoroughly that conifer seedlings cannot emerge above them.

Tanoak is usually classed as medium in size. Mature trees are generally 50 to 90 feet tall but frequently grow to 150 ft. Mature trees vary from six (6) to 48 inches in DBH. After the overstory is logged or burned, even small tanoaks can respond, and tanoaks of all sizes may dominate disturbed areas. Because of its ability to respond to disturbance and to reproduce and grow in the shade, it is considered to be a climax species in Douglas-fir, redwood, and mixed-conifer forests.

Redwood

The range of redwood extends southward from two groves on the Chetco River in the extreme southwest corner of Oregon, to Salmon Creek Canyon in the Santa Lucia Mountains of southern Monterey County, CA. Currently there is approximately 456 acres of the redwood type within the ownership of the Yurok Tribe. The frequent summer fogs that blanket the redwood region seem to be more significant than the amount of precipitation in delineating the redwood type. The major effect of fog is to decrease water loss from evaporation and transpiration. An additional effect of condensation and fog drip from tree crowns is an increased soil moisture supply during the dry summers. High-site soils for redwood consist of Xerochrepts, Haploxerults, and Haplohumults of the Hugo, Josephine, Melbourne, Empire, Sites, and Larabee series (orders Inceptisols and Ultisols) and associated alluvial soils. The high-site residual soils have been derived from either consolidated or soft sedimentary rocks.

Although most redwood stands are close to the ocean, redwood does not tolerate ocean winds, and considerable evidence suggests that it is sensitive to ocean salts carried inland during storms. Usually redwoods do not grow on hillsides that face the ocean. The absence of redwood near the ocean also

may be caused by the absence of forest soils of sufficient depth and fertility to support redwood. Redwoods are smaller and give way to other species as altitude, dryness, and slope increase. Redwood is a principal species in only one forest cover type, Redwood, but is found in three other Pacific Coast types, Pacific Douglas-Fir, Port-Orford-Cedar, and Douglas-Fir-Tanoak-Pacific Madrone. Of the great variety of lesser vegetation found in association with redwood, these species are especially common: bracken (Pteridium aquilinum var. lanuginosum), sword fern (Polystichum munitum), salal (Gaultheria shallon), blueblossom (Ceanothus thyrsiflorus), California huckleberry (Vaccinium ovatum), Pacific rhododendron (Rhododendron macrophyllum), salmonberry (Rubus spectabilis), coyote-brush (Baccharis pilularis), and snowbrush (Ceanothus velutinus).

New redwood seedlings require a greater supply of soil moisture for survival than that needed by seedlings of most associated trees. In its early stages, redwood grows rapidly in height. Seedlings often grow about 18 inches in the first season and trees four (4) to 10 years old sometimes two (2) to 6.5 feet in a year. In many instances, however, rapid height growth of trees that originate from seed does not commence until the trees are more than 10 years old. Sprouting by redwood is principally from root crowns, but sprouts sometimes grow from the sides and tops of stumps. These high sprouts are less desirable because they are mechanically weak and not as vigorous as root-crown sprouts. Sprouts originating from the sides and top of stumps often are destroyed by strong wind. Most of a fully stocked stand is the result of young growth sprouts.

Economical conversion of old-growth redwood to young managed stands by shelterwood or selection cutting is difficult because net growth is negative during the decade after logging. Windthrow, slow growth of residual trees, and damage to established reproduction when residual trees are removed contribute to economic losses. Considering effect on growth, group selection seems to be a good method for converting old-growth redwood to young managed stands. The yield of young-growth redwood stands at 100 years is expected to range from 742 m^3/ha (10,600 ft^3/acre) on low sites to 3576 m^3/ha (51,080 ft^3/acre) on high sites (32). The same stands yield 781 to 4998 m^3/ha (55,760 to 357,000 fbm/acre International quarter-inch rule), and yields of more than 2800 m^3/ha (about 200,000 fbm/acre International quarter-inch rule) are common in young-growth redwood stands. At earlier ages, however, the greatest yields are in stands that contain a mixture of redwood and Douglas-fir.

Natural pruning in young redwood stands often is not good. Although live crowns may be limited to the upper third of the trunk, dead limbs are persistent. Branch stubs, although decayed, may remain more than 50 years. In old trees, some branch stubs have affected the quality of the timber over a 200-year period. Trees in the intermediate crown class, however, often prune well naturally, and some trees in a heavily stocked stand have clean trunks for 23 to 30 m (75 to 100 ft.) at 85 years. Redwood stands are dense. At 60 years, redwood may have a basal area of more than 126 m^2/ha (550 ft^2/acre) on the best sites (32). Heavy stocking is desirable because the relatively high tolerance permits land to support a large number of dominant and codominant trees per unit area.

Western Hemlock

Western hemlock thrives in a mild, humid climate where frequent fog and precipitation occur during the growing season. Best stands are in the humid and super humid coastal regions. In subhumid regions with relatively dry growing seasons, western hemlock is confined primarily to northerly aspects, moist stream bottoms, or seepage sites. Western hemlock grows on a variety of soils and is a characteristic species on soils of six (6) of the 10 soil orders. Western hemlock is poorly suited to sites where the water table is less than six (6) in below the soil surface. Although capable of existing on soils with

moisture regimes tending toward ustic or xeric, it grows poorly; frequently, tops die back in years of drought. Western hemlock is highly productive on soils with a broad range of available nutrients.

Western hemlock is a component of the redwood forests on the coasts of northern California and adjacent Oregon. Because of its broad range, western hemlock has a substantial number of understory associates. In its Pacific coast range, common shrub species include the following (starred species are also common associates in the Rocky Mountains): vine maple (Acer circinatum), Sitka alder* (Alnus sinuata), Oregongrape (Berberis nervosa), snowbrush ceanothus* (Ceanothus velutinus), salal (Gaultheria shallon), oceanspray* (Holodiscus discolor), rustyleaf menziesia* (Menziesia ferruginea), devilsclub* (Oplopanax horridus), Oregon boxwood* (Pachistima myrsinites), Pacific ninebark* (Physocarpus capitatus), Pacific rhododendron (Rhododendron macrophyllum), stink currant (Ribes bracteosum), prickly currant* (R. lacustre), thimbleberry* (Rubus parviflorus), salmonberry (R. spectabilis), trailing blackberry (R. ursinus), Pacific red elder (Sambucus callicarpa), common snowberry* (Symphoricarpos albus), Alaska blueberry (Vaccinium alaskaense), big huckleberry (V. membranaceum), ovalleaf huckleberry (V. ovalifolium), evergreen huckleberry (V. ovatum), and red huckleberry (V. parvifolium).

Provided adequate moisture is available, seed germination and germinant survival are excellent on a wide range of materials. Seeds even germinate within cones still attached to a tree. Western hemlock germinates on both organic and mineral seedbeds. Decaying logs and rotten wood are often favorable seedbeds for western hemlock. Decayed wood provides adequate nutrition for survival and growth of seedlings. In brushy areas, seedlings commonly grow on rotten wood where there is minimum competition for moisture and nutrients. Seedlings established on such materials frequently survive in sufficient numbers to form a fully stocked stand by sending roots into the soil around or through a stump or log. Because western hemlock can thrive and regenerate on a diversity of seedbeds, natural regeneration can be obtained through various reproduction methods, ranging from single-tree selection to clearcutting. Through careful harvesting of old-growth stands, advance regeneration often results in adequately stocked to overstocked stands.

Western hemlock may form pure stands or be a component of mixed stands. Young stands vary in stocking, but understocking is infrequent. Natural 20-year-old stands can have 6,000 to 10,000 stems per acre. Stocking levels of 600 to 725 stems acre at crown closure are believed to provide the best yields if commercial thinnings are part of the management regime. If thinnings are not planned, stocking levels as low as 300 well-distributed trees per acre can provide maximum yields at rotation age.

Management Methods

The following descriptions should provide some general information about un-even and even aged methods, but it must be emphasized that actual cutting methods will have to remain flexible and be based on stand conditions.

Uneven-aged Methods

Uneven aged management silvicultural techniques are utilized to establish and maintain an uneven aged stand structure. Uneven aged management attributes include the establishment and/or maintenance of a multi-aged, balanced stand structure, promotion of growth on leave trees throughout a broad range of diameter classes, and encouragement of natural reproduction. Under uneven-aged management,

optimal stand structure is best represented by a negative exponential size distribution curve. This idealized stand would contain many small (young) trees and ingrowth (conifer seedlings), with progressively fewer trees in the larger (older) size classes. (It is important to note that many times, smaller understory trees are in fact old and suppressed, and not thrifty young trees). Given that most stands on the YIR are generally even aged, and that most timber is moderately shade tolerant Douglas-fir, this management method may have uncertain results with regard to regenerating these stands. Depending on stand conditions, in order to increase the opportunities for conifer regeneration, the most appropriate uneven aged prescription to apply would be group selection. This method creates openings in the stand usually no greater than two tree heights across (typically less than two acres in size).

The advantages of this method are:

(1) The regeneration of the small groups grow under even aged conditions which results in better stem form;

(2) The openings allow natural regeneration of shade intolerant Douglas-fir;

(3) Harvesting is more concentrated so logging costs are lower;

(4) Harvesting in groups lowers damage to residual stands;

(5) Intermediate cutting can be made less frequently without sacrificing diameter class distribution.

In general, these openings will be less than two acres in size, and usually less than 20% of the entire sale area. It should be noted that some treatments such as planting and manual removal of vegetation from the openings may be required if there is inadequate regeneration, excessive regeneration, or excessive colonization by non-coniferous vegetation. In some cases, these non- conifer plants may be considered desirable (bear grass, hazel nut, black berries, etc.), and conifer regeneration should be given a lower priority as identified in the specific prescription. In general though, management for non-conifer cultural plants should be done in separate areas away from areas designated for timber management. Some observers may not like the appearance of these cuts, and in fact may consider them small clearcuts. This silviculture is still considered an uneven aged method on a stand basis, although some planting and vegetation management may be necessary.

The layout of group selection cuts should be done very carefully in order to:

(1) Create natural appearing openings, and minimize visual impacts;

(2) Reduce the amount of roads;

(3) Minimize damage to regeneration in openings;

(4) Maximize the opportunities for conifer regeneration;

(5) Minimize, in certain sites/conditions the opportunities for hardwood and brush growth;

(6) Minimize damage to adjacent stand from falling;

(7) Minimize potential insect and disease entries into adjacent stands.

Single-tree selection can also be applied where group cuts are considered undesirable or silviculturally inappropriate. This system involves the removal of individual trees from a stand with the goal of

achieving an all-aged stand structure containing the best phenotypes. These stands could be typically treated with a sanitation cut or an overstory removal (selected overstory and poorly formed, suppressed, and dead and dying trees removed).

The advantages of this method are:

(1) Site protection is excellent, with minimal exposure to wind and erosion;

(2) Stands can be readily adapted to fluctuating market conditions;

(3) Fire is less likely to kill all trees as in an even aged stand;

(4) Habitat and aesthetic values are retained;

(5) Lower post- harvest costs;

(6) Less erosion (ignoring roads);

(7) Creates stand diversity.

Like group-selection, this method requires multiple entries, which in turn necessitates continuous road maintenance. Unlike group-selection, shade intolerant species (Douglas-fir is moderately shade tolerant), have a more difficult time regenerating (if at all) in the shady understory. This practice needs to be carefully evaluated over time to see if conifer regeneration is occurring. There is a potential to create sparse conifer overstory with a hardwood understory, which does not ensure future timber crops. For this reason, group selection should be favored over single tree selection if uneven-aged management is preferred.

As mentioned earlier, tribal goals and some allottees' goals may be in conflict with regard to cutting practices and harvest scheduling. Clearcutting, while not the preferred method to harvest timber, and is briefly described here.

Even-aged Methods

The clearcutting regeneration method involves the removal of a stand in one harvest. Regeneration after harvesting shall be obtained by direct seeding, planting, sprouting, or by natural seed fall. When practical, clearcuts shall be irregularly shaped and variable in size in order to mimic natural patterns and features found in landscapes. Clearcutting is one of several even age silvicultural systems that, if properly applied are very effective in regenerating Douglas-fir dominated stands. Typically, all trees are removed at once from a given area, which is then prepared for planting by either broadcast burning or piling and burning the logging slash. Natural regeneration can occur, but usually seedlings from appropriate seed stock are planted. Often, highly competitive vegetation such as ceanothus must be either manually removed, which can be quite expensive, or chemically treated with herbicides to ensure conifer survival and growth. Clearcutting allows the manager to completely replace the stand in situations where damage exists from insects, diseases, fire, or in decadent (over mature) stands. Improved genetic stock (i.e. disease resistance), or better adapted species can be re-introduced.

In addition to the obvious visual impacts of this practice, concerns about herbicide safety and erosion effects on fisheries are often raised. The system is highly economic, provided regeneration is successful, and does not require repeated costly follow-up treatments. In addition, road building and maintenance are minimized, which is often the single largest source of stream sediment from logging activities. Shade

intolerant species are favored, and, without transitional steps, future silviculture is generally limited to even-aged management.

Clearcutting is not the only effective even-aged system. The seed-tree and shelterwood methods provide means to regenerate even-aged stands by utilizing scattered leave trees for natural regeneration. These methods can be very successful, but require careful timing and skill on the part of the forester. Lack of natural regeneration and excessive competing vegetation can require planting and spraying herbicides to meet stocking. However, there has been success with this method on similar timber types on the Hoopa Reservation, without the use of herbicides. In addition, multiple entries are required to complete the process, and when natural regeneration is successful, thinning is usually required to avoid overstocking. Another advantage to these methods is that visual impacts are minimized until the first commercial entry of planted (or natural) trees, and old growth overstory can be retained for habitat and other values. Planting in a seed tree system also allows for the establishment of desirable species and requires fewer trees per acre compared to a clear cut.

The seed tree regeneration method involves the removal of a stand in one harvest except for well distributed seed trees of desired species which are left singly or in groups to restock the harvested area. The seed step is utilized to promote natural reproduction from seed and to initiate the establishment of an evenaged stand. The removal step may be utilized to remove the seed trees after a fully stocked stand of reproduction has become established. In order to maintain and improve tree species diversity, genetic material and seed production, trees of each native commercial species where present at the time of harvest shall be retained after harvest. These leave trees shall be representative of the best phenotypes available in the preharvest stand.

The shelterwood regeneration method reproduces a stand via a series of harvests (preparatory, seed, and removal). The preparatory step is utilized to improve the crown development, seed production capacity and wind firmness of designated seed trees. The seed step is utilized to promote natural reproduction from seed. The removal step is utilized when a fully stocked stand of reproduction has become established, and this step includes the removal of the protective overstory trees. The shelterwood regeneration method is normally utilized when some shade canopy is considered desirable for the establishment of regeneration.

Intermediate Treatments

Commercial thinning: The removal of trees in a young-growth stand to maintain or increase average stand diameter of the residual crop trees, promote timber growth, and/or improve forest health. The residual stand shall consist primarily of healthy and vigorous dominant and codominant trees from the preharvest stand. Generally stands will develop stand structures with considerably higher levels of basal area than provided in these minimum standards as stand age increases.

Sanitation-Salvage**:** Sanitation is the removal of insect attacked or diseased trees in order to maintain or improve the health of the stand. Salvage is the removal of only those trees which are dead, dying, or deteriorating, because of damage from fire, wind, insects, disease, flood, or other injurious agent. Salvage provides for the economic recovery of trees prior to a total loss of their wood product value. Sanitation and salvage may be combined into a single operation.

- Areas of timber devastated by fire, insects, disease, wind, flood, or other natural disasters may be salvage logged and this volume is not subject to limitations of the annual allowable cut (AAC). However, to maintain a sustainable harvest level the AAC should be recalculated and the FMP revised to reflect any significant changes in timber stocking caused by natural disasters.
- Prior to any salvage harvest, a re-stocking plan must be approved by the Forestry Department Director.
- No salvage logging is allowed in Streamside Management Zones unless needed for safety purposes or to protect life and or property.

Rehabilitation of Understocked Area Prescription**:** This prescription is used for the purposes of restoring and enhancing the productivity of commercial timberlands which are not currently stocked with conifers or on understocked timberlands where no countable conifer trees are to be harvested and the broadleaf species are not designated for management, the area shall be planted with conifers.

Silviculture Prescription Goals & Recommendations

- Herbicide use and broadcast fertilization are not desired management practices and are prohibited on Phase I lands.
- Uneven aged management is the preferred management regime on timberlands.
- Selection is the most likely uneven-aged management system to be employed. Group selection is likely to apply in only a few situations.
- Group selection areas will generally be no larger than 2 acres in size and will usually cover no more than 20% of the harvest unit during any one harvest entry.
- Commercial thinning shall be used in younger stands to develop an uneven-aged structure for future management
- Stands that are not suitable for uneven-aged management may be treated with even-aged prescriptions, except on Phase I lands. For instance, stands with a high hardwood-to-conifer ratio or stands with currently low conifer stocking may lend themselves to even-aged management.
- Under even-aged management, seed tree or shelterwood prescriptions may generally be employed in lieu of clearcutting
- At a minimum, 1 >36” diameter sound green conifer and 2 of the largest hardwood trees per acre must be retained in even-aged harvest units.
- Large diameter, >16” DBH, acorn producing tanoaks that are not severely damaged during harvest activities may be retained.
- Even-aged units should be limited in size to 20 acres or less. Acreage limit may be exceeded due to stand configuration, logging system constraints, specific economic constraints, or to meet cultural needs.
- All regeneration harvest (e.g. any even-aged management, and all group selection) shall ensure that conifer crop trees (whether planted or residual) are maintained in a free to grow condition.

- All harvest shall be conducted such that the proportion of conifers to hardwoods is maintained or increased through a combination of residual stocking control and/or planting of conifers.
- Residual conifer and/or planted conifer stock shall be comprised of currently healthy conifers that shall be maintained in a free to grow condition.
- Appraisals for all timber sales and harvest units must allow for silvicultural treatments that are needed to maintain active management for commercial timber (e.g., hardwood removal, brush control, tree planting, precommercial thinning).
- Stocking surveys and regeneration surveys should be conducted in all harvest units at least at two and five years after harvest. Informal walk-through may suffice to evaluate stocking, but formal plot installation should be used for accurate evaluation.

General Silvicultural Recommendations by Timber Type

The Yurok Tribe's timber types were classified using the California Wildlife Habitat Relationship (CWHR) classification system. Vegetation/timber/land classification types within the Tribe's land holdings consists of the following types: annual grasslands, barren, coastal oak woodlands, coastal scrub, Douglas-Fir, Jeffrey Pine, Klamath mixed conifer, lacustrine, mixed chaparral, montane chaparral, montane hardwood, montane hardwood-conifer, montane riparian, pasture, redwood, Sierran mixed conifer, and urban. All the timber types except type I are composed of the Douglas-Fir, Jeffrey Pine, Klamath mixed conifer, redwood, and Sierran mixed conifer CWHR types. Lacustrine and urban land classes were not classified as timber types. Data is lacking or in differing formats for some types, and so, like all projects, cutting methods will have to be prescribed on a project by project basis. Given the stated goals of the Tribe, general silvicultural recommendations for each timber type are described below.

Timber Type I (Hardwoods/Suppressed Conifers): These lands include the following CWHR types: annual grasslands, barren, coastal oak woodlands, coastal scrub, mixed chaparral, montane chaparral, montane hardwood, montane hardwood-conifer, montane riparian, and pasture. Canopy density and DBH range were not determined for this timber type. These stands need stand exams in order to identify any areas that might contain suppressed conifer understories. Otherwise they should be managed for habitat, commercial firewood harvest, Tribal fuelwood areas, culturally significant species/areas, diversity, aesthetics and recreational values.

Timber Type II (Plantations): These timber types are classified as areas that were clear cutting sites. The density and DBH range for these areas were not determined. These stands need prompt stocking control and conifer release (pre-commercial thinning, manual removal of competing vegetation). These stands are critical to the future stand structure of the YIR, and early management investments are highly recommended.

Timber Type III (Small Partially Stocked Sawtimber): The canopy density of these stands ranges between 10% and 39% canopy closure and the DBH ranges between 11 to 24 inches. These stands

contain reasonable conifer stocking and growth, but more information is needed to determine appropriate silviculture to promote appropriate stocking levels.

Timber Type IV (Small Moderately Stocked Sawtimber): The canopy density of these stands ranges between 40% and 59% canopy closure and the DBH ranges between 11 to 24 inches. These stands could be commercially thinned depending on individual stand attributes. Growth in these stands does not appear suppressed (growth rates considered reasonable at four (4) percent). These stands represent the next medium sawtimber size class, and are very important to achieving a future sustainable flow of timber.

Timber Type V (Small Densely Stocked Sawtimber): The canopy density of these stands ranges between 60% and 100% canopy closure and the DBH ranges between 11 to 24 inches. These stands need thinning in order to promote forest health and habitat values. Co-dominants need to be released and dead/suppressed trees need to be removed to reduce fire risk and increase understory diversity.

Timber Type VI (Large Partially Stocked Sawtimber): The canopy density of these stands ranges between 10% and 39% canopy closure and the DBH ranges are greater than 24 inches, however, more data is needed in these stands to prescribe silviculture. Depending on regeneration amounts, some thinning from below may be indicated or a sanitation/salvage. It is most likely that these stands would be best treated with seed tree cuts, followed by site preparation and planting.

Timber Type VII (Large Moderately Stocked Sawtimber): The canopy density of these stands ranges between 40% and 59% canopy closure and the DBH ranges are greater than 24 inches. These stands have the highest priority for harvesting with an emphasis on establishing and controlling conifer stocking. Depending on stand conditions, group cuts, single-tree selection, or seed tree/shelterwood could be appropriate in these stands.

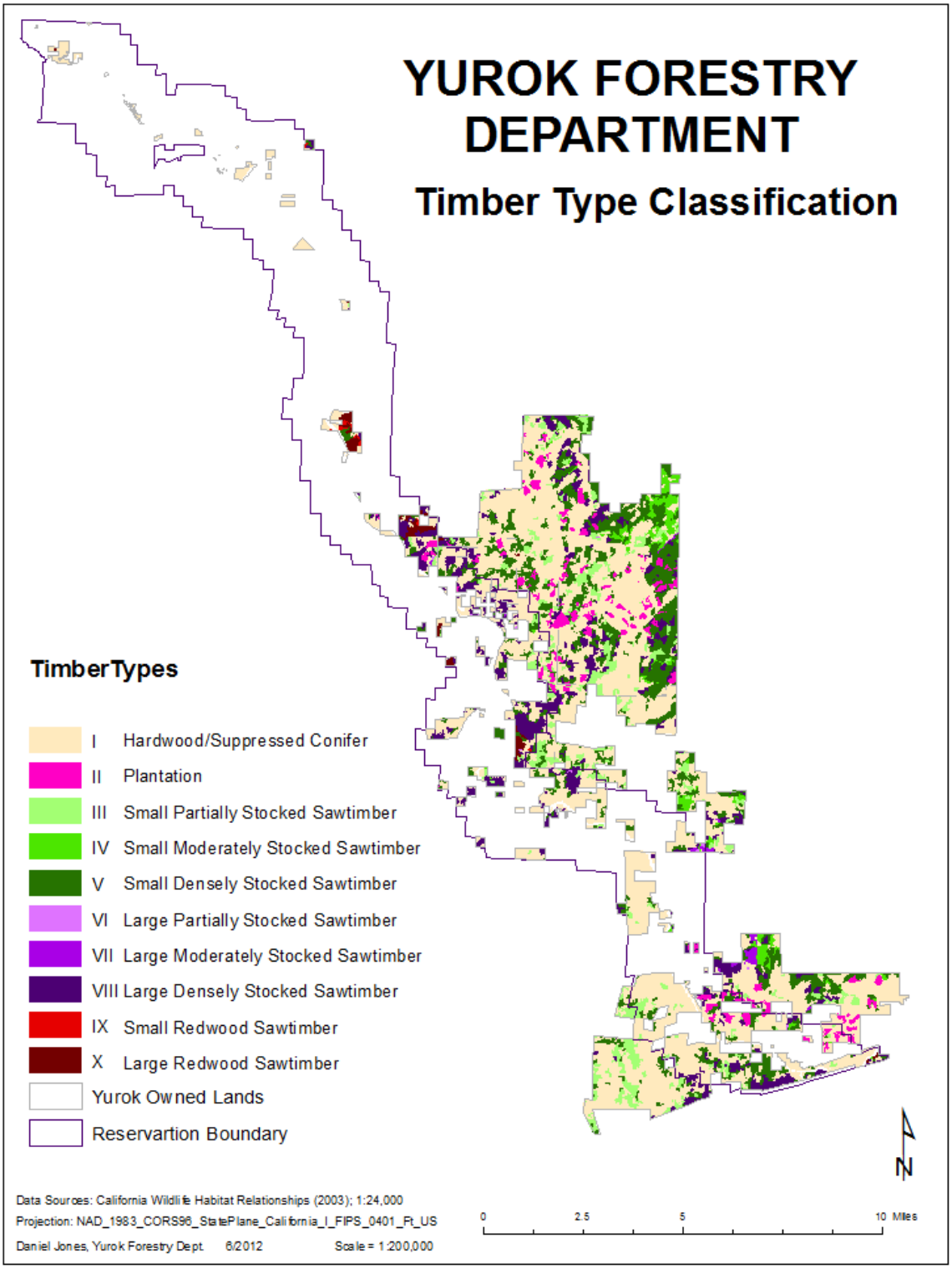
Timber Type VIII (Large Densely Stocked Sawtimber): The canopy density of these stands ranges between 60% and 100% canopy closure and the DBH ranges are greater than 24 inches. Management of these stands should emphasize the identification of habitat and biodiversity values and, if appropriate, early management for timber production. Depending on stand conditions, carefully planned group selection or individual tree selection cuts could be applied, with special attention given to road location. Depending on stand health, sanitation/overstory removal approaches may also be appropriate. Some stands that show a high degree of rot or other disease should be considered for clear cutting at the time of harvest.

Timber Type IX (Small Redwood Sawtimber) and Timber Type X (Large Redwood Sawtimber): The canopy density of these stands ranges between 60% and 100% canopy closure and the DBH ranges are between 11 and 24 inches and greater than 24 inches, respectively. Depending on stand conditions and habitat issues, these stands could have the larger overstory trees selectively harvested (thinned from above) and, depending on access, managed fairly intensively.

Table 4 illustrates the ten timber types, canopy density, DBH range, and their acreages within Yurok land holdings. The subcategory acreage was included in the timber type acreage.

Table 4: Land Classification by Timber Type for the YISYL

Yurok Indian Sustained Yield Lands Classification by Timber Type				
Timber Type	Timber Type Description	DBH Range	% Canopy Closure Range	Acres
	Urban/Lacustrine	Not Applicable	Not Applicable	442
I	Hardwood/Suppressed Conifer	Not Determined	Not Determined	20,846
II	Plantation	Not Determined	Not Determined	1,495
III	Small Partially Stocked Sawtimber	11 - 24 inches	10% - 39%	2,658
IV	Small Moderately Stocked Sawtimber	11 - 24 inches	40% - 59%	823
V	Small Densely Stocked Sawtimber	11 - 24 inches	60% - 100%	6,555
VI	Large Partially Stocked Sawtimber	> 24 inches	10% - 39%	41
VII	Large Moderately Stocked Sawtimber	> 24 inches	40% - 59%	154
VIII	Large Densely Stocked Sawtimber	> 24 inches	60% - 100%	3,447
IX	Small Redwood Sawtimber	11 - 24 inches	60% - 100%	52
X	Large Redwood Sawtimber	> 24 inches	60% - 100%	382
			Total Acres =	36,895
		Subcategories		
III	Small Partially Stocked Pole-timber	6 - 11 inches	10% - 39%	68
IV	Small Medium Stocked Pole-timber	6 - 11 inches	40% - 59%	124
V	Small Densely Stocked Pole-timber	6 - 11 inches	60% - 100%	2,188
X	Large Redwood Partially Stocked	> 24 inches	10% - 39%	1
X	Large Redwood Moderately Stocked	> 24 inches	40% - 59%	3



Map 6: Timber Type Classification

Harvest Policy

All timber harvesting on both tribal and allotted lands must comply with the standards and practices described in 53 BIAM Supp. 3, PL 101-630, 25 CFR 163, the PRO Logging Practices (see Appendix), the FMP, and USF&WS guidelines. In addition harvesting practices should also comply with recommendations as part of the environmental assessment process such at the fisheries recommendations, cultural concerns and endangered species consultations. The choice of optimum timber management policy is highly dependent on the objectives of the Tribe. A desire for both short and long-term economic benefits must be weighed against desires for multiple use and protection of other resources such as cultural sites and lands, aesthetic values, watershed protection and habitat conservation. In addition, the BIA is required by Congress to manage tribal forests on a long-term sustainable basis. The calculated allowable cuts for each alternative can be reached in the first year or the tenth year of the 10-year management plan horizon. This distribution of harvesting over time (the harvest schedule) is left to the discretion of the Tribal Council, and allows for the capture of strong timber markets and avoidance of weak ones. Discussions with the Tribal Council and a review of the questionnaire survey data indicate that the Tribe would like to emphasize uneven-aged harvesting methods, but will allow limited clearcutting. Some allottees do not want their "hands tied" in terms of harvest methods and timber volume removed. The harvest policy must therefore provide for an equitable mixture of allotment and tribal land harvest projects, while not precluding projects between ownerships. Although separated here for the purpose of discussion, it is important to note that the allowable cut is based on all lands combined however different land units have differing AAC targets. As long as the AAC for the differing units (i.e. trust lands vs. Phase I SYU) is not exceeded, the Tribe will determine where that cut will come from.

Future forest product sales will be identified and mapped to satisfy the AAC for the entire operational management period. The specifications of sales will comply with FMP management objectives. Market buffers (deviations in the AAC from year to year) will be identified for optimum harvest in times of good markets and minimum harvest during poor markets.

Harvesting of SYU restricted fee lands outside of the Reservation boundary will require the approval harvest from Cal Fire. This State agency is the responsible lead agency for the State Forest Practice Program. Consulting agencies also involved in review of a state timber harvest plan (THP) include the Department of Fish & Game, Regional Water Board, and the California Geological Society. The THP is the environmental review documents submitted by landowners to Cal Fire outlining what timber he or she wants to harvest, how it will be harvested, and the steps that will be taken to prevent damage to the environment. Any THP submitted has to be prepared by a Registered Professional Forester (RPF) and comply with the California Forest Practice Act. In addition any and all timber operations under a THP have to be conducted by a Licensed Timber Operator (LTO). License Timber Operators are persons who have been licensed under the Forest Practice Act law and are authorized to conduct forest tree cutting and removal operations. LTOs must understand and comply with all laws relating to such tree cutting or removal.

Indicated Allowable Cut

AAC is the target annual harvest level specified by the plan. The determination of AAC is the result of either the scientific calculation of Indicated Annual Cut (IAC) under the Tribe's preferred management alternative documented and approved in the land management plan. Actual volume harvested in any one year may exceed the AAC but in other years harvest levels may not meet the AAC. The Government Performance Results Act provides for that the AAC be achieved each year. Between inventory/analysis periods should be considered "planning periods" and the Unit should meet the cumulative AAC for the planning period. The Forest Inventory Data Summary completed in January of 2010, by the BIA's Branch of Forest Resources Planning, using forest vegetation simulator (FVS) software is the current standard. This analysis is based upon timber stand information that was compiled as part of the BIA's CFI cruise that was performed in 2007. With this data three IAC calculations and associated management considerations were developed for Trust and Allotment and Restricted Lands. The ACC from the previous forest management plan was 2.0 MMBF. Due to poor log markets and other unforeseen factors not all of this ACC was met, creating a backlog. The new AAC was determined for the new 10 year operational planning process. The unharvested portion of the cumulative AAC becomes part of the stocking that contributed to the newly calculated IAC.

Ten Year Timber Sales 2012 to 2022

Ten year sale planning units were determined and the overall units were mapped. These sales are primarily located on Trust lands with a minor amount on allotments. In addition sales were identified for the Phase I lands that are excluded from the carbon project. The Joe Bear and Essenprise sales are currently in the planning preparation and assessment phase. It is anticipated that the sales will be going out to bid during the summer of 2012.

Table 5: Ten Year Harvest Outlook for Tribal Lands

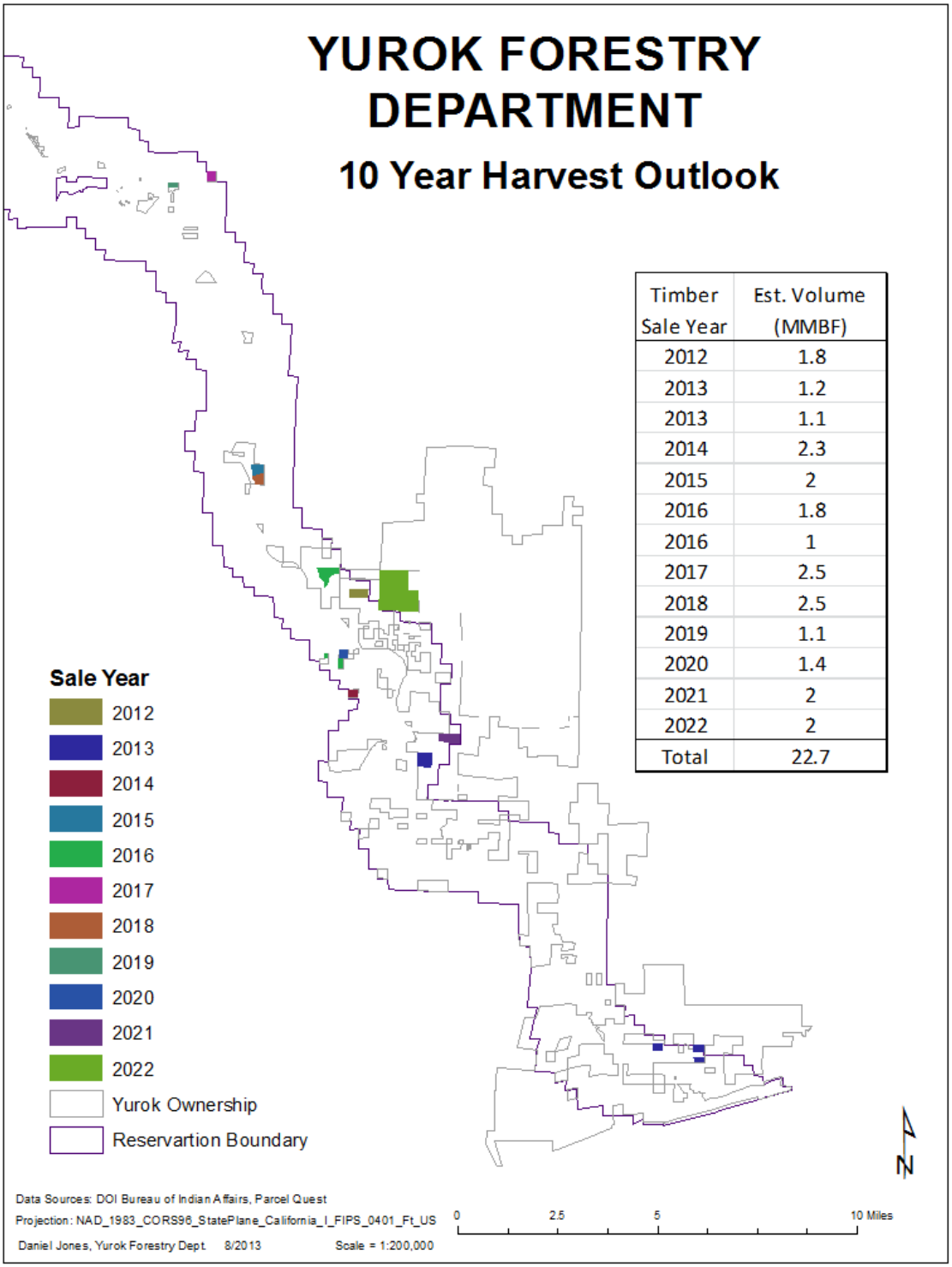
	Acres	Sale Name	Estimated Volume (MMBF)	Land Classification
2012	70	Joe Bear	1.8	Trust
2013	55	Essenprise/Angel	1.2	Trust
2013	26	Cappell "C"	1.1	Trust
2014	40	Johnson 40	2.3	Trust
2015	35	Blue Creek	2	Trust
2016	30	Johnson 30	1.8	Trust
2016	80	Phase I West	1	Fee
2017	40	Starwein North	2.5	Trust
2018	40	Blue Creek	2.5	Trust
2019	25	Scaath	1.1	Trust
2020	45	Bear Creek Final	1.4	Trust
2021	20	Cappell "D"	2	Trust
2022	125	Phase I Thin	2	Fee
Totals	**631**		**22.7**	

Table 6: Ten Year Annual Allowable Cut Forecast

Annual Allowable Cut by Land Class (MMBF)						
Year	Trust	Allotment	Phase I Fee	Phase I Carbon	CKGG Carbon	AAC
2012	1.8	0	0	0	0	1.8
2013	1.8	0.3	0.5	0	0	2.6
2014	2.15	1.4	0.5	4	0.75	8.8
2015	2.15	1.4	0.5	4	0.75	8.8
2016	2.15	1.4	0.5	4	0.75	8.8
2017	2.15	1.4	0.5	4	0.75	8.8
2018	2.15	1.4	0.5	4	0.75	8.8
2019	2.15	1.4	0.5	4	0.75	8.8
2020	2.15	1.4	0.5	4	0.75	8.8
2021	2.15	1.4	0.5	4	0.75	8.8
2022	2.15	1.4	0.5	4	0.75	8.8
Total	**22.95**	**12.9**	**5**	**36**	**6.75**	**83.6**

For each of the land classes shown in Table 6 the annual allowable cut has been determined. The amount shown is the total harvestable board feet, shown as million board feet, of timber that is the target to be removed for each land class. In order to maintain the current growing stock within each land class, timber should not be removed from one class to make up a deficit harvest within an adjacent class. The AAC shown for each land classification is based on annual growth information and determined for the gross acres within each category. In addition in order to derive the net harvest amount, areas that are precluded for harvesting, such as watercourse protection zones, have been deducted from the AAC.

It is important to distinguish between the “Phase I Fee” and “Phase I Carbon” units (refer to Map 18: Sustainable Forest Carbon Project Location). While all of Phase I is fee land in a restricted SYU, “Phase I Fee” and “Phase I Carbon” have different harvesting targets. Harvest planning units for the Phase I Carbon and CKGG Carbon SYUs have not been delineated as of yet.



Timber Sale Year	Est. Volume (MMBF)
2012	1.8
2013	1.2
2013	1.1
2014	2.3
2015	2
2016	1.8
2016	1
2017	2.5
2018	2.5
2019	1.1
2020	1.4
2021	2
2022	2
Total	22.7

Map 7: Ten Year Harvest Outlook for Tribal Lands

Timber sales may be possible with the carbon project sale areas provided that the carbon baseline is not reduced below the minimum. The following table reflects the amount of timber that may be available for harvest once the carbon credits have been sold and the baseline is established.

Table 7: Ten Year Sustainable Harvest Forecast within the Carbon Project Areas

Planning Year	Phase I Carbon Area (MMBF)	CKGG Harvest (MMBF)	Annual Harvest (MMBF)
2012	0	0	0
2013	0	0	0
2014	4	0.75	4.75
2015	4	0.75	4.75
2016	4	0.75	4.75
2017	4	0.75	4.75
2018	4	0.75	4.75
2019	4	0.75	4.75
2020	4	0.75	4.75
2021	4	0.75	4.75
2022	4	0.75	4.75
Total	**36**	**6**	**42**

Timber Sale Layout on Trust Lands

Once the Environmental Assessment (EA) has been prepared for a specific timber sale, the steps to perform a timber sale are suggested here.

(1) Based on the plan, the Tribal Forestry Department proposes a timber sale to the Tribal Council.
(2) Identify the sale area boundaries using maps and aerial photography.
(3) Perform field reconnaissance - identify and flag roads, landings, main skid trails, special treatment areas, streams, crossings, sale, and YIR boundaries.
(4) Identify in the field, stand composition, landslides and erosion areas, under stocked areas, areas in need of release or pre-commercial thinning.
(5) Prepare a Timber Sale Map.
(6) Develop marking/Prescription guidelines.
(7) Inventory designated forest products to meet Regional standard.
(8) Perform stand exam, estimate volume marked using appropriate methods.
(9) Layout and flag any new road construction.
(10) Secure any right-of-ways needed.
(11) Present to Tribal Council for Approval.
(12) Present to BIA for approval.
(13) BIA consults with State if appropriate.

(14) Send a prospectus and sample contract to potential bidders.
(15) Award of contract by BIA.
(16) Administer contract - check scale, remark when needed, monitor operations, etc.
(17) Flag all areas requiring planting or other treatments.
(18) Proceed with any forest improvement work immediately after harvesting.
(19) Perform reforestation if required.
(20) Perform 5-year post-harvest inspection.

Timber sale layout on Fee lands may require the preparation of a Timber Harvest Plan (THP) and/or consultation with Cal Fire.

Forest Development

53 IAM 5-H defines forest development (FD) as "...that segment of the Forestry Program that addresses the improvement of the commercial forest resource", and 25 CFR§163.32 describes FD as "…land management activities undertaken to improve the sustainable productivity of commercial Indian forest land. The program shall consist of reforestation, timber stand improvement projects, and related investments to enhance productivity of commercial forest land…" The logging history (including the absence of logging) on Tribal lands has resulted in a mixture of large sawtimber and small sawtimber stands. Opportunities for forest development activities are concentrated in stand types II (plantations), and V (large sparsely stocked sawtimber).

Hardwood stands need to be examined to see if there are culturally significant species present, and also whether conifer stocking is present that could be improved through the removal of hardwoods and brush and then interplanting. If a hardwood stand transformed into a commercially viable conifer stand then a modification to the BIA's catalog of forest acres will be made. Portions of these stands may have supported commercial conifer growth at one time, but were not regenerated adequately following past logging, or were converted to hardwoods through the historic use of fire. Because tanoak is often present in Douglas-fir stands prior to harvesting, without rigorous vegetation control, logging often results in heavy tanoak colonization. Douglas-fir can reclaim the site after many years, provided there are no fires. However, improving these stands by providing increased stocking of commercially viable species could provide a substantial cost/benefit ratio. Forest development planning will consider stands with high benefits and low costs for conversion. Alternatively, unless an area is of particular importance for timber production, or conifer stocking could be quickly and reliably increased, these stands should be of a lower priority to treat. There are approximately 860 acres of hardwoods present on all trust lands.

<u>Backlog, Accrual, and Accomplishments</u>

Plantation sized stands, such as the 30 acre Salmon fire area which was seeded, need to be examined to determine stocking levels and growing conditions. These areas may require replanting, release treatments, or thinning. Release treatments should be done by manual means in order to comply with tribal concerns regarding herbicide use. There are approximately 60 acres of plantation sized trees

mapped on all tribal trust lands. These areas need to be visited in order to confirm their existence and to determine their condition.

Understory portions of sparse large sawlog stands contain brush, and/or conifer regeneration. This stand type needs to be examined in order to determine what treatments are required to increase conifer regeneration stocking and growth. Like the hardwood stands, conifers in the understory will eventually overtop the hardwood component, but with a codominant lengthening of rotation age. These stands may offer a view as to how more dense large sawtimber stands may respond to selection harvesting. There are 223 acres of this stand type on all tribal trust lands.

Funding priorities for all projects will be determined through benefit/cost analysis (53 IAM 5-H, 25 CFR§163.32).

In general, all forest development projects should follow these suggested principles:

(1) One year prior to reforestation, schedule the area for any needed salvage work. Scheduled thinning and salvage should be performed simultaneously.
(2) Identify areas needing reforestation, pre-commercial thinning, etc. during timber sale preparation and treat areas immediately after logging is completed.
(3) Coordinate seed collection with timber sale operations if harvested trees are of high enough quality to be used as seed sources.
(4) Scheduled inspection of all sale areas for 5 years should occur after logging to identify salvage, erosion protection, and/or reforestation needs and accomplishments of FD should be reported.
(5) Scheduled inspection and collect data on all project areas for 5 years after initial work is completed. Follow-up treatment as necessary and accomplishments of FD should be reported.

Reforestation

Reforestation is the reestablishment of forest cover either naturally (by natural seeding, stump or root sprouts) or artificially (by direct seeding or planting). Reforestation usually maintains the same forest type and is done promptly after the previous stand or forest was removed

Specific reforestation procedures can be found in 53 BIAM 5-H chapter 5 and chapter 9. In general, reforestation of understocked areas should be accomplished by the following suggested steps.

<u>Project Layout</u>

(1) Identify project area on an aerial photo.

(2) Flag project area on the ground.

(3) Flag buffer zones around streams and springs for heavy equipment exclusion.

(4) Flag exclusion areas that are well stocked or need protection from site prep.

(5) Flag inaccessible, steep or rocky areas that will not be practical to treat.

(6) Map project area boundaries.

(7) Supervise site preparation treatments.

(8) Inspect planting methods.

(9) Inspect planted areas annually, taking a representative sample, identifying mortality rates by cause.

Site Preparation

Site Preparation means any activity involving mechanical disturbance of soils and/or vegetation or burning of vegetation which is performed during or after completion of timber harvesting and is associated with preparation of any portion of a logging area for artificial or natural regeneration.

(1) Type and intensity of preparation will depend on amount of residue present, site quality, slope, and silviculture proposed.

(2) If slopes are less than 30%, brush and debris should be cleared with a D-6 or D-7 tractor equipped with a brush rake.

(3) Rake shallowly, leaving as much fine organic matter on the site as possible.

(4) Avoid damage to established reproduction.

(5) Pile and burn raked material.

(6) If slopes are greater than 30%, broadcast burn planting area.

(7) Avoid flagged exclusion zones.

Planting

(1) Depending on site and survival rates, using a shovel, planting auger, planting bar or hoedad, plant at an 8' X 8' spacing (increase spacing if survival is high).

(2) Plant 1-0 plug, redwood and/or Douglas-fir seedlings from Seed Zones 092, 303 and 312.

(3) Plant in the spring taking advantage of appropriate environmental conditions to ensure survivability.

(4) Apply VEXAR tubes in areas heavily used by animals or if needed to reduce browse damage.

(5) Avoid planting on skid roads and landings unless ripped first.

(6) Follow BIA/state guidelines as applicable.

<u>Follow-up treatments</u>

(1) Work-up survival rates after the second growing season.

(2) Identify areas with excessive mortality.

(3) Apply treatments to reduce mortality (fencing, shade cards etc.)

(4) Replant as necessary.

(5) Identify areas with vegetation competition and apply 5' radius manual release.

Pre-commercial Thinning

A pre-commercial thinning is a cultural treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality. Specific thinning procedures can be found in 53 BIAM 9-H. In general, thinning of overstocked pre-commercial stands should be accomplished by the following suggested steps.

Thinning Project Layout

(1) Identify project areas on resource aerial photography.
(2) Flag project area on the ground.
(3) Map project area, determining acreages.
(4) Appropriately designate to ensure crop trees are retained with minimal damage.
(5) Leave tree spacing will be based on basal area and trees per acre.
(6) Leave trees should be thrifty dominants or codominants, without significant insect, disease of mechanical damage.
(7) Leave at least three snags per acre for wildlife.

Thinning Project Tasks

(1) Cut all designated trees, being careful not to damage leave trees.
(2) Lop and scatter all slash to within 24" of the ground.
(3) Or pile and burn all slash.
(4) Thoroughly explore all markets for merchantability of thinned material.

Follow-up treatments

(1) Inspect thinned units for mortality or pest activity.
(2) Increment bore leave stand after 5 years to estimate release effect for impacts to overall growth and yield estimates.
(3) Determine needs for additional slash treatments.

Annousus Root Disease

Annousus root disease infestation is characterized by group killing, with the oldest mortality at the center and the most recent dead and dying trees at the margin. Such disease centers usually develop around infected stumps. Infected trees may also be infested with bark beetles. Crowns of living, infected trees are chlorotic and thin. Symptoms are usually expressed from the bottom and inside of the

Figure 11: Infected Stump with Annosus Root Rot

crown up and outward. Trees usually are stunted or exhibit reduced growth, especially in the terminal shoots. Shortened needles and "lion's-tailing" (needles only retained at the tip of the branch shoots) may also be present. The roots and root collar have several symptoms:

- Easy separation of bark and wood
- A streaking of the wood surface with darker brown lines
- Small silver to white flecks on the surface of the inner bark
- Heavy resin accumulation in the wood of pines is common

Wood decayed by H. annosum is straw yellow, stringy or laminated, and may have small black flecks.

The fungus can be readily identified in the field if fruiting bodies are present in or on infected trees or stumps. Conks (fruiting bodies) on standing trees are occasionally located in the duff layer at the base of the tree. More commonly, conks can be found in internal cavities of old decayed stumps. Conks are variable in size and shape and have a light gray to brown upper surface and a creamy white to light brown lower pore surface. Tiny conks (called "popcorn conks") can sometimes be found growing under bark or on roots of infected trees. These are sometimes easily found by pulling up dead seedlings near decayed stumps and inspecting the roots.

Invasion of freshly cut stump surfaces by germinating spores is a critical stage in the disease cycle. Conks produce spores which disseminate throughout the year, but H. annosum is dependent on favorable environmental conditions for successful germination and establishment. Spores are inactivated by ambient temperatures of 113 F (45.0 C) and mycelium in wood is killed after exposure for one hour at 104 F (40.0 C). In eastside pine on the Lassen National Forest, lethal temperatures reach above 40.0C in the top 6 inches of 6-inch diameter stumps when exposed to direct sunlight for several days in the average summer. Temperatures do not approach the lethal range in larger size classes of stumps.

Soil data in and around the Yurok Reservation is generally lacking however, the mean annual air temperatures for the Burroin and Tulleycreek soil series (two major series in the area) ranges from 50 to 59 F. It is unlikely that temperatures ever reach into lethal ranges except in rare heat wave events.

Stumps are susceptible to infection immediately after cutting. Ponderosa pine, Douglas-fir, and coast redwood stumps remain susceptible to infection for 2 to 4 weeks. The decrease in susceptibility with time is probably a result of colonization of the stumps by microorganisms that compete with and replace H. annosum.

Figure 12: Annosus Root Rot Fruiting Bodies

The goal of annosus root disease management is to reduce resource losses to levels which are economically, aesthetically, and environmentally acceptable when measured against the objectives of the resource manager. It is possible to reduce the impact of annosus root disease through detection, evaluation, prevention, and suppression. These activities must progress in a planned, timely sequence for successful reduction of annosus root disease impacts. Detection and evaluation in individual stands are normally

necessary before undertaking prevention and suppression action. In developed recreation sites, early recognition and removal of hazardous annosus-infected trees is critical, and will greatly improve chances of preventing future damage with minimal site deterioration. Prevention is the most desirable means of reducing losses. Undertake suppression activities only when needed to supplement prevention measures.

Management Strategies

Currently there are two different products that can be used to treat cut stumps, Sporax and Cellu-Treat.

It has been established that the fungus, Heterobasidion annosum, often infects cut conifer stumps following thinning or cutting operations, and that the disease can spread from infected stumps to residual trees in the stand. Several chemical agents have been used to limit the development of annosus root disease. Research has shown that Borax prevents establishment and growth of annosus in cut stumps of conifer tree species not already infected.

Before using Sporax for stump treatment control of annosus infection, contact Local, State or Federal Forestry or plant pathology specialists to verify the most economical and efficient methods and materials for your situation. Use Sporax for this purpose includes all conifer tree species occurring in the stand being treated. It should be applied to stump surface of the cut tree as soon after felling as is practical. For most efficient use apply immediately after cutting, but avoid delaying treatment more than one day.

The best method of application is to sprinkle the material "san-shaker style on the freshly cut stump surface. Complete coverage, including exposed side areas and any splinters, is necessary. Also level rather than sloping stump surfaces are preferred, especially in areas of high rainfall. "Shaker-top" applicators are available in most farm and garden shops in one or two pound sizes. Apply enough Sporax to lightly cover entire stump surface. At proper rates of application, one pound of this product will adequately cover 50 square feet of stump surfaces; that is, 260 six-inch stumps, 158 eight-inch stumps, 80 ten inch stumps, or 60 twelve-inch stumps. When dry method is used, moisture in the exposed wood from freshly cut stumps, dew or rain, will dissolve the product and leach it into the wood. Treat all freshly cut stumps in sale areas with Sporax.® (sodium tetraborate decahydrate, EPA Reg. No. 2935-501; see FSM 2303.14 R-5 Supp. 230092-1, 06/92 and FSH 3409.11.62.2.9 R5 Supp. 3409.11-94-1, 5/94).

CELLU-TREAT kills and prevents Fommes. It is a soluble borate powder that can be sprayed on using a simple backpack sprayer or applied during harvest with a stump spray bar. One pound of Cellu-Treat makes 2 gallons of solution and covers 400 sq. ft. (2,000 six-inch stumps or 480 twelve-inch stumps).

Dilute Cellu-Treat to a 5% active solution by thoroughly mixing 1/2 pound Cellu-Treat per gallon of water. Using a mechanical harvester, back-pack sprayer, or hand-held sprayer apply the solution to the surfaces of freshly cut stumps immediately or within 3 days of felling. Apply to the point of wetness. A rate of one gallon solution per four hundred (400) square feet of stump surface area will treat 400 to 2,000 stumps, depending on stump size. Marker dye may be added to the solution as a visual treatment aid.

Figure 13: Borax Treated Stump

The borax product Cellu-Treat (EPA# 64405-8) has been actively registered in California for a couple of years. This is an alternative to Sporax, a product widely available here in California. Cellu-Treat is a formulation of borax that can be dissolved in water and applied as a spray solution to the cut stump. Obviously this has utility in harvest areas where mechanical equipment is used as often the stumps are rather chewed up and make the application of the granular Sporax material problematic. Cellu-Treat is not a replacement for Sporax in all cases, nor does it come free of issues. Since it is applied as a spray, there are drift issues that must be considered. The personal protective equipment used are similar to those worn with Sporax, including eye protection and waterproof gloves. The difference is that coveralls are not required with Cellu-Treat. The national risk assessment does not include Cellu-Treat or the liquid application method.

Stocking Sampling Procedures

The procedures outlined below should be adhered to when sampling for stocking. More than one procedure for sampling may be used on plans where more than one regeneration method or intermediate treatment is used in the timber operations.

<u>The sampling procedures are divided into the following categories</u>

(a) Basal Area Stocking Sampling Procedure: This procedure shall be used where it is necessary to determine whether the specific basal area standards for such situations as the selection and shelterwood (preparatory steps) regeneration methods and commercial thinning intermediate treatment have been met.

(b) Point Count Stocking Sampling Procedure: This procedure shall be used where it is necessary to determine whether specific point count standards must be met. For example, the procedure can be used for the clearcut and seed tree regeneration methods.

(c) Combination Stocking Sampling Procedure: This procedure shall be used where stocking standards can be met using either basal area or point count, such as for the sanitation-salvage intermediate treatment, alternative prescriptions, or where exceptions to the stocking standards have been provided for in the rules and are specified in the plan.

(d) Waiver Request Procedure: This procedure may be used to request from Cal Fire a waiver of sampling procedures provided in 14 CCR 1072 (a), (b), or (c) where, based upon an RPF's, an RPF supervised designee's, or owner of timberland's inspection, he/she has determined that the stocking requirements of the Act and rules have obviously been met.

For all lands within the YISYL, the Tribe intends to meet these afore mentioned standards, however, the Tribe may or may not consult with Cal Fire for a waiver for any of the non-Phase I lands. The BIA will maintain records and consult as appropriate.

Number of Plots Required

There shall be at least one plot per acre, with a minimum of 20 plots, for each timber operating area sampled. The timber owner or his/her agent is encouraged, in lieu of sampling the entire logged area or area being sampled, to delineate by ocular estimate the least stocked 40 acres (16.187 ha) of the logged area or area being sampled and sample this area to determine if it is acceptably stocked. If the least stocked area sampled is determined to be acceptably stocked in accordance with these regulations, the entire logged area, or area being sampled, shall be assumed to be acceptably stocked. If the area sampled is not acceptably stocked the area sampled shall be regenerated to bring it into conformance and the remainder of the logged area shall be sampled, or the next least stocked 40 acres (16.187 ha) shall be sampled to determine whether the rest of the logged area is acceptably stocked.

Plot Layout

Plots shall be placed on the area being sampled in a uniform grid. The grid shall be considered uniform if the distance between lines does not exceed by two and one half times the distance between plots on the lines.

The starting point of each plot line shall be referenced to a survey corner if convenient or to a suitable, readily locatable permanent landmark and shall be indicated in the Report of Stocking and flagged in the field. The compass bearings shall be recorded in the Report of Stocking.

Equipment

The following equipment and methods for measuring distance are acceptable when basal area, point count, or combination stocking sampling procedures are used. Hand compass and pacing may be used for locating plot centers. A measuring tape or other calibrated measuring device shall be used for determining the radius of plots. For basal area and combination stocking sample procedures, an angle-gauge, wedge prism, to determine basal area will normally be needed.

Exclusions

Roads and landings that will not be regenerated, meadows, wet areas, rocky areas, and areas not normally bearing timber shall not be used as plot centers for sampling purposes. Stream protection zones may be excluded from the sample where stocking cannot be achieved due to legal restrictions on regenerating the zone and it is explained in the stocking report. Notwithstanding the provisions of 14 CCR 1072.2, a random right/left offset from the plot center may be used. Alternatively the plot may be treated as an unstocked plot for purposes of determining acceptable stocking. The reason for the offset shall be stated in the stocking report.

Offsets shall be in one-half chain (33 ft. or 10.06m) intervals at a right angle to the plot line with a maximum distance of 1.5 chains (99 ft. or 30.19m) allowed. The direction and distance of the offset, if any, shall be note on the plot sheet.

Basal Area Stocking Sampling Procedure

The following procedure shall be used to determine if these stocking standards have been met: One or more basal area factors suitable for determining stocking shall be used. The same basal area factor shall be used on all of the plots on a sampling area. A countable tree for basal area is described in PRC 4528. If each plot has a minimum basal area equal to or greater than that specified in 1071 (a), or as required by the rules if different, then the plot shall be counted as stocked.

Point Count Stocking Sampling Procedure

The silvicultural rules of each forest district and the Act contain point count stocking standards to be met following the completion of a timber operation. The following procedure shall be used to determine if these stocking standards have been met.

Since there are separate values for three different size classes, three circular concentric plots may be needed at each plot center. The following standards are for a 300 point count:

(a) For trees counted as one point each, a plot with a 6.80 foot radius is used (1/300th of an acre). If a countable tree of a value of at least one point is found in the plot, it is stocked, so recorded, and the timber owner or agent thereof moves on to the next plot center. If no countable tree is found, the next concentric plot is measured.
(b) For trees counted as three points each, a plot with an 11.78 foot radius is used (1/100th of an acre). If a countable tree of a value of at least three points is found in the plot, it is stocked, so recorded, and the timber owner or the agent thereof moves on to the next plot center. If no countable tree is found, the next larger concentric plot is measured.
For trees counted as six points each, a plot with a 16.65 foot radius is used (1/50th of an acre). If a countable tree of a value of at least six points is found in the plot, it is stocked. If no countable trees of the required sizes are found in the three concentric plots, the plot center is recorded as being unstocked and the timber owner or agent thereof moves on to the next plot center. For point counts of 450 per acre, the three concentric circular plot radius sizes are: 5.55 feet (1/450th of an acre), 9.61 feet (1/150th of an acre), and 13.6 feet (1/75th of an acre). For point counts of 150 per acre, the three concentric circular plot radius sizes are: 9.61 feet (1/150th of an acre), 16.65 feet (1/50th of an acre), and 23.55 feet (1/25th of an acre).

Combination Stocking Sampling Procedure

The procedure is used where the silvicultural rules of each forest district and the Act allow the stocking standards to be met through combination of point count and basal area. The following procedure shall be used to determine if these stocking standards have been met: At each plot center the timber owner or agent thereof shall check for either basal area or countable trees. The same basal area factor shall be

used on all plots in the sample. If the plot is not stocked with countable trees it shall be necessary to sample for countable trees.

Unacceptable Results

(a) No more than five unstocked plots shall be contiguous to each other. A contiguous unstocked plot is any plot within the rectangle constructed around the two adjacent plots on the same line and the three plots adjacent to them on the two nearest lines. See Figure 1073(a). An unstocked plot shall not be counted as contiguous to another unstocked plot if any of the following occur:

(1) Where, in use of the point count or combination stocking sampling procedure, an unstocked plot has a countable tree located in the largest circular concentric plot described in the procedure.

(2) Where the basal area sampling procedure is to be used, the continuity of the six contiguous plots may be considered broken if one or more of the contiguous unstocked plots meets the minimum stocking standards of the Act.

(b) If there are more than five unstocked plots contiguous to each other, the sample shall be assumed to be understocked except where application of the following gives a number of less than six.

$$\frac{(CUP) \times (SA) - (SIP) \times (0.5) \times (SA)}{(NPS)\ (NPS)} \text{ is less than } 6$$

CUP---Number of contiguous unstocked plots
SA---Acres in sample area
SIP---Number of stocked intermediate plots
NPS---Number of plots in sample, excluding intermediate plots. An intermediate plot is a plot placed halfway between two unstocked plots in the sample.

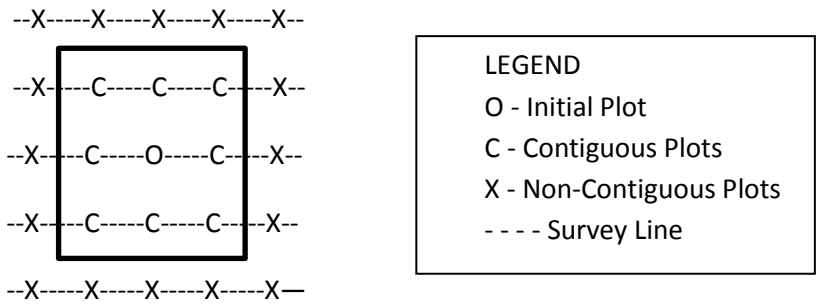


Figure 14: Stocking Sample Design

Example of a rectangle enclosing contiguous plots

(c) If less than 55% of the plots are stocked when using the basal area, point count, or combination stocking sampling procedures, it is assumed that the area being sampled is understocked. The timber owner or agent thereof shall delineate the understocked areas in the report of stocking. If the timber owner or the agent thereof still believes the area to be stocked, another sample may be run. The second sample shall be laid out in the same manner as the first sample with the additional plots lying halfway between the initial plot lines. For statistical analysis, the two samples shall be combined and analyzed together.

Point Count and Minimal Stocking Standards

The following standards constitute minimum acceptable stocking after timber operations have been completed.

(a) Rock outcroppings, meadows, wet areas, or other areas not normally bearing commercial species shall not be considered as requiring stocking and are exempt from such provisions.

(b) An area on which timber operations have taken place shall be classified as acceptably stocked if either of the standards set forth in (1) or (2) below are met within five (5) years after completion of timber operations unless otherwise specified in the rules.

(1) An area contains an average point count of 300 per acre on Site I, II and III lands or 150 on site IV and V lands to be computed as follows:

(A) Each countable tree which is not more than 4 inches DBH counts as 1 point.

(B) Each countable tree over 4 inches and not more than 12 inches DBH counts as 3 points.

(C) Each countable tree over 12 inches DBH counts as 6 points.

(D) [Coast] Root crown sprouts will be counted using the average stump diameter 12 inches above average ground level of the original stump from which the sprouts originate, counting one sprout for each foot of stump diameter to a maximum of 6 per stump.

Planning Coordination and Communication

The FMP must be coordinated with other natural resources of value (wildlife, water quality, and cultural uses) and programs under the jurisdiction of other Agencies. Possible conflicts could involve road use and safety issues. Field crews should be scheduled to work in areas well away from active logging operations. The status of planned timber activity should be reviewed annually, at Tribal Council meetings, and meeting notes sent to the Regional Forester. The FMP should be updated every ten years, with periodic revisions and amendments made as needed. Detailed records will be maintained for each project in accordance with 53 BIAM 5-H.2.

Yurok Aquatic Habitat Conservation Plan

The Habitat Conservation Plan and Candidate Conservation Agreement with Assurances for the Yurok Tribe (the YHCP (see Appendix: Final Yurok HCP Complete) or Plan) is based on and derived from the Aquatic Habitat Conservation Plan and Candidate Conservation Agreement with Assurances for the California Timberlands of Green Diamond Resource Company (the AHCP/CCAA) approved and effective on July 1, 2007. The Yurok Tribe (Yurok) has acquired Green Diamond Resource Company lands within the AHCP/CCAA Plan Area subject to an Assignment and Assumption Agreement among Yurok, and Green Diamond Resource Company (Green Diamond), National Marine Fisheries Service (NMFS), and U.S. Fish & Wildlife Service (USFWS), dated April 14, 2011. Pursuant to and in fulfillment of Section 11.3(c) of the Implementation Agreement (the IA) for the AHCP/CCAA, the Yurok, considered the Assignee, have agreed to assume and perform certain rights, duties and obligations of Green Diamond, considered the Assignor, under the AHCP/CCAA with respect to that portion of the AHCP/CCAA Plan Area that Yurok has acquired (the Yurok Plan Area). The Assignment and Assumption Agreement requires Yurok to implement and comply with this YHCP as the substantial equivalent of the AHCP/CCAA for the Yurok Plan Area. The Assignment and Assumption Agreement also requires Yurok to sign an implementation agreement for the YHCP (the YIA), which is the substantial equivalent of the IA for the AHCP/CCAA and the means by which NMFS and USFWS (the Services) obtain the enforceable commitment of Yurok to implement and comply with the YHCP. On the basis of the YHCP and the YIA, the Services will issue to Yurok an incidental take permit (ITP) and an enhancement of survival permit (ESP) (the Permits) for the Covered Activities and Covered Species in the Yurok Plan Area.

Because the YHCP is derived from and based on the AHCP/CCAA for that portion of the Plan Area acquired by Yurok, the YHCP generally incorporates entire sections of the AHCP/CCAA by reference and selectively incorporates, revises, or replaces other sections of the AHCP/CCAA where necessary to tailor and scale the ACHP measures to the Yurok Plan Area. The defined terms used in this YHCP shall have the same meaning as the defined terms in the AHCP/CCAA and the AHCP/CCAA Implementation Agreement. Where the same defined terms are used in both the AHCP/CCAA and the YHCP, their meaning shall be limited to the context of the Plan or Implementation Agreement where they are used such that Yurok shall only have responsibility for rights and obligations in the Plan Area it owns and controls and Green Diamond shall only have rights and obligations in the Plan Area it owns and controls. Any other defined terms used in the YHCP shall have the meaning given by the new definition set forth in this YHCP and the YIA.

The Initial Plan Area for the YHCP shall be 22,237 acres that are generally and legally described as Phase I [fee lands] to this YHCP. Yurok timber harvest activities will be conducted pursuant to all applicable laws and regulations. There will be no timber harvest in the Yurok Plan Area until January 1, 2013 at the earliest. Until such time as timber harvest activities begin within the Yurok Plan Area, Covered Activities under the YHCP will largely be limited to road inspection, assessment, and repair work.

To meet the statutory criteria for approval of an HCP/ITP, Yurok's conservation program must: (i) minimize and mitigate the impacts of authorized incidental take of Covered Species that may result from Covered Activities to the maximum extent practicable and (ii) ensure that any such taking will not

appreciably reduce the likelihood of the survival and recovery of such species in the wild. Biological goals can be either habitat-based or species-based. Habitat-based goals are expressed in terms of the amount and or the quality of habitat. Species-based goals are expressed in terms specific to individuals or populations of that species.

Based upon the biological goals and objectives, Yurok will implement a comprehensive conservation program with a number of specific conservation measures. These measures are termed the "Operating Conservation Program" and reflect all the binding, enforceable commitments Yurok will make to satisfy the requirements of ESA Section 10(a). The Operating Conservation Program will be incorporated by reference in the section of the YIA that describes all Yurok's conservation planning commitments that must be made and carried out to qualify for and comply with the ITP and ESP that Yurok receives from the Services.

Pursuant to the Operating Conservation Program, Yurok will undertake the following measures within the Yurok Plan Area during the term of the YHCP and Permits. In all areas where Yurok adds any Harvesting Rights to the Yurok Plan Area over time, all measures under the YHCP will be implemented except as follows: 1) the road assessment and implementation plan measures (6.2.3.1 and 6.2.3.2) will not apply, and 2) routine road maintenance and inspection plan measures (6.2.3.9) will apply only where Yurok has exclusive road-use rights. Furthermore, when Yurok acquires Harvesting Rights and plans to make an election to add such areas to the Yurok Plan Area pursuant to YIA Paragraph 11.2, Yurok will use its best efforts to enter into an agreement with the fee owner to allow for the application of the road assessment and implementation plan measures (6.2.3.1 and 6.2.3.2) on such lands and, if successful, will apply these measures in such Harvesting Rights areas. Where Yurok does not have exclusive road-use rights in a Harvesting Rights area, Yurok will conduct road maintenance and inspection activities in accordance with Yurok's management policies and practices. Harvesting Rights acreage with exclusive road-use rights added to or deleted from the Yurok Plan Area pursuant to the YIA will be taken into account for purposes of the annual adjustments made pursuant to 6.2.3.2.1#4. Regarding roads that are subject to Road Access Rights and included in the Yurok Plan Area pursuant to YIA Paragraph 3.11.1, Yurok will conduct the assessment of road-related sediment sources for existing roads pursuant to 6.2.3.1.1-6.2.3.1.4 where the fee owner allows Yurok to do so, and Yurok will report the results of the assessment to the Services. Yurok will apply the routine road maintenance and inspection plan measures (6.2.3.9) on such roads only where Yurok has exclusive road-use rights. Where Yurok does not have exclusive road-use rights in a Harvesting Rights area, Yurok will conduct road maintenance and inspection activities in accordance with Yurok's management policies and practices.

Watercourse Assessment and Protection for All Tribal Forest Lands

This section is to provide guidance for projects so that timber operations do not potentially cause significant adverse site-specific and cumulative impacts to the beneficial uses of water, native aquatic and riparian-associated species, and the beneficial functions of riparian zones; or results in an unauthorized take of listed aquatic species; or threaten to cause violation of any applicable legal requirements. This article also provides protection measures for application in watersheds with listed anadromous salmonids and watersheds listed as water quality limited under Section 303(d) of the

Federal Clean Water Act. It is the intent of this FMP to restore, enhance, and maintain the productivity of timberlands while providing appropriate levels of consideration for the quality and beneficial uses of water relative to that productivity. During and following timber operations, the beneficial uses of water, native aquatic and riparian-associated species, and the beneficial functions of riparian zones shall be maintained where they are in good condition, protected where they are threatened, and insofar as feasible, restored where they are impaired. Maintenance, protection, and contribution towards restoration of the quality and beneficial uses of water during the planning, review, and conduct of timber operations shall comply with all applicable requirements. Trees or large woody debris shall not be remove from a watercourse, the adjacent riparian area, or the adjacent flood prone areas in quantities deleterious to fish, wildlife, beneficial functions of riparian zones, or the quality and beneficial uses of water. Protecting and restoring native aquatic and riparian-associated species, the beneficial functions of riparian zones, and the quality and beneficial uses of water shall be given equal consideration as a management objective within any prescribed watercourse and lake protection zone (WLPZ), within any riparian management zone (RMZ), equipment limitation zone (ELZ), or equipment exclusion zone (EEZ) designated for watercourse protection and any other location where timber operations may affect riparian zones or the quality and beneficial uses of water.

Riparian Management Zones under the YHCP for Phase I Fee Lands

Within the AHCP (Section 6.2.1) there are procedures for the use of riparian management zones within Phase I fee lands. For these lands, Yurok will apply a RMZ of at least 150 feet (slope distance) on each bank of all Class I watercourses. The width will be measured from the watercourse transition line or from the outer Channel Migration Zone (CMZ) edge where applicable.

Inner Zone

Yurok will establish an inner zone within the RMZ, the width of which will depend upon the streamside slope in accordance with the following:

Side Slopes	Inner Zone Width
0-30%	50 feet
30-60%	60 feet
>60%	70 feet

According to the YHCP, Yurok will carry out only one harvest entry into Class I RMZs, which will coincide with the even-aged harvest of the adjacent stand. Yurok will apply the restrictions in this subsection of Section 6.2.1.2 during such entry. If cable corridors through RMZs are necessary to conduct intermediate treatments (e.g., commercial thinning) in adjacent stands prior to even-aged harvest, Yurok will apply the restrictions in this section except harvesting of trees in the RMZs will be limited to cable corridors only. Any cable roads established in the RMZ as part of the intermediate treatment will, to the extent feasible, be reused during the even-aged entry in the adjacent stands. These Class I RMZs will be subject to the restrictions identified in Section 6.2.1.2.

Overstory Canopy Closure

1. Yurok will retain at least 85% overstory canopy closure within the inner zone.

2. At least 70% canopy overstory closure will be retained within the outer zone

Conifer Density Requirements

1. If the inner zone is predominantly composed of hardwoods (it contains less than 15 conifer stems per acre that are greater than 16 inches DBH), Yurok will take no conifers from the inner zone.
2. No harvesting within the RMZ will be undertaken that would reduce the conifer stem density within the RMZ to less than 15 conifer stems that are greater than 16 inches DBH per acre.

Class II RMZ Width

1. Yurok will establish an RMZ of at least 75 or 100 feet on each bank of all Class II watercourses.
2. A 75-foot minimum buffer will be used on the first 1,000 feet of 1st order Class II watercourses (Class II-1 watercourses). Downstream of this first 1000-foot section, the RMZ will be expanded to at least 100 feet.
3. A 100-foot minimum buffer will be used on all 2nd order or larger Class II watercourses (Class II-2 watercourses).

Inner Zone RMZ Width

Yurok will establish an inner zone within the RMZ, the width of which will be 30 feet measured from the first line of perennial vegetation.

Outer Zone RMZ Width

Yurok will establish an outer zone of the RMZ within the RMZ, which will extend the remaining 45 feet or 75 feet (depending on whether it is a Class II-1 watercourse or a Class II-2 watercourse, respectively).

During the life of the Plan, Yurok will carry out only one harvest entry into Class II RMZs, which will coincide with the even-aged harvest of the adjacent stand. Yurok will apply the restrictions in this subsection of Section 6.2.1.4 during such entry. If cable corridors through RMZs are necessary to conduct intermediate treatments (e.g., commercial thinning) in adjacent stands prior to even-aged harvest, Yurok will apply the restrictions in this section except harvesting of trees in the RMZs will be limited to the cable corridors only. Any cable roads established in the RMZ as part of the intermediate treatment will, to the extent feasible, be reused during the even-aged entry in the adjacent stand. These Class I RMZs will be subject to the restrictions identified in Section 6.2.1.4 of the Yurok AHCP.

The Class II RMZ is an EEZ, except for a) existing roads and landings; b) construction of new spur roads to extend operations outside the RMZ; c) road watercourse crossings; d) skid trail watercourse crossings; and e) designated skid trail intrusions.

The exception for skid trail watercourse crossings is only applicable when the following conditions are met:

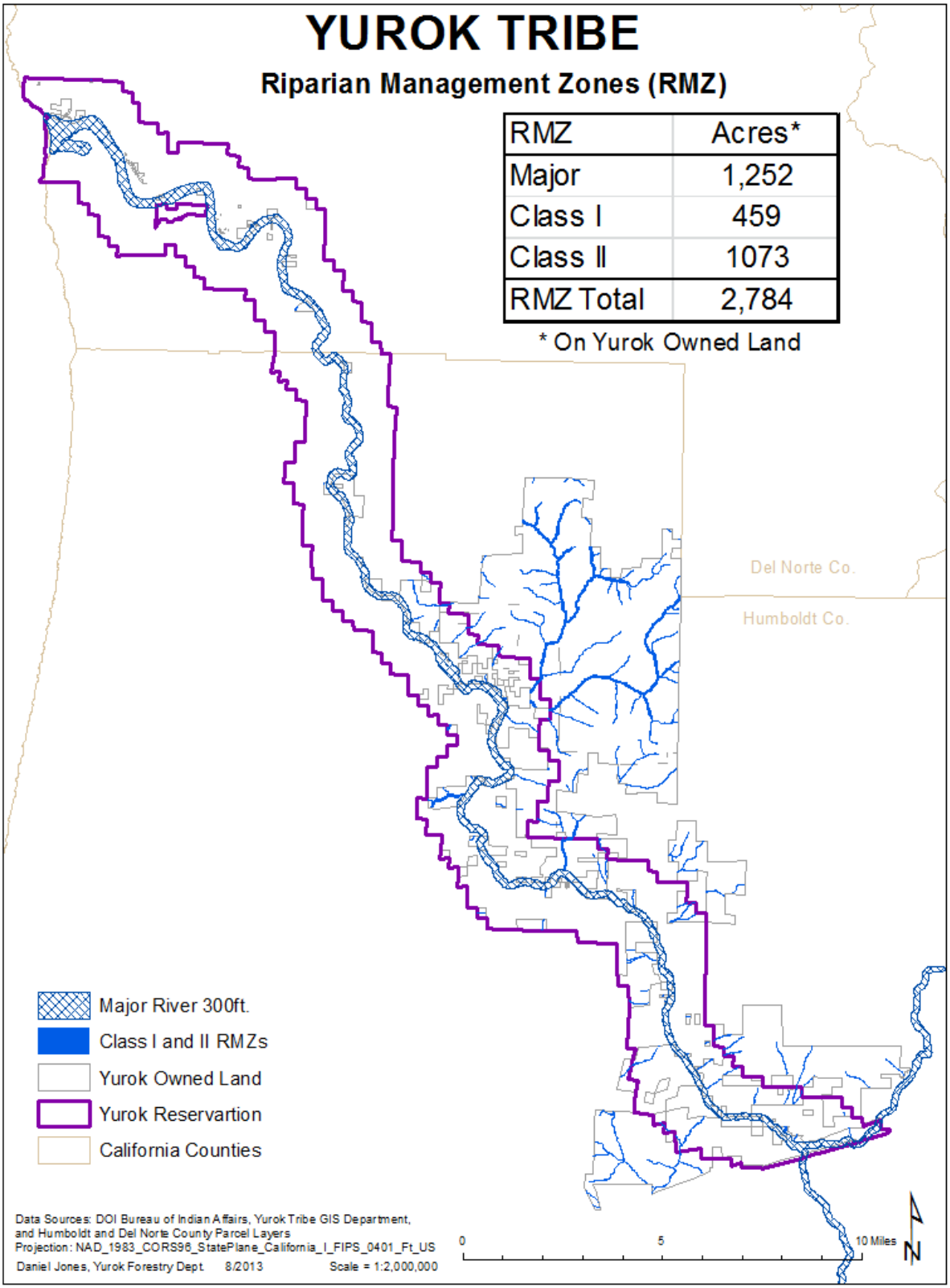
1. Construction and use of skid trail watercourse crossings within the RMZ may occur only when construction and use of alternative routes to otherwise inaccessible areas outside of the RMZ would result in substantially greater impacts to aquatic resources. Preference shall be given to utilizing existing skid trail watercourse crossing sites in the RMZ over establishing new skid trail watercourse crossing sites in the RMZ.
2. Skid trail watercourse crossings shall not be constructed or used in the RMZ to provide access to RMZs for the purpose of their harvest.
3. Within Class II-1 RMZs, trees may be felled and harvested to facilitate skid trail watercourse construction and use. All harvested trees will be counted towards estimated reductions in full tree equivalent (FTE) values and reductions in potential recruitment of large woody debris (LWD).
4. Within Class II-2 RMZs, trees may be felled to facilitate skid trail watercourse crossing construction and use. All such felled trees shall be retained as downed wood in the RMZ and shall be counted towards estimated reductions in FTE values and reductions in potential recruitment of LWD.
5. Yurok has submitted to the Services an explanation, justification, and map of the proposed skid trail and use in the RMZ as part of the informational copy of tribal harvest plan (see Section 6.2.7.2).

Yurok Additionality

The Yurok Tribe is extending the protective measures described in the YHCP to include all Tribal lands and not just the lands described in the Plan Area (Phase I Fee lands). In addition to these protective measures, the Yurok Tribe is decreasing the slope break threshold on all lands and extending the total riparian buffers on all classes of streams in the Plan Area by 20%. The additional 20% increase will be an equipment limitation zone (ELZ) and be designated on the ground with flagging.

Table 8: Yurok Stream Protection Zones.

Watercourse Class	Subdivision	Total Width[1]	Inner Zone Width	Outer Zone Width	Additional Zone Width
Klamath (Scenic)	None	300 ft No Harvest	N/A	N/A	N/A
Class I	None	180 ft RMZ	50-70 ft w/ 85% TOCR	80-100 ft w/ 70% TOCR	30 ft ELZ w/ 40% TOCR
Class II	None	120 ft RMZ	30 ft w/ 85% TOCR	70 ft w/ 70% TOCR	20 ft ELZ w/ 40% TOCR
Class III A	<50% Slope	40 ft EEZ w/ 40% TOCR	N/A	N/A	N/A
Class III B	>50% Slope	60 ft EEZ w/ 40% TOCR	N/A	N/A	N/A
TOCR = Total Overstory Canopy Retention		Class I Side Slopes	Inner Zone	Outer Zone	
[1] Width on one side of watercourse		0 - 30%	50 feet	100 feet	
		30 - 50%	60 feet	90 feet	
		> 50%	70 feet	80 feet	



Map 8: Riparian Management Zones

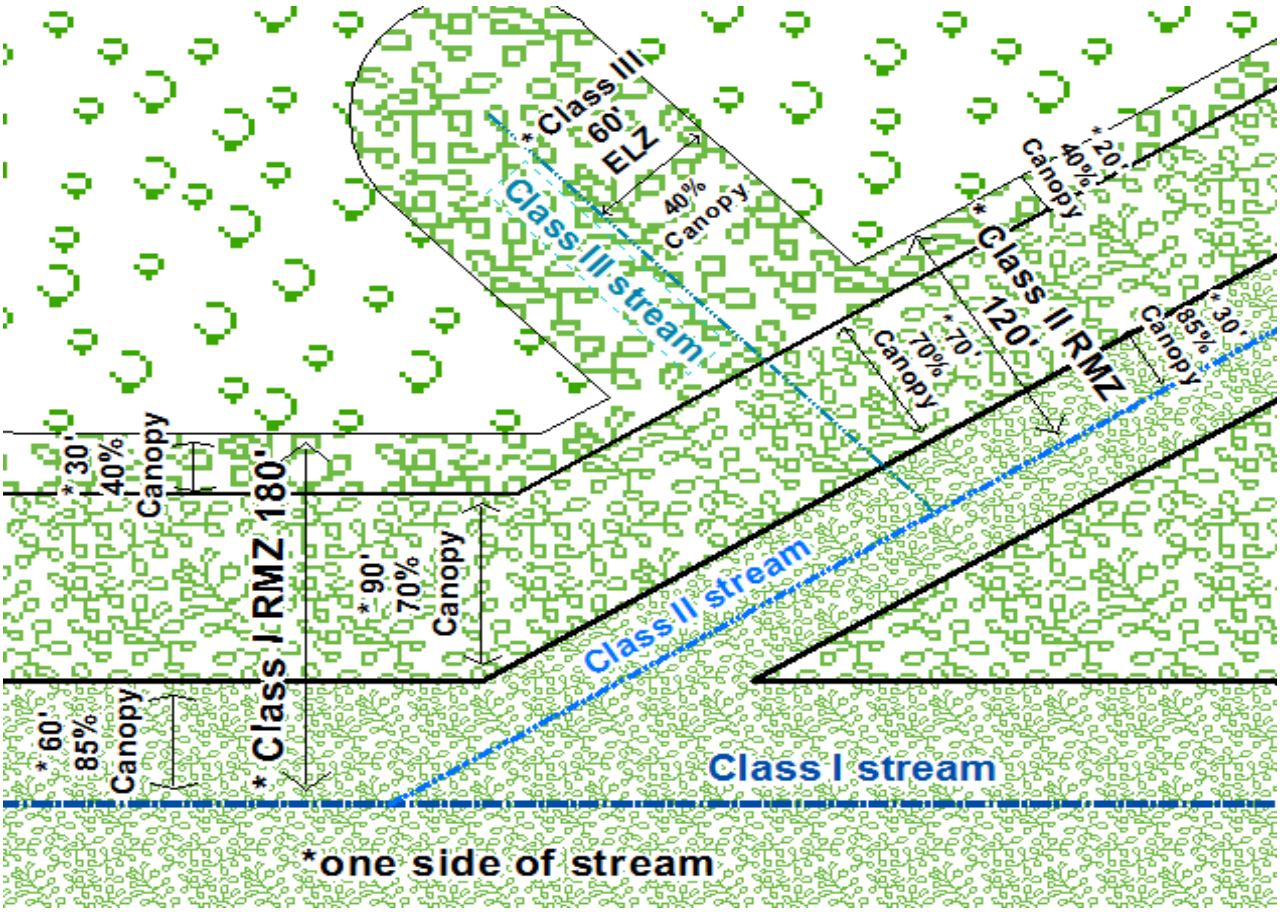


Figure15: Yurok Riparian Management Zones.

Roads

There is a very extensive network of roads throughout the YISYL for fee lands access, but some Tribal parcels are completely inaccessible. Rights-of-way for log hauling are a considerable issue on the entire reservation, and will need to be addressed project by project. A one lane public blacktop road (State Highway 169) extends along the east side of the Klamath River to Johnsons, and private roads continue down river to Klamath Glen, where Highway 169 starts again.

All new road construction must comply with 53 BIAM 5-H, the PRO Logging Practices, the FMP, the Yurok Non-Point Source plan (NPS), and the YHCP where applicable. It is also recommended that the recommendations of the Yurok Tribal Fisheries Program be considered. Impacts of all new road construction must be addressed in each project specific EA.

Management roads are defined as roads that are needed to either support long term management activities on the property or provide access to timber that will be harvested within the next 20 years. There are two sub-classifications of management roads 1) mainline roads and 2) secondary roads. Mainline roads support significant amounts of traffic annually from major tracts of timber or provide the

main access into a tract for non-harvest management activities. Secondary roads support periodic traffic into portions of tracts with the level of use dependent upon location of harvest units. Management roads will be maintained for seasonal or year-round use (depending on their surface).

Road Assessment

In general, chronic surface erosion delivers sediment every winter, whether or not there are any large storms. Sediment delivery from chronic road erosion is generally greatest on roads that are used during the winter, and where ditches are connected to watercourses. Newly constructed roads also exhibit increased risk of surface erosion for the first several years following construction. Roads that are abandoned and overgrown typically contribute far less sediment from chronic surface erosion. Although chronic surface erosion represents a threat or risk to the aquatic system, it is not one that results in catastrophic sediment inputs.

Sediment delivery from road-related landslides and watercourse crossing failures are episodic in nature, and are linked to large storm events. The more extreme the hydrologic events are, the more frequent and larger are the failures from these two sediment sources. These episodic sediment sources deliver relatively large quantities of sediment (including both fine and coarse grain sizes) to watercourse channels. The risk is typically greatest on old or abandoned roads with undersized culverts that are not properly maintained.

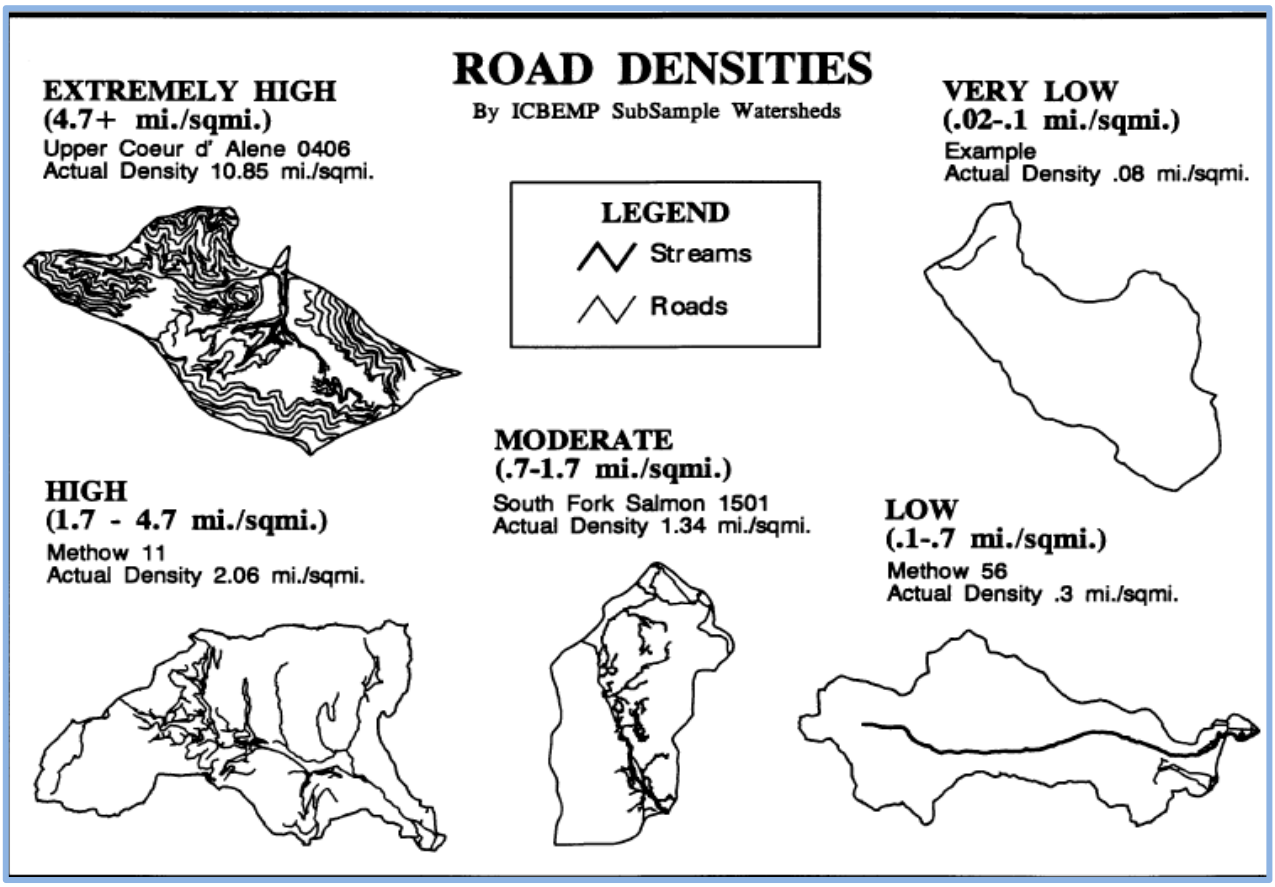


Figure 16: Road Density for Sub Sample Watersheds

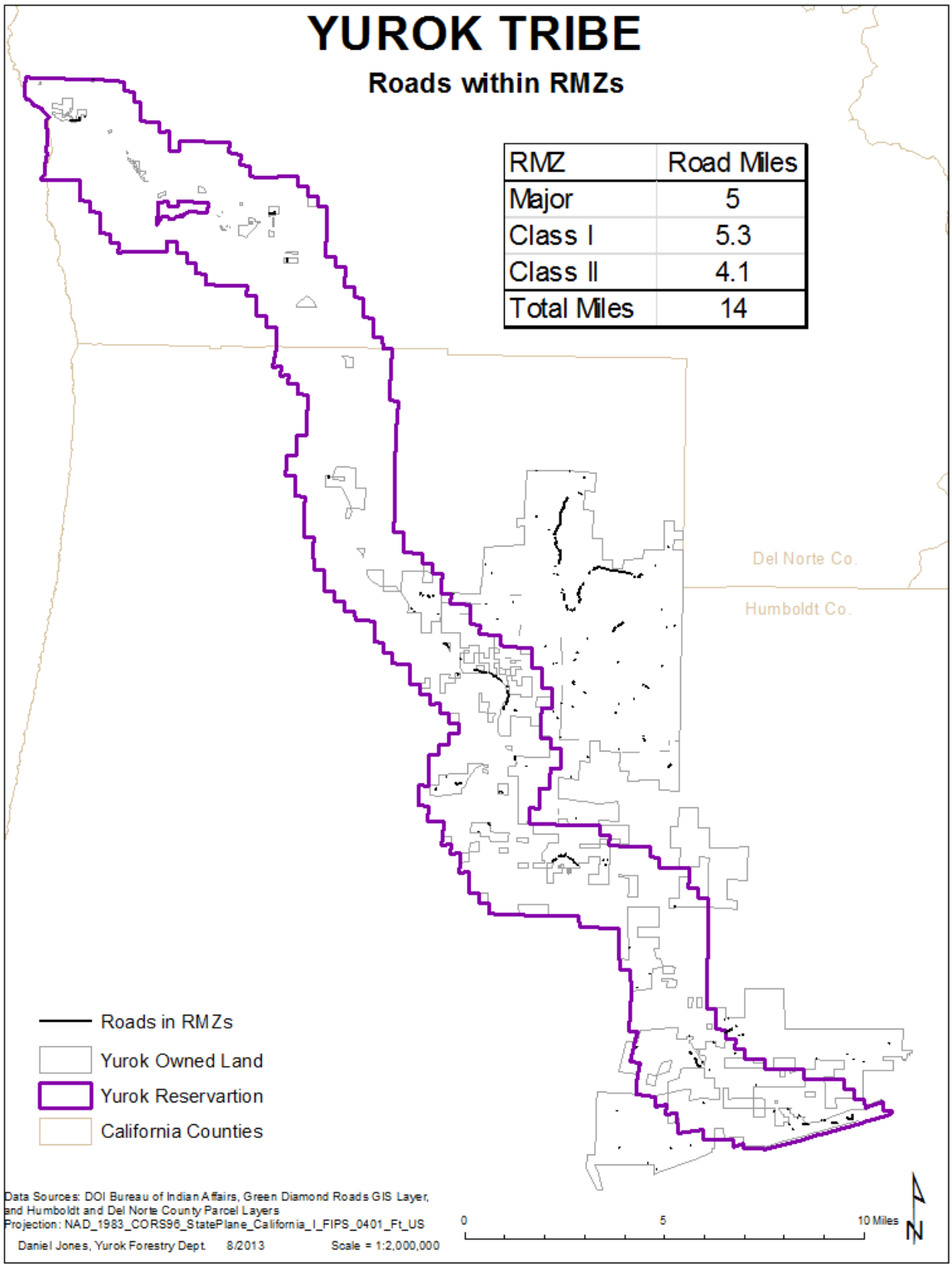
Road failures can contribute both fine and course sediment to streams, and accumulated road failures in large storm events can have catastrophic effects, such as filling in pools and reducing habitat complexity. Studies show that roads can contribute 50 to 80% of the sediment that enters streams. The amount of sediment delivered from forests with roads can be more than 300 times greater than from undisturbed forest land.

Surface erosion from roads can produce chronic sources of fine sediment which can diminish salmon and steelhead spawning success. Roads constructed next to streams are chronic contributors of fine sediment, particularly if they are used in winter months. Winter logging exacerbates this problem because the truck wheels pump fines from within the road bed to the surface. Fine sediment from roads that enters streams fills interstitial spaces in gravel streambeds, reducing survival of salmon and steelhead eggs and aquatic insects. Fine sediment in salmon spawning gravels can increase by 2.6 - 4.3 times in watersheds with more than 4.1 miles of roads per square mile of land area.

Regional studies from the interior Columbia River basin (Haynes et al., 1996) show that bull trout do not occur in watersheds with more than 1.7 miles of road per square mile and NOAA (1995) set limits for road densities on National Forest lands in the Columbia River Basin at no more than 2.5 mi./sq. mi. It has been shown that," increased fine sediment levels can reduce juvenile salmonid growth rates by decreasing macro invertebrate prey and increasing metabolic demands due to reduced availability of sheltered microhabitats (Suttle et al. 2004, SONCC Coho Recovery Plan, 2012)."

The National Marine Fisheries Service guidelines for salmon habitat characterizes watersheds with road densities greater than 3 miles of road per square mile of watershed area (mi/sq. mi) as "not properly functioning", while "properly functioning condition" was defined as less than or equal to 2 mi./sq. mi., with no or few stream side roads. Based on extensive field data analysis of road densities and the occurrence of bull trout the USFS characterizes road density levels of greater than 1.7 mi./sq. mi. as High and greater than 4.7 mi./sq. mi. as Extremely High.

Because road-drainage crossings can be the largest categorical source of sediment within watersheds, cost-effective inventory and prioritization methods, consistent with NPS, should be employed in all watersheds where roads and erosion are of concern. Road decommissioning has been shown to be an effective means of reducing sediment to salmon streams.



Map 9: Road Locations within Riparian Management Zones

Reciprocal Road Easement Agreement

The road agreement between the Yurok Tribe, BIA, and Green Diamond Resource Company is an example of an implement that can be used to gain access to valuable resources within the YISYL. This easement is granted to Yurok appurtenant to Yurok property. The Yurok Easement Area shall not be used for the benefit of any property other than the property in the "Yurok Appurtenant Area". This grant of easement may not be subdivided to benefit subdivided portions of Yurok Appurtenant Area. The easement granted to Green Diamond is appurtenant to Green Diamond's property. The Green Diamond Easement Area shall not be used for the benefit of any property other than the property in the "Green Diamond's Appurtenant Area). This grant of easement may not be subdivided to benefit subdivided portions of Green Diamond's Appurtenant Area. This easement shall also include the right to trim or remove any brush, trees, or shrubs that may interfere with the use, maintenance or construction of the roads, except no Grantee shall cut nor cause to be cut any merchantable trees upon its Easement Area, unless specific permission is granted by the Grantor. If it becomes necessary to cut trees, and such cutting is authorized by the Grantor, the Grantee shall agree to fell the trees carefully so as to minimize breakage and buck them into lengths stipulated by the Grantor.

If there is any hauling under this Agreement, then prior to each day of hauling, the Grantee shall contact the Grantor representative and shall obtain his/her concurrence that the Grantee's use of its Easement Area on that day will not adversely affect the Grantor's operations. Notwithstanding the concurrence of the Grantor for road use on any day, the Grantee acknowledges that its use is not exclusive, and that others are entitled to use the road(s) described hereunder, including use for hauling operations, and that it is responsible for coordination and cooperation with all road users. To the extent that the Grantee's Authorized Use includes hauling operations, the Grantee agrees to cooperate and coordinate with the Grantor and the Grantor's contractors, timber purchasers and other users of the Grantor's roads in the Grantee's Easement Area, and to assure that Citizens' Band ("CB") channels are assigned to all of the Grantee's employees, contractors and agents and that such users have, carry and use CB radios in an appropriate manner.

As part of this Agreement each Grantee agrees to comply with all applicable governmental laws, rules, statutes, regulations, and permits relating to its use of its Easement Area, and to do so at its cost. Each Grantee's agreement to comply shall include any programmatic or generally applicable local, state or federal government regulatory permits held by the Grantor and applicable to the Grantee's Easement Area, including, without limitation, incidental take permits held by the Grantor. The Grantor reserves the right to require the Grantee to take affirmative steps to review and comply with permits noticed by the Grantor and to promptly comply when the Grantor requests specific action on a requirement applicable to the Grantee's use of the Grantor's Property. In the exercise of the rights granted hereunder, Green Diamond shall comply with all Federal and State laws, rules and regulations applicable to the use of Green Diamond's Easement Area and the Yurok shall comply with all Federal and State rules and regulations applicable to the use of the Yurok Easement Area. Unless specifically provided for by this Agreement, the Parties do not warrant their authority to permit the uses of the Easement Areas. Each Party shall secure all other rights or permits that are required for the lawful use of the Easement Areas. This Agreement shall not serve as a basis for an assertion or exercise of Yurok tribal law or civil

jurisdiction over Green Diamond's property or any of its activities on Green Diamond property in the Yurok Reservation.

If a Grantee is the primary user of the road(s) in its Easement Area, then that Grantee shall provide for: (1) dust abatement in a form and sufficient quantity to be acceptable to the Grantor's Area Timberlands representative; and (2) properly winterizing the road(s) immediately upon completion of hauling (if applicable) in any season. This will include, but is not limited to, clearing all logs and debris from the roads, clearing ditches, opening culverts, grading the road surfaces smooth, eliminating berms, properly ditching the roads and cross-draining them, and leaving the roads in a condition that will insure minimum damage from winter storms. Each Grantee agrees to use only those water drafting sites that are authorized by the Grantor. Additionally, Grantees agree to comply with any water drafting requirements required by programmatic or generally applicable local, state or federal government regulatory permits held by the Grantor and applicable to the Grantee's Easement Area, including, without limitation, incidental take permits held by the Grantor.

Each Grantee shall repair any damage to the Grantor's roads when such damage is caused by the Grantee's use of its Easement Area. In the event that the Grantee is the primary user of the road(s) in its Easement Area, then that Grantee shall maintain the road(s), at its sole cost and expense, on an ongoing basis during all periods of road use, including: periodic spot rocking and grading to prevent damage to subgrades; ditching and culvert maintenance to prevent water damage to the roads and creeks; and maintenance of all erosion control devices in good working order. In the event that both Parties are using the same road(s) for hauling, then during that period the Grantee shall pay to the Grantor a share of maintenance costs associated with hauling activities, prorated during the time of use in proportion to the use. Each Grantor will be the maintaining party unless otherwise agreed. Reimbursements shall be due within thirty (30) days of invoice.

The entire road use agreement should be reviewed prior to any extensive road use that may be covered by the Agreement. The Yurok Reciprocal Road Use Agreement and the accompanying Exhibits (maps) can be found in the Appendix.

Road Decommissioning

Some management roads will change to a decommission category as timber harvesting operations along them are completed. A road assessment project (to be implemented winter 2013), which includes Phase I fee lands, will help determine sediment delivery potential and aid in prioritizing roads for future management actions.

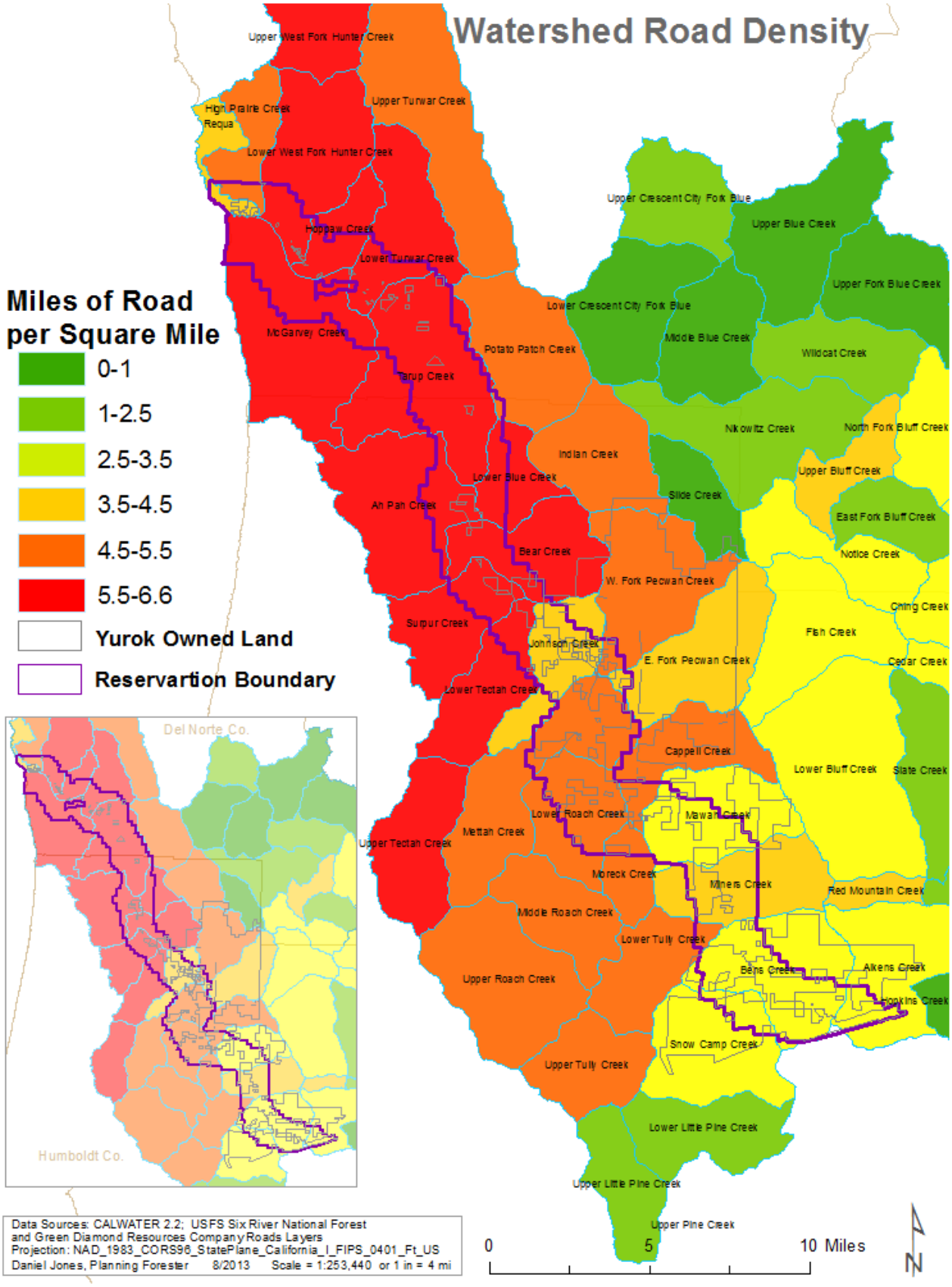
Temporarily decommissioned roads are those roads that may be used again in the future (typically unused for 20 years). A schedule will be developed for decommissioning of roads throughout the Yurok Plan Area. Decommissioning is described in Section 6.3.3. and will include pulling all watercourse crossings, back-sloping of fills at crossings to the approximate natural slope contours, waterbarring road surfaces (including interception of the ditch line), pulling back excess overburden where there is a significant risk of fill failure that would deliver sediment to a watercourse, and grass seeding and mulching of cut and fill surfaces exposed during decommissioning operations. Assessment may show

that some roads or road segments are completely revegetated, and no longer pose a threat to aquatic systems. These roads are in a condition that would render the disturbance, inherent in decommissioning, counter-productive.

Permanently decommissioned roads are roads that will not be needed for future management activities. Most of the roads that will be permanently decommissioned are those that were constructed on unstable slopes, or within or adjacent to riparian zones. Treatment of permanent decommission roads is essentially the same as the treatment for temporarily decommissioned roads. The storage location of waste material could be different between permanent and temporary decommissioning, but the distinct difference is the intent of future use. Permanently decommissioned roads are not intended to be used again at any point in time in the future. Assessment may show that some roads or road segments have been abandoned for such a long time that they are completely revegetated, no longer pose a significant threat to aquatic systems. These roads are in a condition that would render the disturbance inherent in decommissioning counter-productive.

Presently, the majority of the roads are in a management status, however, the table shows the course the road plan will lead as the plan is implemented over time. Throughout the life of the plan, the mileage of management roads is anticipated to decrease and the mileage of decommissioned roads is expected to increase (both temporary and permanent). The intent is to decrease the mileage of management roads over time. Every five years the entire classification system will be reviewed to ensure that management roads no longer needed for log transportation or administrative access are changed to the appropriate decommission status. Roads newly constructed pursuant to tribal harvest plans will be classified using this system, but will not contribute toward the treatment implementation total. The newly constructed roads will be built to the higher standards and will not require treatment.

Road decommissioning will not occur during the winter operating period (October 16th through May 14th) unless unseasonably dry weather persists in the fall at the beginning of the winter period. Road decommissioning will cease when 4 inches cumulative rainfall is reached or a National Weather Service forecasted rainfall amount will reach or exceed the four (4) inch cumulative total. No road decommissioning will occur prior to May 15th or after November 15th. Some roads have been abandoned and are in a condition where no treatment would be required because they are completely revegetated, no longer pose a threat to aquatic systems, and are in a condition that would render the disturbance inherent in decommissioning counter-productive.



Map 10: Watershed Road Density Rating

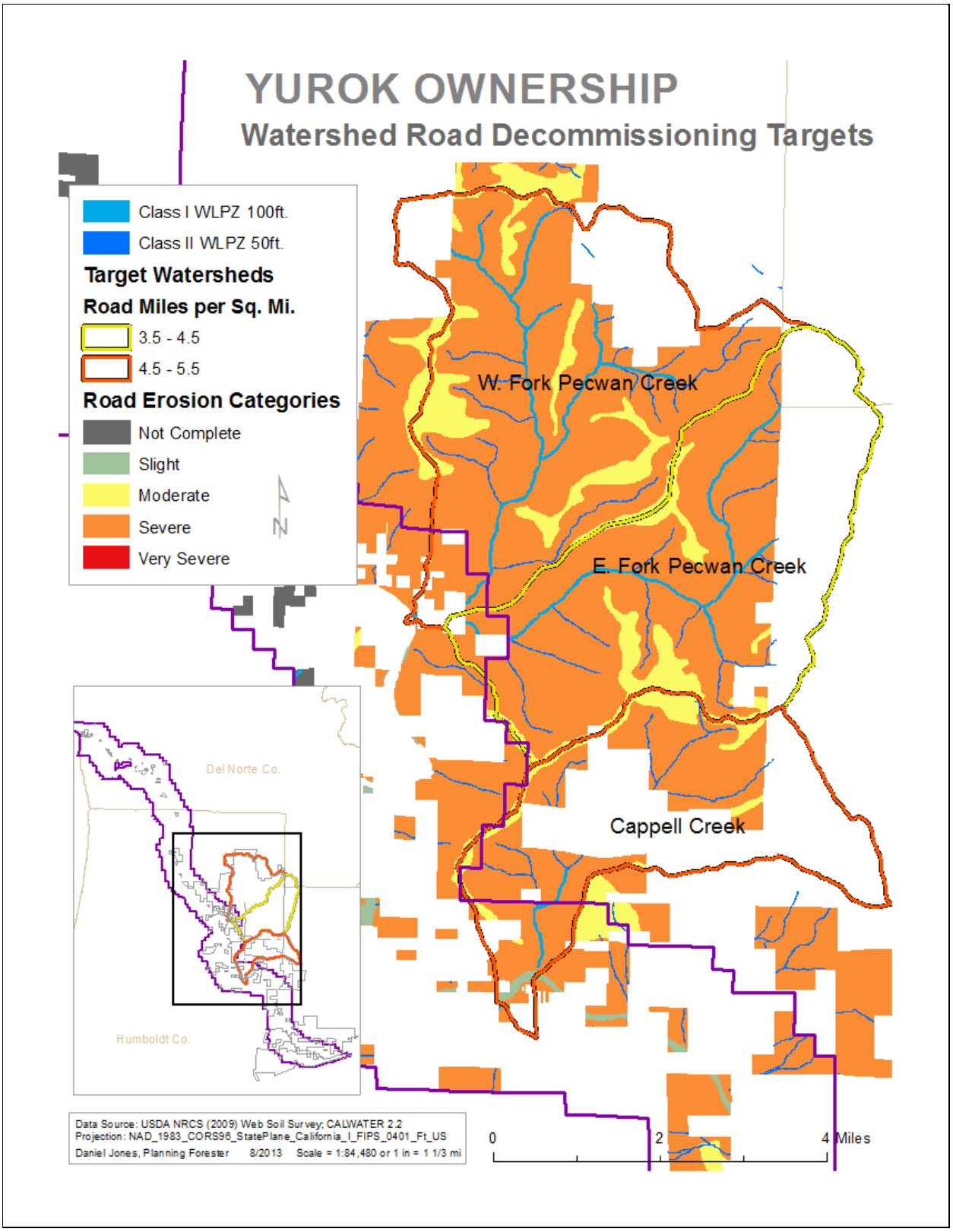
Forest ecosystems produce the best quality fresh water in the world due to an abundant and diverse soil organism community and an extensive and relatively deep root system. The main source of sediment input into stream systems from timber production lands are due to logging road soil erosion. A GIS analysis of road miles per square mile of land was performed to determine the road density within the watersheds surrounding Yurok owned forested land. An analysis of *On Road* erosion potential for soil types on Yurok owned forested land was determined using United States Department of Agriculture Natural Resource Conservation Service soils data. The watershed road density layer and the *On Road* erosion layer were then overlaid to target watersheds for road decommissioning exploration.

Three planning watersheds in particular have been targeted for erosion site prioritization: West Fork Pecwan Creek, East Fork Pecwan Creek, and Cappell Creek. All of these planning watersheds occur in the Phase I fee lands and since much of the Phase I fee lands will be utilized for carbon production and not intensively managed for timber, this is an excellent area to focus soil conservation efforts. The planning watersheds have been prioritized by ownership continuity, erosion severity, and road density.

Planning Watershed Name	Road Decom. Priority	Road Density (Mi/Sq Mi)	Watershed Acreage	Yurok Owned Acreage	Yurok Owned % of Watershed	Moderate Soil Erosion Ac.	% Yurok Ownership	Severe Soil Erosion Ac.	% Yurok Ownership
W. Fork Pecwan Creek	1	5.2	9,215	7,382	80	985	13	6,397	87
E. Fork Pecwan Creek	2	4	8,424	5,864	70	656	11	5,208	89
Cappell Creek	3	4.5	5,792	2,837	49	403	14	2,397	84

Table 9: Planning Watershed Road Density Priority Locations

The Watershed Road Decommissioning Targets map (Map 12) illustrates the soil erosion categories of Yurok owned forest land within the East and West Pecwan Creek planning watersheds and the Cappell Creek watershed.

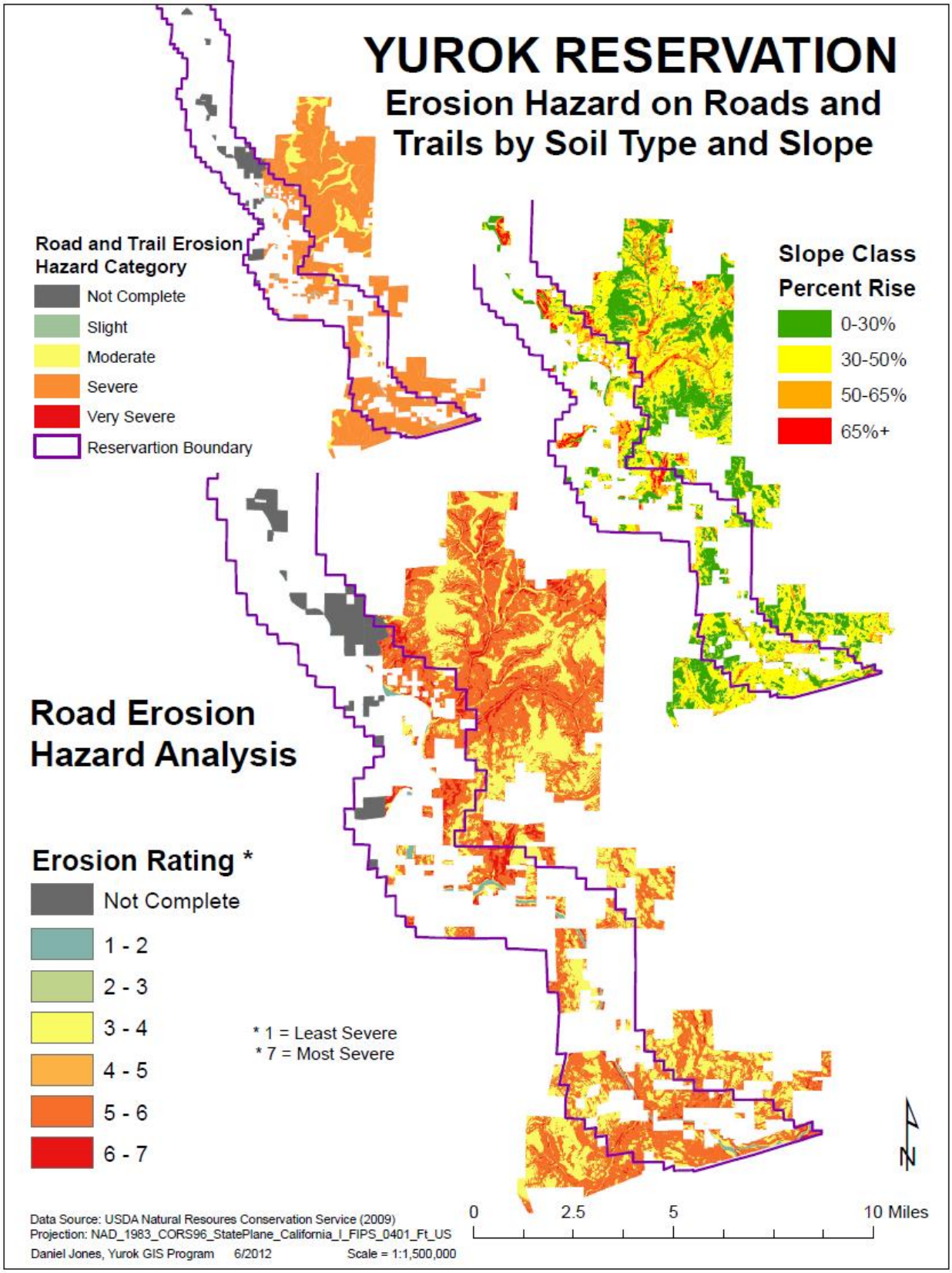


Map 11: Road Erosion Rating by Watersheds

Erosion Control

1. Appropriate erosion control measures, as per the NPS (and YHCP where applicable), will be utilized to minimize erosion and prevent sediment from entering watercourses during all road and landing construction activities. Erosion control measures to be utilized will include, but not be limited to: road surfacing, dispersing runoff into stable vegetated filter areas, armoring with rock rip-rap, end hauling waste material to stable locations, construction of rolling dips, critical dips, and waterbars, mulching, and revegetating disturbed surfaces as soon as practical.
2. Where construction activities are conducted in close proximity to watercourses, additional erosion control protection measures will be utilized to trap sediment and minimize its entry into the watercourse. As required, slash filter windrows, silt fences, mulching and/or straw bale check dams will be used to control runoff over fill slopes and along concentrated runoff flow paths.
3. All watercourse crossings and cross drains will be installed and functional prior to October 15th. In addition, by October 15th, all waterbars, rolling dips, and road and landing construction associated with straw mulching and grass seeding will be completed in order to minimize suspended or mobilized sediment delivery to a watercourse.
4. Prior to the beginning of the first winter period (October 15th) following construction, all new cut and fill slopes on road construction within the RMZ or EEZ of a Class I, II, or III watercourses will be seeded at a rate of at least 30 pounds per acre and mulched to a depth of at least 2 inches (before settling) with 90% surface coverage.
5. At temporary crossings, the fill slope will be pulled back to the natural side slopes and deposited in a stable location where sediment will not deliver to any watercourses. All exposed areas associated with the crossing will be seeded at a rate of at least 30 pounds per acre and mulched to a depth of at least 2 inches (before settling) with 90% surface coverage.

The Erosion Hazard map (Map 13) illustrates the potential for on road and trail soil erosion if no precautions are made.



Map 12: Erosion Hazard Rating for Roads and Trails by Soil Type and Slope

Road Maintenance and Inspection Routine Plan

Road Maintenance Schedules for Mainline and Appurtenant Roads – As per the YHCP

1. Prior to September 15th of each year, Yurok will inspect all mainline roads for needed maintenance (see map in Appendix: AHCPMainlineRoads.PDF).
2. Other roads that are appurtenant to tribal harvest plans will be inspected at least through the prescribed maintenance period for erosion controls as established by applicable law or regulation, or at the minimum for three years after harvest activities have been completed.
3. The inspections of mainline and other roads will assess the effectiveness and condition of all erosion control and drainage structures.

Road Maintenance Schedules for All Secondary Management Roads or Roads Not Yet Decommissioned

Yurok will maintain all secondary management roads or roads yet to be decommissioned that are:

1. Yurok will conduct inspections on roads that are accessible by truck. Problems identified during the inspections will be documented and recommendations for their repair will be provided.
2. The inspections will assess the following:

    a. Adequate waterbar spacing, depth, and complete diversion of water flow onto undisturbed soil.

    b. Interception of the ditch line by ditch relief structures.

    c. Areas having poorly drained low spots or inadequately breached outside berms.

    d. That ditches are open and properly functioning, free of debris that could plug the ditch or a culvert and cause a diversion of water onto the road surface.

    e. Culverts are functioning properly (i.e., the culvert is not rusted out or separated at a joint; water is flowing through the pipe and not underneath; sediment and debris is not reducing the pipe capacity).

    f. Forest floor discharge sites below the outlets of drainage facilities for evidence of sediment delivery to Class I, Class II, or Class III watercourses accessible to maintenance crews.

Prioritize maintenance or repairs that are needed based on treatment immediacy (a subjective combination of event probability and potential sediment delivery evaluated as either low, moderate, or high). Yurok's goal will be to complete all the priority tasks prior to the winter period. If the priority workload exceeds that which can be accomplished in the current maintenance year, lower priority sites, including those identified under, will be held over until the following maintenance year.

Emergency Inspection Trigger

As per YHCP section 6.2.3.9.6.1, if a storm occurs that produces three inches of precipitation or more in a 24-hour period at a gauge location identified below, then Yurok's timberlands staff will conduct emergency inspections of all accessible rocked roads in the corresponding region, to the extent the roads can be traveled without causing road damage during or immediately after such event.

Gauge Location Associated Inspection Areas:

Gauge: Klamath River near Terwer Creek	Area: Coastal Klamath and Blue Creek
Gauge: Trinity River at Hoopa	Area: Interior Klamath HPA

Emergency Inspection Repairs

1. Make repairs during the emergency inspections if hand labor can correct the problem.
2. Any major problems observed during emergency inspections that would require the use of heavy equipment for repair will be reported to a designated "storm response coordinator." The coordinator will prioritize and schedule repairs so that they are accomplished as soon as possible. If access is prohibited because of adverse conditions, these sites will receive priority for treatment during the following summer's road maintenance schedule.

Time of Year Restrictions

1. Yurok may carry out patch (spot) rocking, brushing, cleaning inlets and outlets of culverts, cleaning ditches where poor drainage is occurring, repairing or maintaining existing waterbars, replacement of a failed or imminently failing culvert along a needed access road, and site specific road surface grading for maintaining the integrity of the road surface year-round, including during the winter period.
2. Grading will not be used to blade off wet soil to provide conditions for extended periods of operation on a deteriorated road surface.
3. The installation of waterbars, rolling dips and critical dips, general project grading for shaping the road surface, road outsloping, road rocking, resurface rocking, cleaning ditch lines, and general culvert replacements may occur only during the period when road upgrading may occur

Distribution of Information

Yurok will distribute information about proper road use and reporting of maintenance problems to all of its woods personnel and woods contractors and to members of the public who have road access to the Yurok Plan Area.

Fuels Management

Protecting life, property, and forest resources is of the utmost importance to the Yurok Tribe. A fuels reduction program of creating defensible space around tribal member's homes is currently, and will remain in practice. The acquisition of land set aside for carbon production poses an increased need for the expansion of the fuels reduction program in order to safeguard carbon stocks. The forestry program will make efforts to create fuel breaks in strategic locations in and around Yurok owned lands. In addition to fuel breaks, the forestry program intends to initiate in timber stand improvement projects that will decrease ladder fuels and increase stand resiliency.

Our aim is to support fuels projects that:

- Create a safe environment for fire fighters and those who live and recreate in fire prone ecosystems
- Meet tribal resource management goals
- Involve collaborative efforts with stake holders to reduce risks to communities, restore and maintain healthy ecosystems, and protect our cultural and natural resources
- Restore fire as a natural and managed process in fire dependent ecosystems
- Develop and maintain a competent and skilled work force
- Integrate fuels reduction with other natural resource program activities
- Support biomass utilization and promote healthy economies
- Incorporate fire monitoring to measure fire effects and assure desired conditions are met

Shaded Fuel Breaks

The California Department of Forestry Fire and Resource Assessment Program (CDF FRAP) rates the fire threat level of the Yurok Reservation area as Moderate to High with pockets of Very High. Fire suppression responsibility on the Yurok reservation ultimately lies with the BIA however, the BIA contracts with CalFire to provide all fire suppression services. The reservation hasn't had a big fire since 1998, but that doesn't mean the tribe shouldn't take preventative measure to guard against wildland fires. Over the last century the Yurok ancestral territory has experienced 132 fires encompassing an area of ~ 179,000 Ac (that's more than three times the size of the reservation).

Protecting life, property, and forest resources is of the utmost importance to the Yurok Tribe. A fuels reduction program of creating defensible space around tribal member's homes is currently, and will remain in practice. The acquisition of land set aside for carbon production poses an increased need for the expansion of the fuels reduction program in order to safeguard carbon stocks. The Forestry Department has identified 21 miles of ridgeline, in the Phase I Pecwan carbon area, to implement shaded fuel breaks.

Shaded fuel breaks serve as strategic fire protection zones while maximizing total forested acres of land. A shaded fuel break is an area within a forestland that has been treated or managed to remove or decrease fuel loads. These areas, approximately 300 feet in width, have had heavy underbrush and

downed dead material been removed and the mature trees are spaced so that the understory will not redevelop. The result is a landscape void of ladder fuels which decreases fire intensity and slows movement and increases the stand's resistance to fire damage.

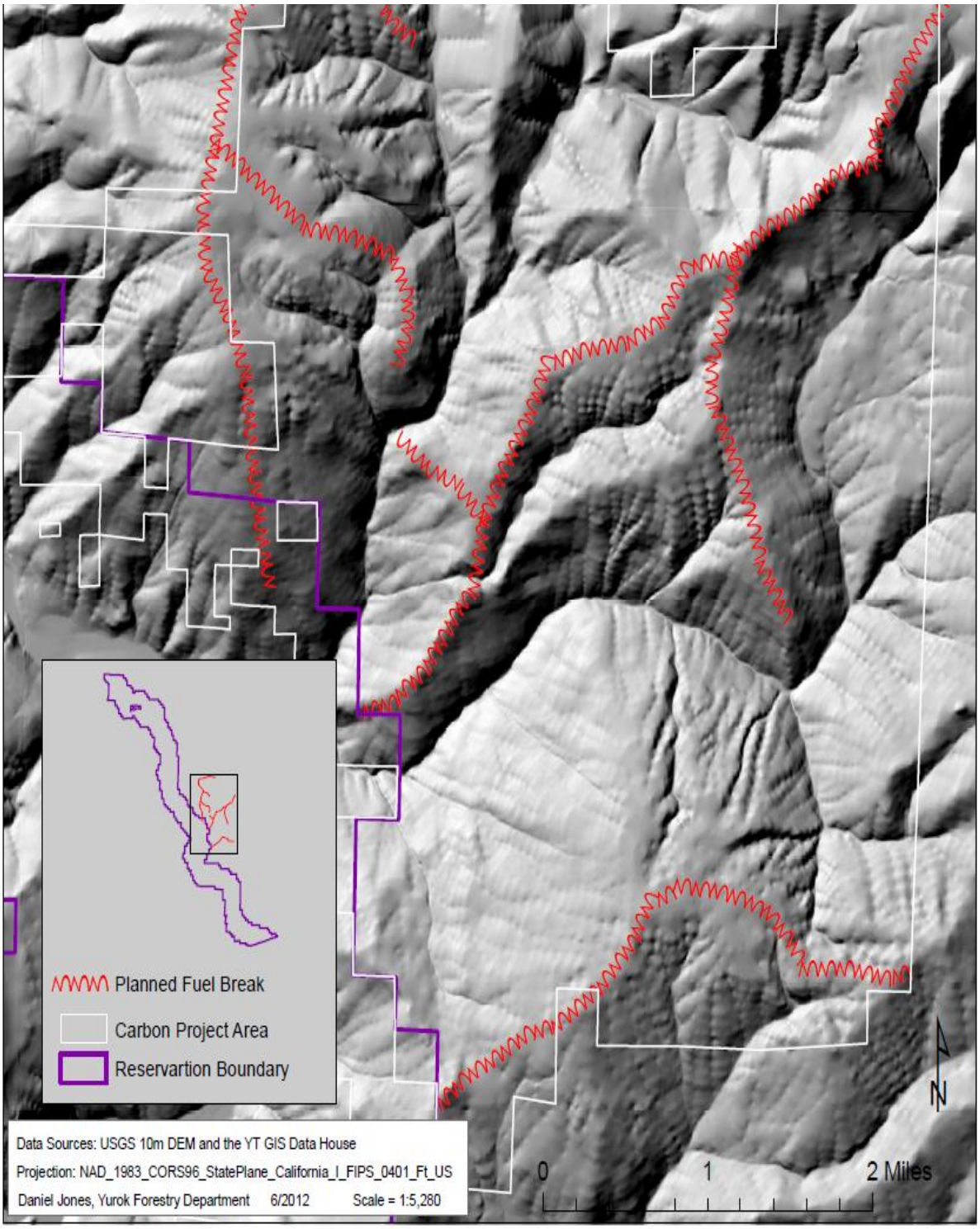
Over the next ten years the Forestry Department intends to complete the construction of the Phase I Pecwan ridgeline shaded fuel breaks. The Forestry Department has set a goal of completing 70 to 100 acres of fuel break a year in the Pecwan area. These breaks would stretch across the 21 miles of ridgeline identified in the following map and consist of an area of ~ 770 acres. In addition to the fuel breaks, the Forestry Department plans to use the ArcFuels extension of ArcMap to model flame run time and flame length and implement fuels reduction/fuel breaks at strategic points throughout the Yurok landscape.

Fuels Management Plan Needs

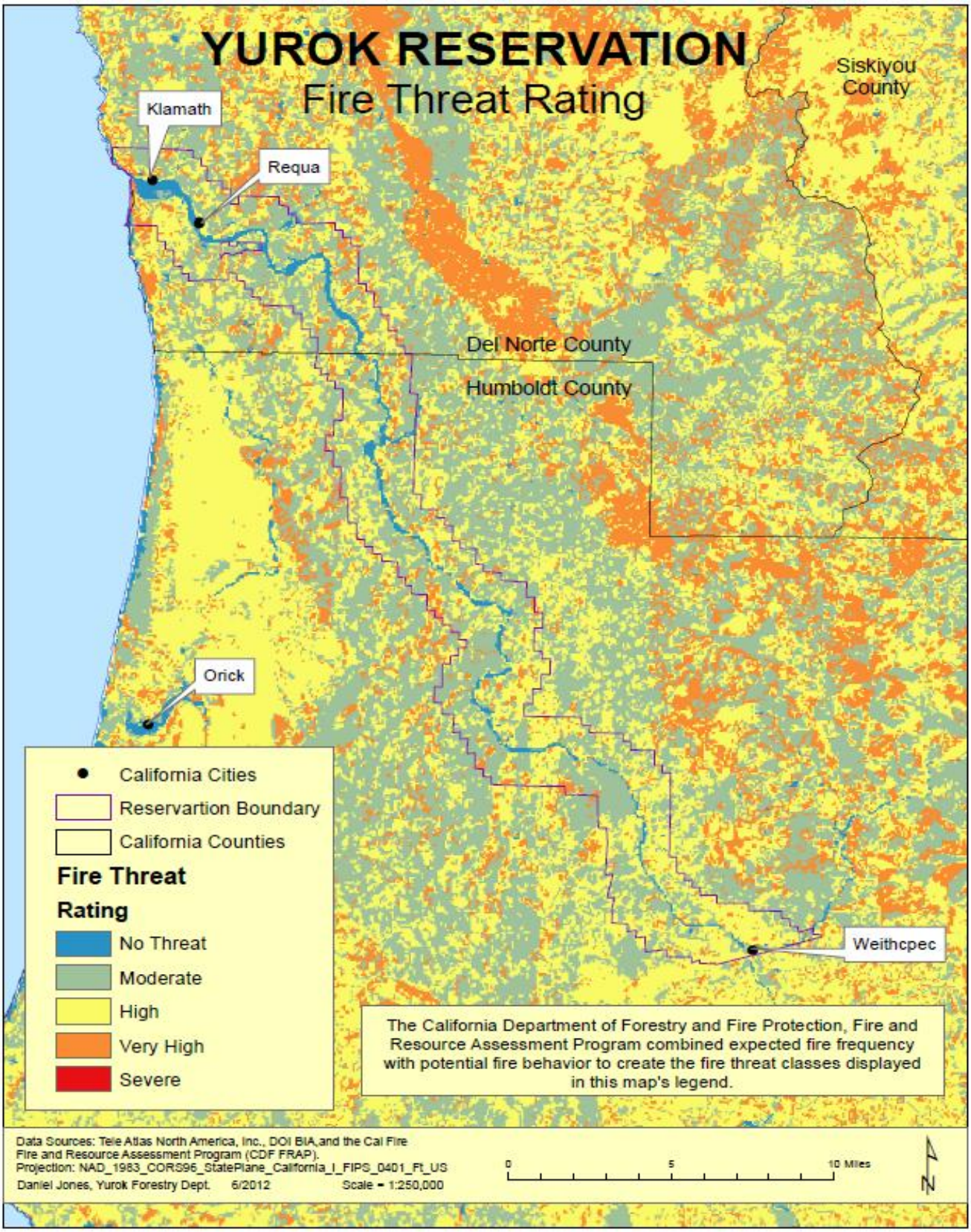
The Yurok Tribe currently does not have a Fire or Fuels Management Plan. 90 IAM Ch. 1 sec. 1.2 requires a Wildland Fire Management Plan in order to address fuels management needs. Because the Tribe has no fire management plan that addresses fuels management, all fires are considered wildland fires and must be suppressed.

The purpose of fuels management planning is to translate resource goals and objectives into appropriate management strategies for each fire management unit, zone, or other ecological unit, with associated suitable tactics, priorities, resource values, constraints, and desired future conditions. The management plan must address the full range of fuels management actions that might be considered. The plan should also include fuel treatment schedules, guidelines for setting priorities for treatments, and workload analyses to determine staffing levels needed to implement the plan.

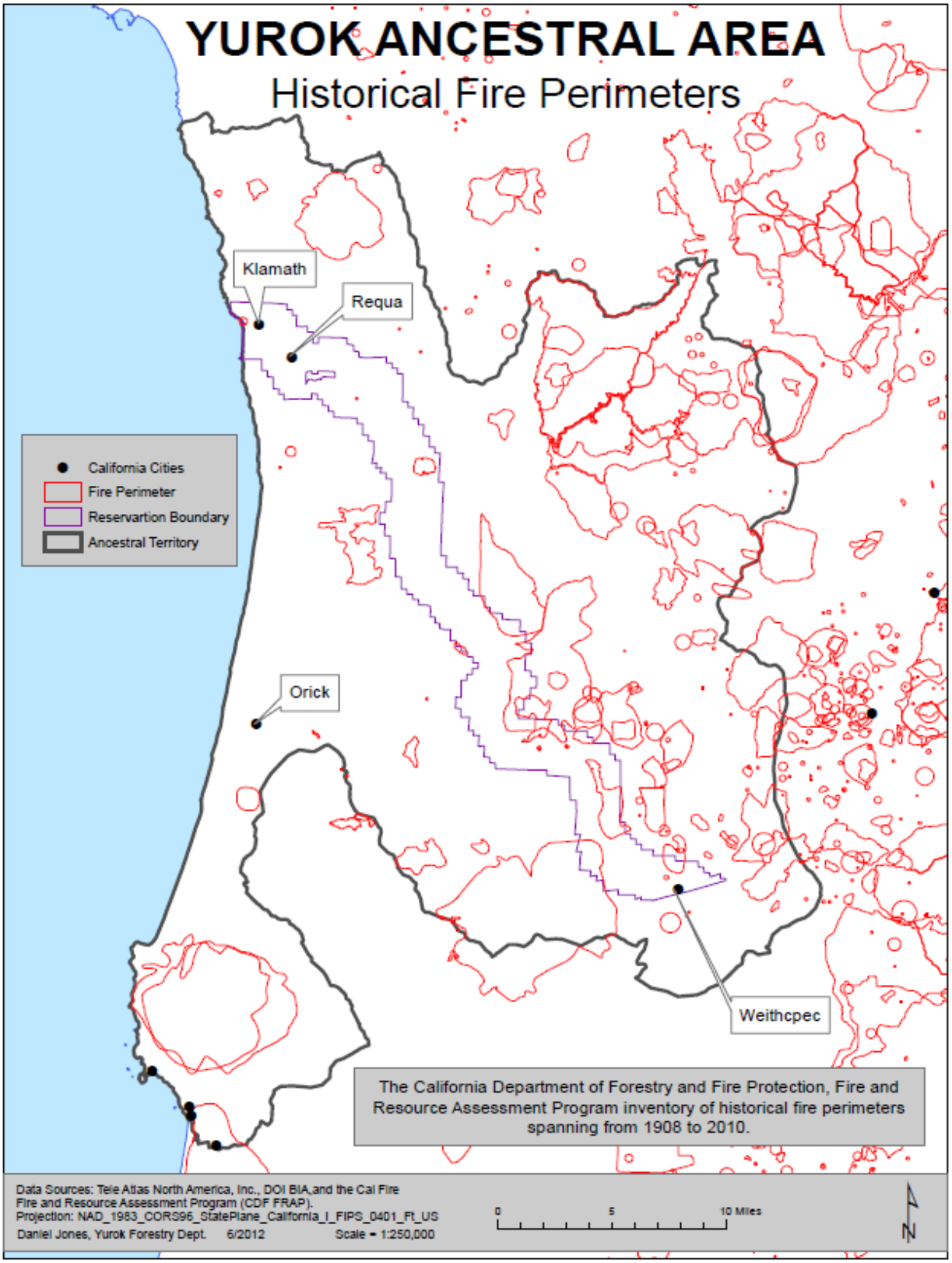
The Fuel Plan should identify the general management approach, including treatment prioritization based on various land classifications (such as wildland urban interface, fire regime and condition class, fuel models, etc.). It should describe specific fuels treatment strategies including scope, methods and timeframes for conducting the work. Identify any opportunities created by hazardous fuels reduction treatments. The strategies should incorporate all fuels work to be conducted. The plan will address all treatments that may conceivably be used, including prescribed fire. Specific and comprehensive strategies will determine the effects to be addressed in the plan Environmental Assessment (EA), and any treatment not include will need to be addressed in a subsequent EA or amendment.



Map 13: Planned Fuel Breaks within the Phase I Purchase Area.



Map 14: Fire Threat Rating for the YIR



Map 5: Yurok Ancestral Historical Fire Perimeters

FOREST MANAGEMENT ALTERNATIVES

Alternative #1 Limited Action: Timber harvest would be limited to salvage logging, hazard tree removal and limited operations on Allotments. Less than 500 thousand board feet (MBF) per year would be harvested. Firewood harvest would be limited to cutting by permit only. No clear cutting will occur. Less than 100 cords of firewood harvested on an annual basis. No timber harvests will occur within the Carbon Credit areas. No prescribe fire would be utilized for land management purposes.

Alternative #2 Conservative: This alternative limits all harvesting on tribal lands to uneven-aged management (single-tree and group selection methods), yielding an average annual harvest of approximately 1.5 million board feet (MMBF) per year, over the ten year planning period. No clear cutting will occur. Firewood harvest would be limited to cutting by permit only. Less than 100 cords of firewood harvested on an annual basis. No timber harvests will occur within the Carbon Credit areas. Prescribe fire would be utilized for land management purposes on a limited basis.

Alternative #3 Moderate (Preferred Option): This option mainly provides for uneven-age management on all Tribal lands. Total timber harvests on all lands would be an average of approximately 6.64 MMBF per year (for the next ten years) including the carbon areas. In general, clearcut units would be limited to less than 20 acres in size (except in Phase I lands where no clear cutting is allowed), but could exceed this size if justified in the project specific Timber Sale Environmental Assessment (EA). Firewood harvest by free use permit can occur, up to 120 cords per year. Commercial firewood cutting, up to 200 cords per year, would also occur. Timber harvests will occur within the Carbon Credit areas up the amounts allowed in the Carbon Credit Program, approximately 2.5 mmbf per year. Timber harvests favor selection, group selection, or intermediate treatments. Rotation age will be from 80 to 100 years. Prescribe fire would be utilized for land management purposes on a project by project basis up to 100 acres per year.

Alternative #4 Industrial: This option allow for nearly all harvests to be even-aged with 50 year rotations. Total timber harvests on all lands would be approximately 9 mmbf per year including the carbon areas. Firewood harvest by free use permit can occur, up to 120 cords per year. Commercial firewood cutting, up to 600 cords per year, would also occur. Timber harvests will occur within the Carbon Credit areas up the amounts allowed in the Carbon Credit Program, approximately 3.5 mmbf per year. Timber harvest silviculture will include clear cuts, selection, group selection or intermediate treatments. Clear cut may be as needed on a routine basis. Clear cuts will be limited to 30 acres or less. Rotation age will be from 50 to 60 years. Prescribe fire would be utilized for land management purposes on a project by project basis up to 500 acres per year.

Implementation Timeline

The following spread sheets outline the project timelines timber sales and the other project work that has been identified with this forest management plan.

Table 10: Forestry Timber Sale Goals 2012-2022

Forestry Work Plan Schedules

Objectives and Activity Time Table

Primary Objectives: **Harvest Schedule for YIR Trust Lands**

Staff Member Responsible: **Timber Sale Forester**

Beginning Date:**2012** Ending Date:**2022**

Sub-Objective/Activities	Fiscal Year: 2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Comment
Joe Bear Sale	ESA/Prep	Harvest										
Essenprise	ESA/Prep	Harvest										
Cappell "C"	ESA	ESA/Prep	Harvest									
Johnson 40		ESA	ESA/Pep	Harvest								
Blue Creek		ESA	ESAPrep	Harvest								
Johnson 30		ESA	ESA	Prep	Harvest							
Phase I West			ESA	ESA/Prep	Harvest							
Starwein North			ESA	ESA/Prep	Prep	Harvest						
Blue Creek				ESA	ESA	Prep	Harvest					
Scaath					ESA	ESA	Prep	Harvest				
Bear Creek Final						ESA	ESA	Prep	Harvest			
Cappell "D"							ESA	ESA	Prep	Harvest		
Phase I Thin								ESA	ESA	Prep	Harvest	

Forestry Work Plan Goals

Objectives and Activity Time Table

Primary Objectives: **Projects Identified within the Forest Management Plan**

Staff Member Responsible: **All Staff under direction of the Forestry Director**

Beginning Date: **2012** Ending Date: **2022**

Sub-Objective/Activities	Fiscal Year: 2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Stand Exam Data Base	Develop	Data Base	Field Verify	Stand Exams on 3,650 per year							
Roads											
Develop Decommission Plan	1/4 mile per sq. mi per year										
Identify Road Classification	ID roads	Classify & Map									
Fuel Management											
Shaded Fuel Break Const.	Planning	Planning	70 ac	70ac	70 ac	70ac	70ac	70ac	70ac	70ac	70ac
Structure Clearance / WUI											
Prairie Areas/ Restoration	Plan Burn	Burn 200	Planning	Burn 200	Planning	Burn	Planning	Burn	Planing	Burn	Planing
Fuel Break Maintenance	Develop Maintance P		Maintain fuel breaks as needed								
Hardw oods											
Hardw ood Sales	Planning	Prep Sale	Harvest	Prep Sale	Harvest	Prep Sal	Harvest	Prep Sale	Harvest	Prep Sa	Harvest
Tribal Free Use	Harvest	Harvest	Harvest	Harvest	Harvest	Harvest	Harvest	Harvest	Harvest	Harvest	Harvest
Planning Activities											
Preperation Work											
Field Implementation											

Table 11: Forestry Project Goals for 2012 to 2022

WOODLAND MANAGEMENT PLAN

Resource Inventory

Woodland means forest land not included within the timberland classification, stocked, or capable of being stocked, with tree species of such form and size to produce forest products that are generally marketable within the region for products other than lumber, pulpwood, or veneer. Commercial Woodland is land qualifying as forest, containing less than 5 percent commercial timber species crown cover, diameters at least 3.0" at root collar (DRC) of woodland species or 5.0" DBH timber, and considered of high site potential capable of growing at least 5 cu. ft/ac/yr of merchantable material. It is a term coined to describe that portion of woodland producing marketable woody products, which is currently or prospectively accessible, is not withdrawn from such use, and not already accounted for within commercial or noncommercial timberland.

Woodland Cover Types

The Bureau of Indian Affairs (BIA) currently recognizes seven woodland cover types for project funding purposes. Additional woodland cover types may be recognized by the BIA Director upon request of the Regional Director. These seven types are:

1. Pinion –Juniper
2. Juniper
3. Non-timber Oak
4. Riparian
5. Mesquite
6. Aspen
7. Sabal Palm

The only woodland type that meets any of these definitions set forth in the BIA Woodland Manual is the Riparian Type. It is defined as:

Riparian woodlands are found in most regions of the country. They are defined by their obligate tree species and are generally composed of cottonwood and willow forests, with alder, maple, elm, ash, and other associated species.

Mapped woodlands of the Riparian type on the YIR consist of approximately 983 acres of hardwood stands. These acres are located mostly along watercourses, major streams, and rivers. These woodland acres are not entirely made up of pure stands of hardwood species. Conifer species also make up a moderate amount of the trees within these stream zones. Due to the composite nature of the hardwood and conifer mix these areas were evaluated as part of the total timberland acres within the YISYL and used as part of the AAC calculations.

Traditional uses of this vegetation type have included tanoak acorn collection, firewood cutting, hunting and mushroom collecting. This area is also an important habitat for deer and other fur bearers. Other

forest products include, but are not limited to: salal, hazel, beargrass, ferns (five-fingered), woodwardia, oregon grape, wild iris, and other medicinal plants.

Tribal O & S

Although it is the intention of the Tribe to generally preserve this habitat, there are no current YIR Tribal O & S that pertain directly to hardwood forest habitat. Some hardwood habitat may be rehabilitated to conifer stands if conditions indicate that this is feasible. Conversely, the assessment of areas that meet specific guidelines may be reverted back to pure hardwood stands so that these areas may provide for traditional uses and values.

Hardwood Reversion Guidelines

- Topography: utilize area of mild slope with a southern aspect.
- Current vegetation: Areas where tanoaks currently occupy the site are preferred. Large old hardwood trees should be a priority for consideration.
- Road Access: Areas with good road access should be considered.
- Species Mix: Areas with a high percentage of conifers should not be utilized. Conifer stocking should not have a basal area over 50 square feet per acre.
- Areas with a large amount of bay trees (*Umbellularia californica*) should not be considered due to the increased risk of SOD infection.

Hardwood Conversion Guidelines

The following guidelines should be considered when prairie establishment is being reviewed:

- Soils: Area of naturally occurring prairie or grassland soils should be highly reviewed and considered.
- Air Photo Use: Areas of potential prairie use should first be located on air photos taken in the 1940' or 1950s'. The use of photos should help confirm past land use.

Maintenance of the prairie areas with the use of fire should be done in accordance with a prescribe burn plan and any necessary burning permits.

Personal Use Firewood Regulation

Personal use firewood is available on designated landings in timber sale and designated locations outside of sale boundaries. Approximately 100 MBF gross scale (approximately 120 cords) will be made available annually. Tribal members, Tribal employees, and their designated gathers can cut firewood. All firewood is for Tribal member personal use only and cannot be bartered, sold, or given away. All cutting shall be by Tribal permit only. This permit is a tracking tool used by the YTFD and has a NEPA categorical exclusion associated with it. The permit, a map of the areas, and times where firewood may be obtained will be provided by YTFD staff for the memberships' personal use. All permits will be subject to the provisions of the Yurok Tribal Council and 25CFR 163.26(b).

The following terms and conditions apply to the personal use firewood permit:

1. Personal use firewood cutting areas will be by permit only.
2. All permits will be subject to the provisions of the Yurok Tribal Council.
3. The permit must be in possession of the permittee of his/her designated gatherer while the permittee or his/her designated gatherer is obtaining firewood from any of the designated areas.
4. Every load of firewood, before being moved from the gathering area, must be correctly accounted for. Permittee shall write the date, amount hauled, vehicle license number and species being transported on back of permit each time.
5. Personal Use Permits will be available to Yurok Tribal members, Yurok Tribal employees and designated gathers only. Yurok Tribal members, Yurok Tribal employees and designated gathers are required to sign the permit in the presence of the officer issuing the permit. Yurok Tribal members, Yurok Tribal employees and designated gathers accept all permit requirements by affixing their signature to the permit.
6. All cutting and gathering with personal use permits in designated areas will be restricted to the cutting of logs specified as firewood use. No live trees will be taken for firewood. No standing or alive trees may be taken for firewood.
7. All personal use firewood permits are for personal use only.
8. Cutting is prohibited on all areas except those designated.
9. All permittee created trash must be removed from designated area.
10. This permit does not entitle permittee to cut or transport firewood from private lands.
11. All permit and firewood cutting privileges will be revoked for non-compliance of permit regulations.
12. No Yurok Tribal vehicles will be used to gather wood for personal use.

Commercial Fire Wood Production

A commercial firewood enterprise is quite possible given the total amount of high quality firewood available on the YISYL. In some areas that are predominately tanoak forest it is estimated that as much as 45 cords of firewood per acre may be available for such an economic endeavor. The average annual growth of hardwood species within the YISYL averages approximately 85 cubic feet of wood per acre per year. This is about ¾ of a cord of firewood per acre per year. Commercial firewood timber sales should be developed and put up for bid. Research should be completed as to the best size and configuration for a sale of this type.

Hardwood Harvest Policy

Commercial hardwood harvest would follow the same requirements that are required for a timber harvest of conifer species. Silviculture to use for these hardwood stands would follow a Rehabilitation of Understocked Area Prescription. This prescription is used for the purposes of restoring and enhancing the productivity of commercial timberlands which are not currently stocked with conifers. It is used on understocked timberlands where no countable conifer trees are to be harvested and the

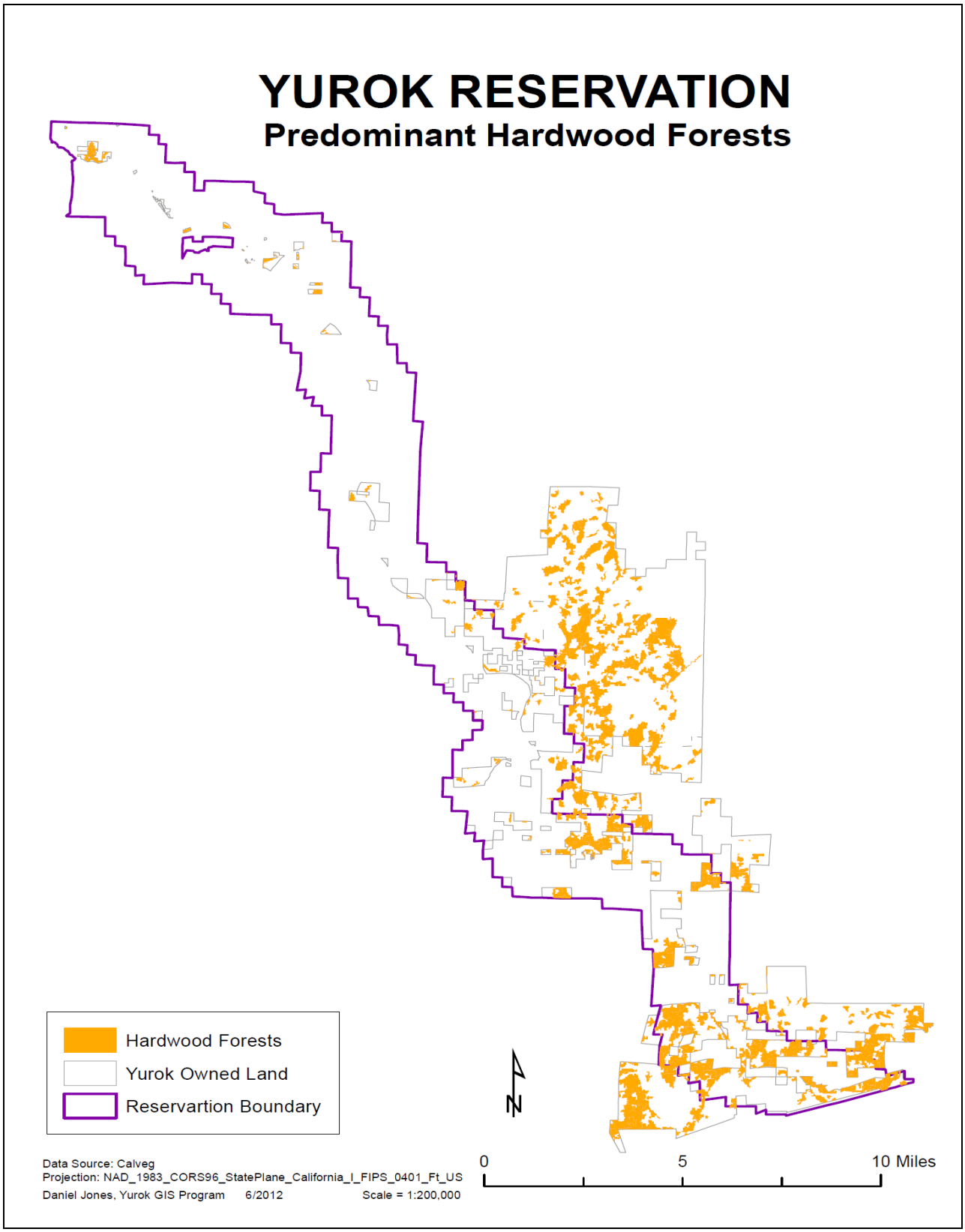
broadleaf species are not designated for management, the area shall be planted with conifers. The following map depicts the area within the YISYL where hardwoods make up the predominate species within the forest stand.

Documentation and Records

Before any harvesting of woodland species, a Timber Use Policy Statement approved by both Tribal Council and BIA must be in place, and cutting must be monitored by the Forestry Department. Firewood harvest volumes must be must be recorded by the FOC, and reported in the annual Report of Timber Cut (ROTC) to the BIA.

Organization and Funding

Harvesting of woodlands for free use firewood is a low intensity activity that should not conflict with other management activities.



Map 6: YISYL Predominant Hardwood Forests

FOREST CARBON PROJECTS

Currently there are two separate and different forest carbon projects on Yurok fee lands. The first and largest project is within the Phase I purchase area. This project is approximately 21,240 acres in size. The second carbon project is located on the fee lands generally referred to as the Cook Koppala Gerber Gleason (CKGG) purchase. This project is 8909 acres in size. The implementation of the carbon projects hinges upon the approval of this [FMP] document. Once the FMP is approved and the carbon project agreements are finalized, the agreements can be added as addendums to the Yurok FMP.

Phase I Project

The Yurok Tribe Sustainable Forest Project (CAR777) is an Improved Forest Management (IFM) project that is registered under version 3.1 of the Climate Action Reserve Forest Project Protocol (FPP). The project site is on fee land owned by the Yurok Tribe. The Phase I Acquisition covers 22,237 acres and includes three tracts of differing acreages within Map 18. The carbon Project Area covers all of the lands within the Cappell and Weitchpec management areas, and the large majority of the Pecwan tract. Total area of the project site is 21,240.5 acres.

This Forest Project Design Document (PDD) utilizes the most recent Template developed by the Climate Action Reserve (CAR) and uploaded to the CAR website on April 5, 2012. Additional supporting documents referred to throughout the text have been included as separate Supplements A – M. In all cases equations, eligibility requirements, supporting data, and other materials have been adapted to conform to Improved Forest Management requirements under the CAR Forest Project Protocol version 3.1.1. The project takes place on land that has greater than 10 percent tree canopy cover and employs natural forest management.

The project area has been mapped using ArcGIS software by the Yurok Tribe GIS Department (see Map 18). Detailed survey data, APN lists, zoning data, and title reports have been provided to verifiers upon the site and office visit. The Project Area extends over two different mapped Supersections, the Northern California Coast and the Southern Cascades. Map 18 shows the Supersection boundary between these two areas, the project boundary, and the total acreage of the Project Area found within each. This map and the calculations below demonstrate that the Yurok Tribe Sustainable Forest project meets this requirement. The Project Area in the Northern California Coast Ecoregional Assessment Area (Supersection) equals 2,079 Acres.

Since the project area that overlaps the Northern California Coast Supersection is less than 10% of the total Project Area, this project meets the eligibility requirement for geographic boundaries.

Total Project Area = 21,240.5 acres
10% of the Project Area = 2,124 acres

Impacts on Timber Harvesting

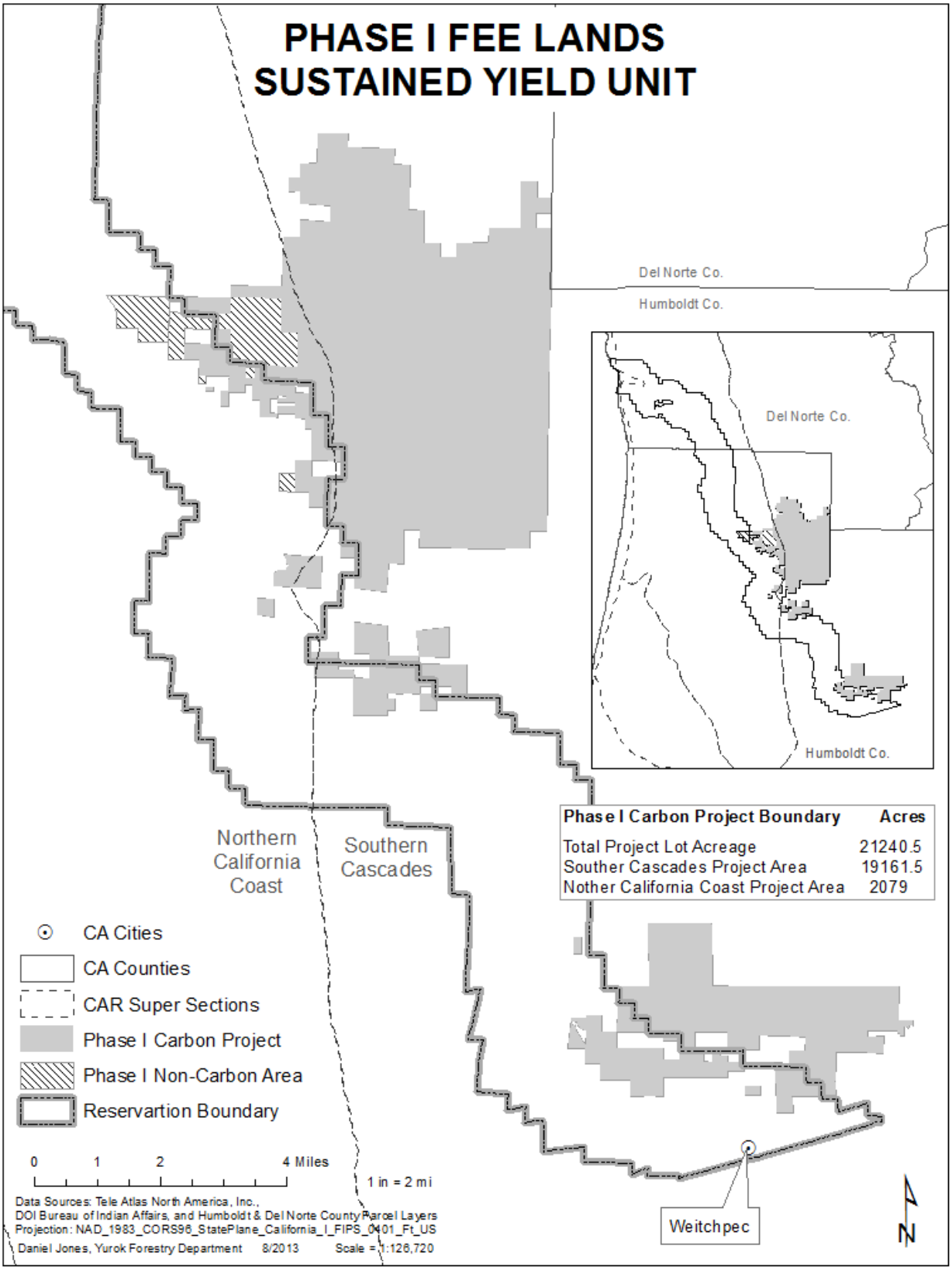
The Tribe can harvest timber on 1,254 acres excluded from the carbon project (see map 18) as otherwise permitted pursuant to its agreements with the State Water Board and this FMP. For the remaining Phase 1 land within the carbon project area, the Tribe will be precluded from any harvest on those lands included in the Phase 1 carbon project until 2015.

The Phase I carbon project generated 1,048,997 Vintage 2011 VERs. The emissions from biomass associated with harvesting a cubic meter of timber is approximately 2.5 – 4.0 tCO2e per cubic meter harvested. If the Tribe maintains 25,000 tCO2e and does not sell these VERs, then it can harvest the roughly equivalent amount6 of 2.1 MMBF from the project area through 2015. After 2015, the Tribe can harvest the total annual growth under the cabon project area, which is projected to be 40,000 tCO2e per year. 40,000 tCO2e is approximately equivalent to 4.20 MMBR to 6.72 MMBF (see Appendix for conversion calculation).

All Improved Forest Management projects must demonstrate that they employ sustainable harvest practices on the Project Area through one of the three following ways:

1. The Forest Owner must be certified under the Forest Stewardship Council, Sustainable Forestry Initiative, or Tree Farm System certification programs.
2. The Forest Owner must adhere to a renewable long-term management plan that demonstrates harvest levels which can be permanently sustained over time and that is sanctioned and monitored by a state or federal agency.
3. The Forest Owner must employ uneven-aged silvicultural practices and canopy retention averaging at least 40% across the forest as measured on any 20 acres within the entire forestland owned by the Forest Owner.

This project will meet the second requirement above by following a management plan that will be monitored by the Bureau of Indian Affairs (BIA), a federal agency.



Map 7: Sustainable Forest Carbon Project Location

Composition of Native Species

Within each Ecoregional Assessment Area there is a maximum percentage that any one species can attain. This project lies within the Southern Cascades Supersection and contains a mix of species found in the Southern Cascades Mixed Conifer Assessment Area. According to data provided by CAR the maximum percentage any one species can attain in this Assessment Area (measured in basal area) is 65%. Taking values from our final forest inventory, ecoPartners have calculated the total basal area by species for the entire project site. By comparing the basal areas values to the total basal area found on the site, we calculated the overall percentage of each species (ft^2/acre). Table 12 demonstrates these and results and that no single species exceeds 65% of the overall basal area.

Table 12: Basal Area and Basal Area % by species on the project area

Species	Basal Area (ft^2/acre)	Percentage by Basal Area
Douglas-fir	55.03	33.45%
Tanoak	36.77	22.35%
Red Alder	19.19	11.66%
Chinquapin	16.58	10.08%
Pacific Madrone	11.62	7.06%
Western Hemlock	4.66	2.83%
Pepperwood/California Laurel	3.33	2.02%
Coast Redwood	3.33	2.02%
Bigleaf Maple	2.71	1.65%
Black Oak	2.66	1.62%
Port Orford Cedar	2.22	1.35%
Western Red Cedar	2.00	1.21%
Ponderosa Pine	1.75	1.07%
Sugar Pine	1.54	0.94%
Incense Cedar	0.75	0.46%
Unknown	0.14	0.09%
Western Hemlock	0.10	0.06%
Western White Pine	0.05	0.03%
Knobcone Pine	0.04	0.03%
Jeffrey Pine	0.02	0.01%
White Fir	0.02	0.01%
Other Hardwood	0.00	0.00%
TOTAL	**164.51**	**100.00%**

Only a small percentage of the total acreage is 20 years of age or younger. Of the 103 strata included in the overall inventory, only two were under 20 years of age. Table 13 demonstrates that the total acreage in age class 20 years or less is only 9.57%, lower than the maximum level of 40% allowed by the protocol.

Table 13: Total Acres by Age Class

Age Class	TOTAL	%
0-20 years	2,129	9.57%
20+ years	19,763	88.87%
Non-productive	345	1.55%
TOTAL	22,237	100.00%

Since harvests have not occurred on the project site for the last two years, the Yurok Tribe must:

maintain (or demonstrate ongoing progress toward) an average of at least:

- one (1) metric ton of carbon (C) per acre; or
- 1% of standing live carbon stocks,

in standing dead wood, whichever is higher, if a verifier determines that the quantity of lying dead wood is commensurate with recruitment from standing dead trees (i.e. there is no evidence that lying dead wood has been actively removed). Since downed woody debris was not included as one of the carbon pools to be measured within the carbon inventory, we have met this requirement by calculating the total percentage of carbon coming from the standing dead wood pool. The estimated carbon in standing dead wood as a percent of carbon in aboveground live carbon stocks is 6.9%, greater than the minimum 1% of total aboveground stocks required by the protocol.

Ongoing Management Activities (CAR FPP v3.1 Section 3.9.3)

The management activities that will increase carbon stocks on the project site are increasing the overall age of the forest through the extension of rotation ages and creating cultural and ecological reserves. The Yurok Tribe currently owns many different areas of forestland that are managed for timber and other resources. Different areas within the Tribal landholdings have different management guidelines and standards. Tribal trust lands and allotments are being managed under standards and guidelines of Yurok Forest Management Plan.

General Silviculture Recommendations by Timber Type (Supplement H)

Given the stated goals of the Tribe, general silviculture recommendations for different timber types found on the project site are described below. These recommendations are a part of the CAR777 PDD.

Timber Type I (hardwoods): These stands need stand exams in order to identify any areas that might contain suppressed conifer understories. Otherwise they should be managed for habitat, fuelwood, culturally significant species, diversity, aesthetics, and recreational value.

Timber Type II (plantations): These stands need prompt stocking control and conifer release (pre-commercial thinning, manual removal of competing vegetation.) These stands are critical to the future stand structures of the YIR, and early management activities are highly recommended.

Timber Type III (large densely stocked sawtimber – coincides with Type VIII on p63): Management of these stands should emphasize the identification of habitat and biodiversity values and, if appropriate, early management for timber production. Depending on stand conditions, carefully planned group selection or individual tree selection cuts could be applied, with special attention given to road location. Depending on stand health, sanitation/overstory removal approaches may also be appropriate.

Timber Type IV (large moderately stocked sawtimber – coincides with Type VII on p63): These stands have the highest priority for harvesting with an emphasis on establishing and controlling conifer stocking. Depending on stand conditions, group cuts, single-tree selection, or seed tree/shelterwood could be appropriate in these stands.

Timber Type V (large sparsely stocked sawtimber – coincides with Type VI on p63): More data is needed in these stands to prescribe silviculture. Depending on regeneration amounts, some thinning from below may be indicated. It is most likely that these stands would be best treated with seed tree cuts, followed by site preparation and planting.

Inventory Design

The Yurok Sustainable Forest project site utilized two different inventories to calculate current carbon stocks on the project site. The inventory utilized nested fixed circular plots. The original cruise covering approximately 47,000 acres (Both Phase I and Phase II property) included 1,147 plots. For the purposes of the Yurok Tribe Sustainable Forest project, 216 fixed-area plots of these 1,147 plots lying within the project site were used to estimate carbon stocks. Individual stands within each inventory strata were randomly selected to be cruised. Plots were laid out on a square 6-chain grid. The data collected for each cruise tree included species, DBH recorded by 1 inch class, number of 16 foot logs to a 6 inch top diameter inside bark, and percent defect by log position. Additional data on selected trees included total height, live crown ratio, defect by bole position (thirds), bear damage code, snag code and age.

Quantification Methodology

Carbon in all trees was estimated using approved equations from the Climate Action Reserve. The equations were compiled in a propriety dynamic link library for use in Excel and forest modeling software. Source code was available for inspection during the verification. Carbon in belowground stocks was estimated using the approved equation in the FPP v3.1.

To estimate carbon using the approved Climate Action Reserve equations, total tree height for some trees had to be estimated by regression on diameter.

The calculation of carbon relied on the following conversion factors and units:

1 metric tonne = 2,204.6 lbs.

1 metric tonne of carbon dioxide equivalent (tCO2e) = 3.666 metric tonnes of carbon

1 cu.ft. water = 62.4 lbs. (used for calculating wood density)

0.5 lbs. of carbon = 1 lb. wood

1 MBF = 1 thousand board feet (Scribner)

1 MMBF = 1 million board feet (Scribner)

Inventory Update Process

According to CAR FPP v3.1, a long-term inventory plan described below is required for continuous monitoring of carbon stocks on the project site:

Annual monitoring of Forest Projects is required to ensure up-to-date estimates of project carbon stocks and provide assurance that GHG reductions or removal achieved by a project have not been reversed. Forest Owners must conduct monitoring activities and submit monitoring reports on an annual basis.

For Forest Projects, monitoring activities consist primarily of updating a project's forest carbon inventory. The Reserve requires a complete inventory of carbon stocks to be reported each year. This complete inventory must be maintained throughout the time the project is reporting to the Reserve.

Prior to the Forest Project's first verification, the Yurok Tribe must establish a monitoring plan detailing the specific methods that will be used to update the project's forest carbon inventory on an annual basis. The inventory methodology detailed in this monitoring plan must adhere to the guidance in CAR FPP v3.1 which establishes the equations for computing biomass and limits to which computer models can be used in the inventory update process.

Inventory data are updated annually by:

1. Incorporating any new forest inventory data obtained during the previous year

2. Modeling growth in sample plots using approved growth models and stands table project methods

3. Updating the forest inventory data for harvests and/or disturbances that have occurred during the previous year.

The plot data used for defining the estimates for verification must have been sampled within the last 12 years. The scheduling of plot sampling may occur in one time period or be distributed over several time periods. Either approach is acceptable so long as an inventory of the entire Project Area (its required carbon pools and corresponding sample plots) is completed within 12-year intervals. The Yurok Tribe will maintain a current running inventory of carbon stocks as part of their management of the project site. The Yurok Tribe is in the process of updating its forest management plan to include Project Area lands. This updated forest management plan will obtain BIA approval and will be compliant with BIA regulations, including completion of a regular inventory at least every seven years that meets a precision level of 5% error at one Standard Deviation. The high level strategic guidelines for management are documented in the Skeleton FMP.

Plots will be re-measured at least every twelve years per A.3 of the CAR FPP v3.1. Individual trees on measurement plots will be grown using FPS or any other growth model approved by CAR between re-measurements, provided that it has been calibrated to accurately reflect data in earlier modeling exercises. Individual trees on the basal area plots may be grown using the same growth model by taking tree diameters as mid-points in each diameter class. Alternatively, basal area on basal area plots may be estimated using a ratio of basal area growth as predicted on measurement plots in the same stratum. Additional plots may be added to the inventory to improve the precision of estimates. Upon event of natural disturbance, fire, timber harvest or other event that may alter the carbon stocks in the project area, the affected area will be delineated into appropriate strata and all plots within the affected area re-measured prior to subsequent verification. All affected areas that are greater than two acres must be delineated. Cruise data will be collected on a regular basis using the Field Measurement. The data will be recorded on plot sheets and subsequently digitized for permanent storage by the YTFD and/or Yurok Tribe GIS staff. Forestry staff will perform a quality control check on the digital data to identify recordation and transcription errors. Carbon in all trees on measurement plots will be estimated using approved equations from the Climate Action Reserve. The equations will be compiled in a propriety dynamic link library for use in Excel and forest modeling software. As part of a continuous inventory and monitoring plan, the Yurok Tribe will supply information listed in Table 14 to verifiers on an annual basis.

Table 14: Verification Reporting Requirements

Reported Information	Supplied documents
The carbon associated with harvest events in terms of effects on onsite stocks and effects on harvested wood products during the previous year.	• Harvest reports prepared by the Forest Owner • Harvest data submitted to agencies
The carbon associated with forest growth during the previous year	• Estimates of growth provided by Forest Owner. The verifier shall determine if reported growth is reasonable based on professional judgment
Any disturbances that have impacted more than 1% of the project carbon that have occurred within the previous year	• Reports submitted by Forest Owner • Regional and State data identifying disturbance sites

Baseline Carbon Stocks

A requirement of the Forest Project Protocol is the listing of all legal constraints that affect management activities on the Project Area. This listing must demonstrate and describe the constraint and discuss how the constraint will be modeled to ensure that the constraint is respected. Management on the site will conform to all applicable state and federal regulations governing timber harvesting and endangered species. On reservation portions of the Project Area are managed in accordance with the National Indian Forest Resources Management Act under a BIA-approved forest management plan. The Yurok Tribe will comply with applicable provisions of California state law for activities undertaken on off-Reservation portions of the Project Area, including compliance with the California Forest Practices Act.

There is a voluntary Habitat Conservation Plan (HCP) applicable on the project site; however, the Forest Project Protocol v 3.1 section 6.2.1.1 (p. 48) states, “Voluntary agreements that can be rescinded, such as voluntary Habitat Conservation Plans (HCPs), Safe Harbor Agreements, rental contracts, and forest certification are not legal requirements”.

For the parameterization of the modeling of carbon stocks on the baseline and project scenarios legal constraints in Table 15 were followed.

Table 15: Legal Constraints for the Carbon Projects

Constraint	Description
Stream Class 1	150 ft buffer around Class 1 waterways
Stream Class 2	100 ft buffer around Class 2 waterways
Stream Class 3	50 ft buffer around Class 3 waterways
Stream Class 4	100 ft buffer around Class 4 waterways
NDDB Species	Natural Diversity Database species subject to surveying and habitat and avoidance requirements
Federal List	Subset of NDDB species that are threatened and endangered under federal law; Pacific fisher is only listed species in project area
Wild and Scenic River	1/4 mile zone around Klamath River; clear-cutting not explicitly prohibited from Wild & Scenic Zone but is not included in the model or the baseline
Road	25 ft road buffer
Northern Spotted Owl Detections	No changes to nesting habitat within 500 ft; no changes to roosting habitat within 1,000 ft
Northern Spotted Owl Territories	500 acres of owl habitat must be maintained within 0.7 miles of NSO detections, and 1,336 acres within 1.3 miles
Salamander Detections	Salamander observations from landowner data
Pacific Fisher Detections	Pacific fisher observations from landowner data
Serpentine Woodland Objective	Areas of poor stocking due to infertile serpentine soils; may be excluded from project
Prairie Objective	Areas recommended for prairie restoration
Oak Savannah Objective	Areas recommended for oak savannah restoration
Clear Cut Adjacency	Forest Practice Rules for even-aged silviculture requiring at least 300 feet between harvested units
Stocking Standards	Minimum planting and residual basal area standards of Resource Conservation from the Forest Practice Rules
Restricted Zones	Spatial harvesting limits imposed by the above riparian and wildlife constraints

Project Carbon Stocks

Current inventory values were projected forward over 100 years in the baseline and project scenarios using the Forest Projection & Planning System version 7.0 (FPS) developed and maintained by the Forest Biometric Research Institute (FBRI).

The model was parameterized with silvicultural prescriptions and local calibration. It was parameterized to consider the required legal constraints of the California Forest Practice Rules and Special Assessment Areas in the baseline scenario and in the project scenario the same, plus management plan objectives.

The estimated total carbon stocks in aboveground living, belowground living and standing dead wood is 4,560,577.05 tCO2e (219.24 tCO2e/ac) and total carbon stocks in aboveground living and standing dead is 3,724,625.79 tCO2e (179.05 tCO2e/ac, 11.29% SEM at the 90% confidence level). These estimates are

based on data collected in November and December of 2011 in the EP Inventory and data collected in the 2008 WTS Inventory. These estimates are for the forested area in the Project Area.

As demonstrated in Table 25, carbon stocks increase over time as reflected by periodic, low-intensity management.

Table 16: Baseline Carbon Stocks Modeled Over 100 Years

Year	AG Stocks (tCO2e/ac)	AG Stocks* (tCO2e)	AG, BG and SD Stocks (tCO2e /ac)	AG, BG and SD Stocks* (tCO2e)
2015	137	2,849,475	174	3,618,263
2025	154	3,196,983	195	4,055,361
2035	167	3,482,030	212	4,420,199
2045	180	3,746,067	229	4,763,269
2055	161	3,339,231	204	4,236,713
2065	171	3,566,236	218	4,529,073
2075	187	3,885,833	238	4,946,880
2085	200	4,152,748	255	5,301,412
2095	194	4,039,939	248	5,150,948
2105	199	4,142,661	254	5,287,921
Average	**175**	**3,640,120**	**223**	**4,631,004**

The risk of reversal has been calculated using the latest default values for projects that will have only a Project Implementation Agreement in place (see Table 17).

Table 17: Reversal Risk Rating

Risk Category	Source	Risk Rating
Financial Failure	Default Risk for Tribal Ownership	1%
Illegal Forest Biomass Removal	Default Risk	0%
Conversion	Default Risk	2%
Over-harvesting	Default Risk	2%
Social	Default Risk	2%
Wildfire	Calculated Risk from worksheet	4%
Disease or Insect Outbreak	Calculated Risk from worksheet	3%
Other Catastrophic Events	Calculated Risk from worksheet	3%
Project Implementation Agreement	Default Risk	0%

Cook and Koppala (CKGG) Project

The Yurok Cook and Koppala (CKGG) Project is an Improved Forest Management project as defined by Air Resources Board Compliance Offset Protocol – U.S. Forest Projects, adopted October 20, 2011. The CKGG Project will produce reductions by managing the project forest for increased carbon sequestration and stocking when compared to the project baseline. This will be accomplished by a combination of practicing uneven-aged management on all suitable timber stands within the project area, and practicing even-aged management on stands not currently suitable for uneven-aged (selection) management, with the goal of eventually bringing the even-aged harvest areas under selection management over the long term.

The goal of selection management is to maintain a timber stand containing trees of a variety of ages and sizes on a particular site, in perpetuity. Trees are harvested periodically (typically, every 15-20 years) from the stand as they reach their optimum size and value and/or as needed to maintain favorable growing conditions. Over time, selection management promotes the development of high-value and larger trees, making for more cost-effective harvest (i.e., fewer trees need to be cut each entry to attain the same financial value, by lowering logging costs per tree and obtaining a higher price at the mill).

Selection management, as prescribed for the CKGG Project, will not follow the structure of a defined rotation age as is typically used for even-aged management. Instead, as noted above, selection management will favor the development of a stand containing larger and older trees than are commonly harvested under even-aged management.

Stands that are not suitable for uneven-aged management (i.e. understocked conifer stands or stands with high hardwood to conifer ratio) may be treated with even-aged management prescriptions. All regeneration harvests (e.g. any even-aged management, and all group selection openings) should ensure that conifer crop trees (whether planted or residual) are maintained in a free to grow condition for the 15 years following harvest. All even-aged harvest should be conducted such that the proportion of conifers to hardwoods is increased through a combination of residual stocking control and/or planting of conifers.

<u>Forest Vegetation Types in the Project Area</u>

The forest components of the 8,489-acre Project Area include nine vegetation types, which were stratified according to overall level of biomass stocking as well as species composition and age. These vegetation types are: Residual Conifer, Klamath Mixed Conifer, Klamath Mixed Conifer Sparse, Young Conifer, Very Young Conifer, Mixed Hardwood Conifer, Residual Hardwood, Young Hardwood, and Alder.

Residual Conifer

Residual Conifer (RC) can be found at any elevation within the project area, and is characterized by a relatively heavy component of large trees that were not logged during the last several decades of logging activity. The dominant conifer species within this type is Douglas-fir, but coast redwood, Port Orford cedar, incense cedar, western red cedar and western hemlock may also be present. There is also a substantial portion of large, old tanoak in the RC stands found in the Pine creek tract. This forest type is found on 459 acres (186 ha) representing 5% of the Project Area.

Klamath Mixed Conifer

Klamath Mixed Conifer (KMC) is generally found above the 500 ft (152 m) elevation and only within the Mawah Tract of the project area. The dominant species are Douglas-fir, Port-Orford cedar, incense cedar and tanoak. The majority of the overstory is about 40 years old, but there are also scattered residual trees that were not cut during the last logging. This forest type is found on 772 acres (312 ha) representing 9% of the Project Area.

Klamath Mixed Conifer Sparse

Klamath Mixed Conifer Sparse (KMCs) is very similar to the Klamath Mixed Conifer Forest as described above, except it is slightly younger at about 34 years old and has substantially lower stocking than the remainder of the KMC type. This is possibly a result of being logged more intensively. It has been broken out separately for analysis purposes. This forest type is found on 345 acres (139 ha) representing 4% of the Project Area.

Young Conifer

Young Conifer (YC) is dominated by Douglas-fir with a significant component of tanoak and madrone as well. In most stands the conifer is beginning to overtop the hardwoods and dominate the site. It will continue to increase in dominance even without management. The overstory canopy is generally 38 years of age and comprised of trees which regenerated after the last logging. This forest type is found on 2,385 acres (962 ha) representing 28% of the Project Area.

Very Young Conifer

Very Young Conifer (YYC) is comprised of even-aged stands on better site with good conifer stocking. It is found almost entirely on the Tower Tract and is dominated by Douglas-fir but also includes a minor but consistent component of redwood. The overstory canopy is stocked with trees averaging 29 years in age that regenerated after logging. This forest type is found on 145 acres (58 ha) representing less than 2% of the Project Area.

Mixed Hardwood Conifer

Mixed Hardwood Conifer (MHC) This type currently has greater hardwood stocking by basal area than conifer, but the relative canopy positions and conifer trees per acre make development into a conifer dominated stand achievable in the foreseeable future. The dominant conifer species in this type is Douglas-fir with a minor component of western hemlock and Port-Orford cedar. It is characterized by abundant stocking of native hardwoods, which in some areas represent the majority of stocking. This type is unique to the Upper Cappell tract. Native hardwoods include a predominance of golden chinquapin as well as tanoak, California bay laurel and others. The average stand age is 32. This forest type is found on 425 acres (171 ha) representing about 5% of the Project Area.

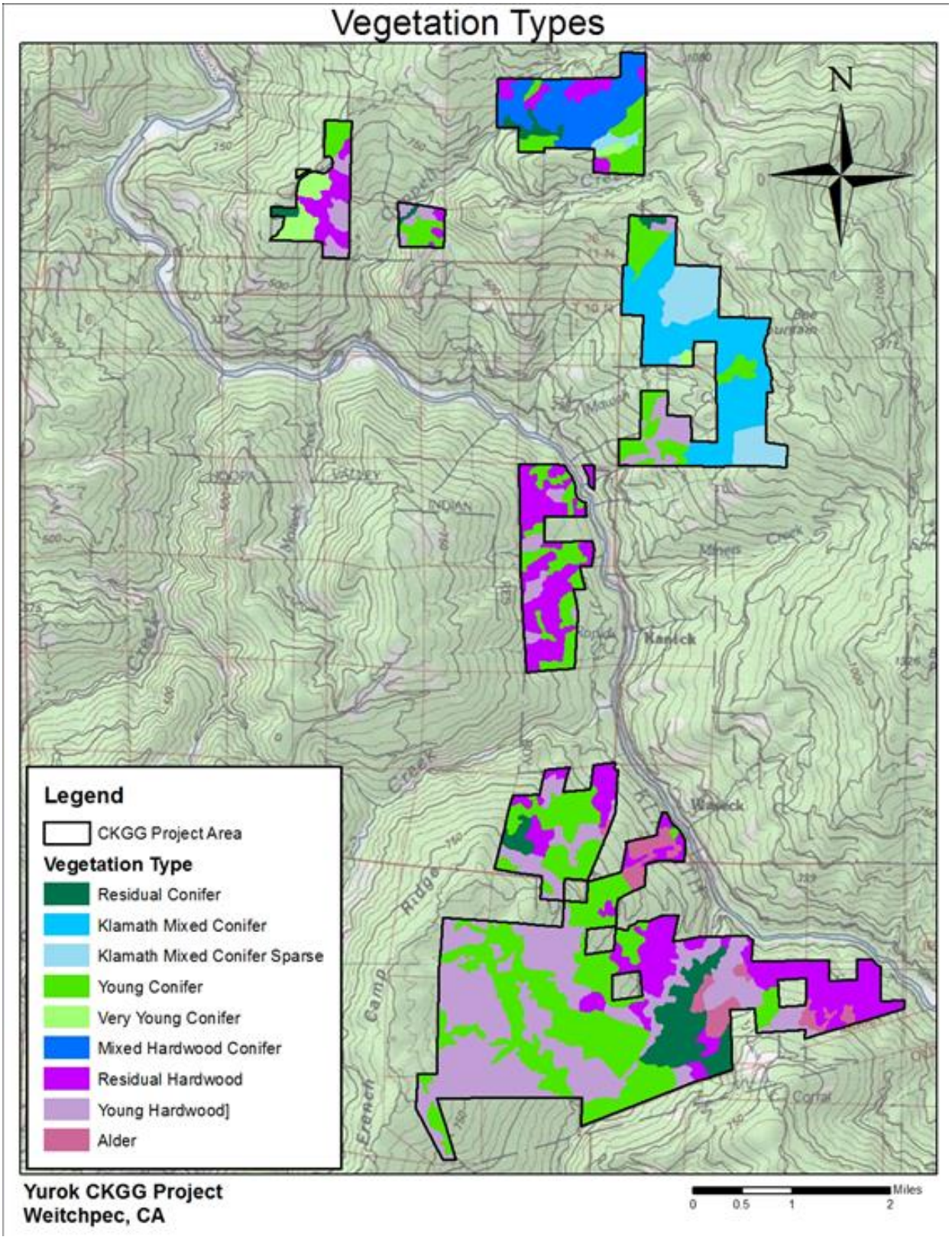
Residual Hardwood

Residual Hardwood (RH) is characterized by heavy stocking of larger tanoak trees that were retained after much of the conifer component of these stands was removed during logging, mostly in the 1980s

and 1990s. There are also scattered residual Douglas-fir. The dominant residual hardwood species tends to be tanoak but other native hardwoods are also common. Areas between the hardwood overstory trees generally contain younger conifers and hardwoods that regenerated after logging. This forest type is found on 1,568 acres (632 ha) representing about 18% of the Project Area.
Young Hardwood (YH) timber stands have been logged within the last 25 years and the regeneration in these stands is dominated by hardwoods, mostly tanoak; although there is significant, if spotty, conifer stocking dominated by Douglas-fir. This type has the lowest average conifer stocking of any of the major types and is in need of rehabilitation. This forest type is found on 2,156 acres (869 ha) representing 25% of the Project Area.

Alder
Alder (Alder) is the designation given to timber stands where most of the volume has been removed recently, and regeneration is largely alder with Douglas-fir saplings coming in underneath. This has occurred primarily in relatively wet areas on lower slopes. These stands also contain a mix of the conifer and other hardwood species as noted above. They generally range from 10-30 years in average age of trees. This forest type is found on 235 acres (95 ha) representing about 3% of the 8,489 acre Project Area.

The “Vegetation Types” map (next page) shows the location and extent of the forest vegetation types in the CKGG project area.



Map 18: CKGG Vegetation Types

Site Class and Index

A sampling effort was conducted in 2012 to generate site index values that would provide the basis for modeling growth and harvest. Site trees were measured as a sub-sample of the inventory. Sampling included tree height, species, diameter and age. Data was collected from 116 trees. The average measured site index, modeled site index and estimated site class by vegetation type is shown in the table below.

Table 18: CKGG Site Index

Vegetation Strata	# of Site Trees	Average Site Index	Modeled Site Index	Site Class
Alder	4	90	110	III
KMC	10	75	75	V
KMCs	6	69	69	V
RC	7	110	110	III
RH	20	104	104	III
YC	27	110	110	III
YH	14	101	100	III
MHC	2	96	100	III
YYC	7	114	114	III

Native Species

Both before and after commercial timber harvest, project activities will improve natural ecosystem processes, enhance native tree species and adhere to the Natural Forest Management practices required by the Forest Offset Protocol. As stated in Table 3.2 of the Forest Offset Protocol, the project must consist of at least 95% native species based on the sum of carbon in the standing live pool. Project Area species composition has been measured using basal area per acre. Based on the 2012 inventory, all the trees within the Project Area are native species.

The Forest Offset Protocol requires that no single species comprise more than 65% of the given basal area for standing live carbon under the "Species Diversity Index" in the Assessment Area Data File. For the CKGG Project tanoak represents the highest proportion of the total stocks at 43% of the average basal area with Douglas-fir being the second most common species at 30%. No single species represents higher than 65% of the project basal area per acre. In fact, over 18 species are represented in the basal area numbers.

Distribution of Age Classes

Field data collected during the 2012 inventory was analyzed to determine the distribution of age classes in the Project Area. The analysis determined that approximately 3% of the forested acreage in the Project Area (at the level of the timber strata) could be considered to be less than 20 years old. The Alder strata has been subjected to even-age harvests in the past 15 years, and though it has substantial levels of retention reflected in the inventory data, the primary age class is less than 20 years old. This 3% falls below the requirement for age class distribution for Natural Forest Management. Therefore the Yurok CKGG Project meets the criteria of the Forest Offset Protocol. The table below shows the average age by strata derived from field data collected within the project area.

Table 19: Distribution of Age Classes

Stratum	Average Age
Alder	10-15
KMC	41
KMCS	34
RC	60+
RH	60+
YC	38
YH	39
MHC	32
YYC	29

Promotion of Onsite Standing Live Carbon Stocks

The Forest Offset Protocol requires that standing live carbon stocking be maintained and/or increased during the life of the project unless the reduction meets one of the 5 possible causes listed in section 3.8.3 of the protocol. The project activity modeling predicts that total standing live carbon stocks might decrease over a ten year period 10 to 30 years in the future commensurate with exception #2 as depicted in Figure 3.1 of the Protocol. This decrease would be the result of silvicultural applications intended to balance age classes and restore species composition in hardwood-dominated stands. Implementing these management practices, although temporarily reducing carbon stocks, will result in greater carbon stocking over the long-term and allow for a higher level of financially feasible sustainable harvesting in the future. This decrease is planned for and projections indicating such are shown in the chart at the end of this section. Any 10-year decrease in stocks is predicted to be less than 5%, and would never drop below the level of standing live carbon stocks at the initiation of the project. Stocks will always be maintained at a level that assures all credited standing live carbon stocks are permanently maintained.

This will be monitored over the life of the project by incorporating new inventories and disturbances into the model, with appropriate changes made to the harvest schedule to ensure compliance with this requirement.

Inventory Design & Sampling Procedures

The sampling design is a stratified sample of systematically installed plots. Plot locations were determined by applying a random start systematic grid on the property. All plots have GPS coordinates to facilitate finding them again in the woods. The Project Area includes nine vegetation types which were stratified according to overall level of biomass stocking as well as species composition and age.

Plot spacing was decreased for smaller strata in order to achieve adequate sampling intensity. The inventory data was collected in late winter and spring of 2012, primarily before the growing season; the inventory shall be considered to have an official date of January 1, 2012 for analysis purposes. Table 20 is a summary of the sampling intensity by vegetation strata.

Table 20: Inventory Sampling Intensity by Strata

Strata	Gross Acres	No. of Plots
Alder	235	40
KMC	772	53
KMCS	345	38
RC	459	58
RH	1,568	127
YC	2,385	165
YH	2,156	139
MHC	425	25
YYC	145	28
Total	8,489	673

Plot centers were monumented using a white fiberglass pole painted blue. Pink flagging was tied to a branch about 7 feet high near the plot center and to the plot pole. Trees greater than 5" dbh were measured using 3 concentric fixed radius plots depending on their diameter. Heights were measured on every 4th plot. The details of the methodology are contained in the Inventory Manual found in Exhibit III of the Offset Project Data Report (OPDR).

The inventory data was collected using paper plot sheets and transferred to a Microsoft Access database. Data were checked for errors in the field, during data entry, and during analysis. The data were analyzed in Microsoft Excel, Microsoft Access and the Forest Vegetation Simulator (FVS) Inland California and Southern Cascades (CA) variant. This variant was used because of the large number of species it tracks and its regional applicability. All GIS data, growth and yield simulation and carbon calculation results have been provided to the Tribe and/or remain stored on personal computers and back-up drives at the BBW Associates and New Forests offices.

Inventory Update Process

Annual monitoring of the Project is required to ensure up-to-date estimates of project carbon stocks and provide assurance that GHG reductions achieved by a project have not been reversed. Monitoring reports have to be submitted on an annual basis. Monitoring activities consist primarily of updating the forest carbon inventory and reporting it every year. For reporting stocks on an annual basis for the 1st ten years, when little or no harvesting is expected, it is best to rely on growth projections from FVS which have already been done. In order to track changes in the inventory over time, one method would be to convert a sub-set of the 673 plots to permanent plots at the time of the next inventory or sooner.

A logical sub-set would be the plots where height was measured, estimated to be about 180 plots distributed evenly across the Project. However the Tribe chooses to track the inventory, it needs to comply with the requirement that no field inventory data will be more than 12 years old.

At the occasion of a disturbance event that alters the carbon stocks in the Project Area, such as fire or timber harvest, the affected area should be delineated into appropriate strata and all plots within the affected area re-measured prior to subsequent verification. Disturbance events need to be monitored as part of normal management activities and noted in the annual reports with an estimate of their impact to carbon stocks. The reporting requirements for the Phase 1 carbon project in Table 14 of the FMP also apply to the CKGG carbon project.

Baseline Carbon Stocks

The baseline above-ground standing live carbon stocks were determined by modeling above-ground standing live carbon stocks through a series of growth and harvesting scenarios over 100 years and averaging the model results over the 100-year timeframe, so that the baseline is expressed as a single (average) value for above-ground standing live carbon stocks per acre in every year. The baseline simulation incorporates all legal and financial constraints that would apply from the California Forest Practice Rules.

Table 21: Baseline Carbon Stocks

Strata	Total Acres	WLPZ Effective No-cut	NSO 500' Buffer	Operable Acres
Alder	235	19.1		216
KMC	772	65.3		706
KMC sparse	345	10	5.4	330
RC	459	61.7	2.0	395
RH	1568	150.5	20.8	1397
YC	2385	233.8	4.0	2147
YH	2156	193.9	8.4	1954
MHC	425	38.4	1.8	384
YYC	145	10.8	3.8	130
Total	**8,489**	**784**	**46**	**7,660**

Consideration was given to financial, legal, and regulatory constraints by removing acres constrained for various reasons from the operable land base. Table 21 shows the constrained acres by strata. All the figures presented in the OPDR for total carbon tons represent the operable acres only. Essentially, the constrained acres are not considered part of the Project since they apply to both the baseline and the project simulations.

The CA variant of the FVS software was used to model forest growth, mortality and harvest over time. FVS is a publicly available and ARB-approved growth model designed for these sorts of applications. The model incorporates 10-year growth increment data collected during the inventory to calibrate the projected growth rates. FVS model outputs report, at a minimum, cubic volume, board foot volume, trees per acre and basal area of live and harvested trees over time. The individual tree diameters, heights, and cubic foot volumes output by FVS to the treelist (a table used by FVS) are the basis for calculating individual tree biomass and carbon. Simulations were conducted in 5-year increments with harvests simulated at the start of the period, and pre-harvest stocking was reported at the start of the period.

The baseline harvest schedule allocated acres to silvicultural prescriptions with the objective of ensuring that the 100-year average aboveground live tree pool is equal to or greater than the minimum baseline level (MBL) of 94.2 tonnes/acre CO2e. Modeling the baseline stocking with legal and financial

constraints yields an average onsite above ground standing live tree stocking which is above the MBL as required by the Protocol (See the final verified OPDR for the actual baseline value).

The live tree list output from modeling the prescriptions in FVS over 100 years was converted to CO2e for the above and belowground pools. The standing dead tree pool was assumed to be constant over the 100-year period. The standing live and dead tree pools were summed to give the total onsite carbon stocks.

Project Carbon Stocks

Anticipated forest management activities within the Project Area were modeled over 100 years in the same way the baseline scenario was modeled. However, different prescriptions were applied and fewer acres were assigned for harvesting due to the more stringent environmental protections being applied under tribal management. The following table shows the acreage allocation to each prescription by strata for the Project. While this simulated management program is not explicitly required, it is the recommended management regime to both maximize the potential for carbon sales and generate a reasonable amount of timber revenue while enhancing and restoring forest productivity. Implementing a lower level of harvesting would be consistent with the carbon project, but more intensive harvesting could lead to reducing stocks below the initial stocks, which is not allowed.

Table 22: Project Carbon Stocks

Strata	Silvicultural Prescription	Acres
Alder	Let Grow	216
KMC	Selection	706
KMCs	Let Grow	330
RC	Selection	111
RC	Variable Retention	171
RC	Let Grow	114
YC	Selection	2,147
YH	Variable Retention	1,170
YH	Let Grow	784
RH	Variable Retention	840
RH	Let Grow	557
MHC	Selection	384
YYC	Selection	130
TOTAL		7,660

Project Simulation

Table 23 shows the first 50 years of harvesting by 5 year period as simulated for the Project. It should be used as a guide in planning the level and type of harvest that is compatible with maintaining the carbon project. The per decade harvest volumes can be viewed as an annual allowable cut (AAC) for that decade, although harvests in future periods would presumably be smoothed out.

Demonstration of Sustainable Harvesting Practices

In order for a carbon sequestration project that includes commercial harvesting to be instituted on the CKGG properties, it is necessary for the project to satisfy the ARB Forest Offset Protocol §3.8.1 – Sustainable Harvesting Practices (when commercial harvest is being conducted). Three options are given to satisfy this requirement:

Table 23: CKGG Project Carbon Simulation

Year	Conifer Harvest MMBF	Even-aged Harvest Acres	Selection Harvest Acres	Annual Hvst Each Decade MMBF
2012	0.293	0	34	
2017	5.522	337	747	0.582
2022	7.203	390	846	
2027	8.077	337	760	1.528
2032	3.478	390	34	
2037	10.363	337	941	1.384
2042	13.493	390	1,246	
2047	9.185	0	950	2.268
2052	1.993	0	340	
2057	9.058	0	941	1.105

1. The forest owner must be certified under the Forest Stewardship Council, Sustainable Forestry Initiative, or Tree Farm System certification systems.

2. The forest owner must adhere to a renewable long-term management plan that demonstrates harvest levels which can permanently be sustained over time and that is sanctioned and monitored by a state or federal agency.

3. The forest owner must employ uneven-aged silvicultural practices and canopy retention averaging at least 40% across the forest as measured on any 20 acres within the entire forestland owned by the forest owner.

Option 2 was chosen for the CKGG project. The renewable long-term management plan the Tribe will adhere to is this Yurok Tribe Forest Management Plan 2012.

The Yurok FMP covers both tribal trust and Tribal fee simple properties including the land within the Project area. The Yurok Tribe's forest management plan contains harvest levels for the project area that can be permanently sustained over time as shown above. A BIA-approved forest management plan meets BIA criteria for sustainable forestry verification, as outlined by the Deputy Commissioner of Indian Affairs by memo on April 18, 2003.

FOREST HISTORY

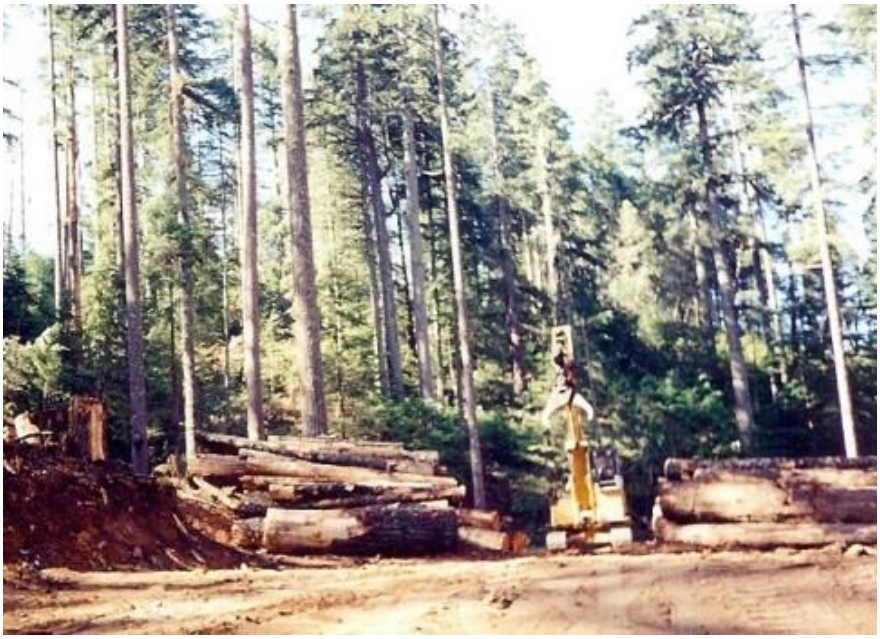
Past Harvesting of Trust Lands

The following table reflects the amount of timber that has been harvested under the past forest management plan.

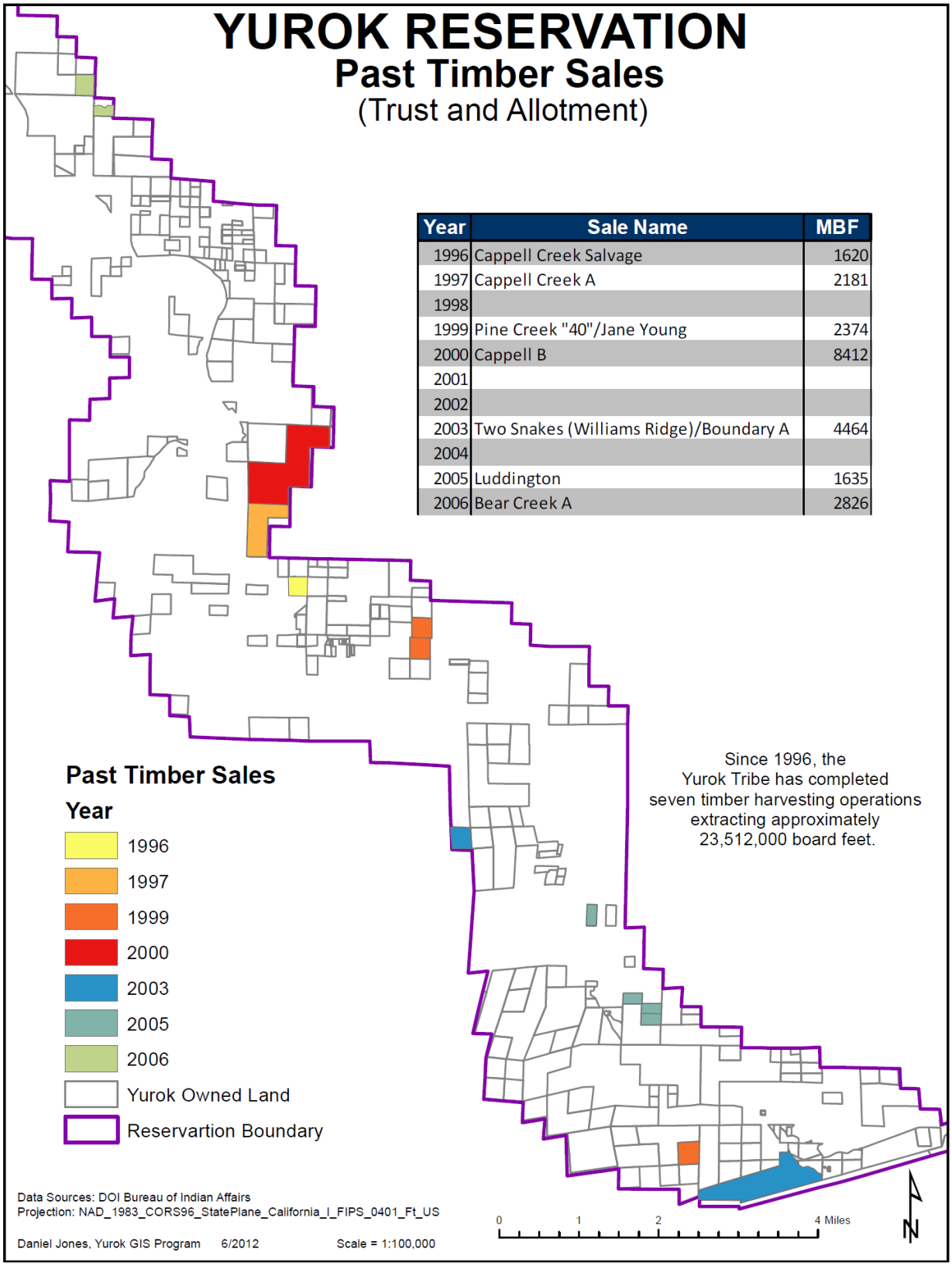
Table 24: YIR Timber Sales 1996 to 2011

Yurok AAC 1996-2011		
Year	**Sale Name**	**Volume (MBF)**
1996	Cappell Creek Salvage	1620
1997	Cappell Creek A	2181
1998		
1999	Pine Creek "40"/Jane Young	2374
2000	Cappell B	8412
2001		
2002		
2003	Two Snakes (Williams Ridge)/Boundary A	4464
2004		
2005	Luddington	1635
2006	Bear Creek A	2826
2007		
2008		
2009		
2010		
2011		
	TOTAL	**23512**

With the adaption of the YIR Forest Management Plan seven different timber sales have been conducted for a total harvest of 23.512 million board feet. Most of this volume was mature and over mature Douglas-fir. Only the Jane Young and Luddington were sales of Allotment timber. The annual allowable cut for this time period was 2.2 MMBF per year as allowed for in the previous FMP. The harvest rate was considerably less what the AAC provided for. This lack of harvest was due, for the most part, to the poor economic conditions of the forest products sector of the North Coast of California.



Figures 17 - 19: Past Timber Harvesting Photos



Map 8: Past Timber Sale Locations

Recent Forest Land Purchases

Since 1996 when the last Forest Management Plan was completed the Yurok Tribe has purchases several large tracts of property. The first large purchase was in 1998 when land was purchases from Cook & Koppala and the smaller purchase from Gerber, Gleason, and Williams. These purchases amounted to 8909 acres of timber land. Harvesting that occurred on those lands were in 1980's or earlier. These lands support a large amount of hardwoods, mostly tanoak.

The purchase of 22,495 acres of timberland in 2011 from the Green Diamond Resource Company has more than doubled the amount of timber land that the Tribe now owns. This industrial timberland has been managed for timber production since the 1950's. The land is well stocked with a variety of timber types along with a developed road system. As the table below shows there are a variety of species that comprise the timber stands within this recent purchase. The purchase is referred to as the Phase 1 purchase and includes the Pecwan, Cappell and Weitchpec tracts.

Table 25: Tree Species Composition within Recent Land Purchase Areas

Species	Basal Area (ft^2/ac)	Basal Area (% of all)
Bigleaf Maple	2.71	1.65%
Black Oak	2.66	1.62%
Chinquapin	16.58	10.08%
Coast Redwood	3.33	2.02%
Douglas-fir	55.03	33.45%
Incense Cedar	0.75	0.46%
Jeffery Pine	0.02	0.01%
Knobcone Pine	0.04	0.03%
Other Hardwood	0.00	0.00%
Pacific Madrone	11.62	7.06%
Pepperwood/California Laurel	3.33	2.02%
Ponderosa Pine	1.75	1.07%
Port Orford Cedar	2.22	1.35%
Red Alder	19.19	11.66%
Sugar Pine	1.54	0.94%
Tanoak	36.77	22.35%
Unknown	0.14	0.09%
Western Hemlock	4.66	2.83%
Western Hemlock	0.10	0.06%
Western Red Cedar	2.00	1.21%
Western White Pine	0.05	0.03%
White Fir	0.02	0.01%
Total	164.50	100.00%

The approximate 22,237 acre phase 1 property is located in the Klamath River drainage in northern Humboldt County and southern Del Norte County about 46 air miles northeasterly of Eureka, generally between the small rural communities of Klamath on the north and Weitchpec on the south. Essentially all of the land lies easterly of the Klamath River and includes portions of the Pecwan Creek and Cappell Creek drainages, among others tributaries. Overall the Yurok Project area contains a wide variety of species, site classes, soils, elevation types and plant communities. Many of these areas provide a unique distribution of forest types and vegetative species for northern California in one general area.

Past Timber Harvest Plans

Extensive timber harvesting has taken place within the boundaries of the recent land purchases. Most of these harvest plans were clear cut with short rotation periods, usually 46 to 60 years. Selective harvesting was usually practiced along watercourses and areas of biological concern.

The "State Timber Harvest Plans" map shows a special representation of the timber harvest plans (THP's) which have occurred in and around the YIR. These THP's were operated under the State Forest Practice Rules which required extensive compliance review and inspections.

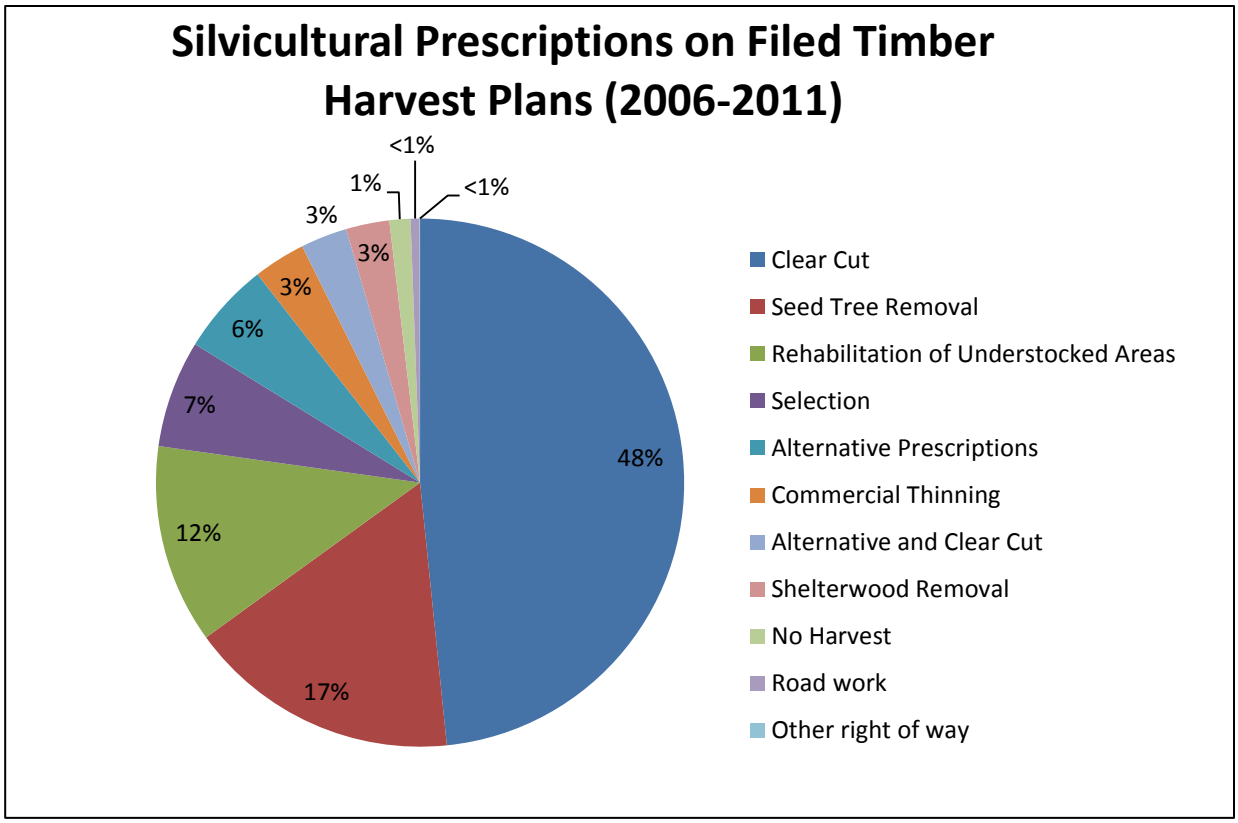
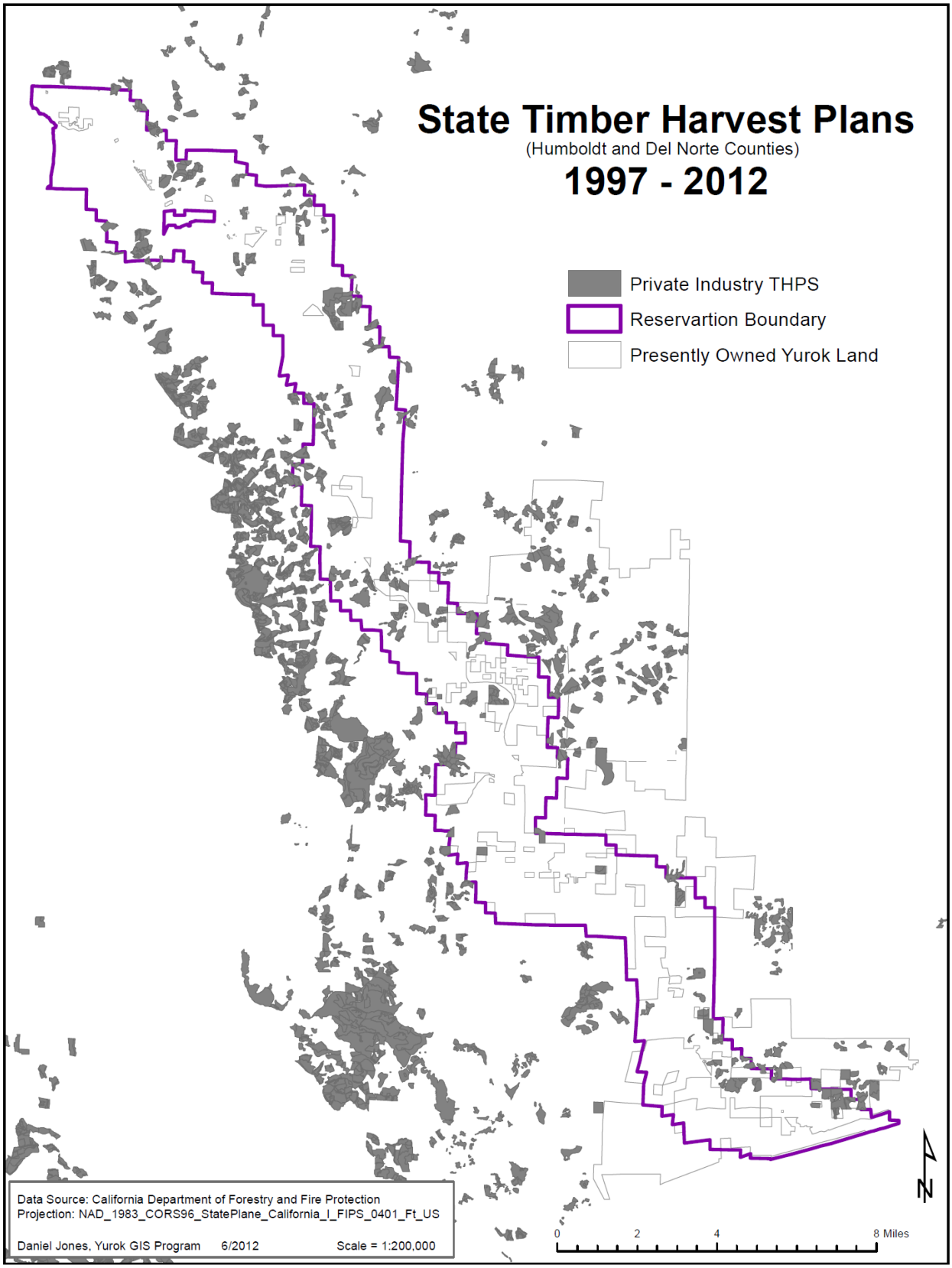


Figure 20: Percentage of Silviculture Prescriptions by Total Acreage of Past Harvests



Map 9: State Approved Timber Harvest Plans

Figures 21 - 23: Past Timber Harvest Photos

FOREST ECONOMICS BENEFITS ASSESSMENT

Potential Income

Timber prices have been at an all times low level since 2007, and indications are that reductions in the housing market, combined with more strict environmental standards for private logging will continue to keep prices low.

As an example of potential income from timber harvesting, if the Preferred Alternative (#3) of the Forest Management Plan were chosen by the Tribe, an average annual cut of 2.0 million board feet per year would be possible on all trust lands over the ten year planning horizon. If we assume that 75% of this volume is old growth Douglas-fir and 25% young growth Douglas-fir, and that one half of the timber is tractor logged and the other half cable yarded, then an estimated annual net revenue of $1,360,000 could be generated (after 10% management deduction).

Actual stumpage values received would be affected by many factors such as additional roading requirements, current market conditions, timber condition, etc.

In addition to Douglas-fir and redwood, the FIA indicates that approximately 3,700,000 gross board feet of Port Orford cedar is growing on the YIR. There is currently an extremely high price being paid in for this species for export to Japan. This tree grows in wet, streamside locations, making harvesting particularly critical in terms of potential environmental impacts. In addition, a root disease is currently affecting this species in Oregon and is reported to be spreading southward; forcing prices even higher (see Resource Protection Plan). Because this tree is found near water, it is important to note that the 150 foot streamside protection zone, stipulated in the AHCP, will likely limit harvesting of this species.

As an example of the high value of this species, a 3 foot diameter tree containing one thousand board feet can be worth up to $10,000 at the delivery point. This high value has created some theft problems on the nearby Six Rivers National Forest, and the YIR should be aware of this risk. Most Port Orford cedar is exported to Japan out of Coos Bay Oregon, where a fairly rigorous chain of custody proof is required for logs to be purchased.

Calculating Stumpage

Analysis of value uses an average for delivered log values in March 2012 of $760/MBF for redwood and $360/MBF for Douglas-fir. Although these prices may no longer be accurate (redwood is down substantially and Douglas-fir is up quite a bit due to export demand). This calculation of stumpage is reproduced from Table 26.

Table 26, 27, 28, and 29 species abbreviations:

RW = Redwood
DF = Douglas Fir
WH = Western Hemlock
POC = Port Orford Cedar
IC = Incense Cedar
PP = Ponderosa Pine
RA = Red Alder

Table 26: Delivered Log Prices

SUMMARY OF DELIVERED LOG APPROACH							
	RW	DF	WH	POC	IC	PP	RA
Delivered Log Value	$ 760	$ 360	$ 295	$ 525	$ 525	$ 375	$ 345
Stump-truck	$ 139	$ 139	$ 139	$ 139	$ 139	$ 139	$ 139
Haul	$ 88	$ 93	$ 98	$ 153	$ 146	$ 101	$ 165
Net of logging costs	$ 534	$ 128	$ 58	$ 234	$ 240	$ 135	$ 41
NSO, THP, supervision	$ 25	$ 25	$ 25	$ 25	$ 25	$ 25	$ 25
Yield tax	$ 15	$ 5	$ 2	$ 9	$ 3	$ 3	$ (0)
Stumpage	$ 494	$ 99	$ 31	$ 200	$ 212	$ 107	$ 16
Indicated stumpage	$ 495	$ 100	$ 30	$ 200	$ 210	$ 105	$ 15

We have assigned a stump to truck cost of $139/MBF, which includes an estimate that 3/5ths of the volume is cable volume. Even if all of these stands were clearcut, the enormous volume of hardwoods to take account of and the 12 MBF/acre of conifers to cut would likely result in logging costs of at least $175/MBF. A recent logging job completed by a logger on flat ground with no hardwoods removing 11 MBF/acre (but required not to beat up the leave trees) had a stump to truck cost of $185/MBF. The enormous amount of hardwood to have to work through is sure to drive up logging costs if for no other reason than having to maneuver around all of the down wood caused by falling of the conifers. In addition, BOE occasionally publishes stump to truck costs by TVA, and for 2012 they show stump to truck in TVA 1 as $192/MBF.

Table 27: Timber Values

SUMMARY OF LOGGABLE TIMBER VALUATION			
	MBF	$/MBF	Contributory Value
RW	390	$ 495	$ 193,050
DF	44658	$ 100	$ 4,465,800
WH	2033	$ 30	$ 60,990
POC	2721	$ 200	$ 544,200
IC	357	$ 210	$ 74,970
PP	835	$ 105	$ 87,675
RA	3586	$ 15	$ 53,790
Total			$ 5,480,475

It is estimated that from the Pecwan track it is an eight-hour round trip (includes load and unload) and from the Weitchpec tract it's a 7-hour haul to the coast. Diesel prices and truck rates were high in 2010 such that hourly truck time was round $80/hour. That makes the eight hour round trip from Pecwan cost about $640/load and from Weitchpec cost around $560/load. Doug-fir and hem fir loads can be expected to go out at an average of around 5 MBF/load, but the Port Orford cedar, incense cedar, and pine are more likely to go out at a lower volume/load, probably in the range of around 4.7/load. Given the preponderance of Douglas-fir in the volume and value, the only significant change in haul cost is to the Douglas-fir which is expected to cost more in the range of $112/MBF assuming half of the wood comes from Pecwan and half comes from Weitchpec.

A third factor is that the timber is appraised as of November 2010, when in fact virtually no timber could be cut until the end of the following logging season in order to conduct NSO calling and prepare THP's. Logging could not start until August 1, 2011 and given the lack of rocked roads, etc., most logging would have to shut down in November. There is virtually no way that all 54 MMBF of timber could be cut and hauled in the three months of logging that would be allowed after NSO calling was completed in 2011, thus pushing the vast majority of the logging into 2012. In addition, it is highly unlikely that whatever timber remained to be cut from the 50 MMBF of conifer timber could be cut in 2012, but assuming it could be cut, there would be both growth and a discount factor that needs to be applied to bring the value of the timber to November, 2010. In addition prices would need to be reconsidered for the timber cut in 2011 and 2012.

The assumption is made that the conifer timber is growing 2%/year given the enormous amount of hardwood competing with the conifers. A discount rate of 6-8% is typical for industrial timberlands, here we use 7%. Prices for redwood crashed in 2011 such that the BOE predicted stumpage price for small diameter redwood logs was $420 which with BOE estimates of $192/MBF for stump to truck and $65/MBF for haul made for a value of $620 for redwood instead of the $790 in 2010 that Fleming used. Conversely prices for Douglas-fir "skyrocketed" due to substantial export demand in 2011 and the predicted price for small diameter Douglas-fir in 2012 is projected by the BOE at $240 stumpage + $257 stump to mill = $497 delivered log. We think this value, which trails the market by six months (e.g., was reasonable in June of 2011) is about $50/MBF too high, as BBW sold approximately 150 MBF of mixed Douglas-fir to export in June of 2011 and the price for the small logs was $450.

In 2010, no one would have predicted the large increase in Douglas-fir prices that took place in 2011 while the fall in redwood prices was already looming in late 2010. As a result, we lower the price for delivered redwood logs to $625 and leave the Douglas-fir at the rates described. BOE Douglas-fir prices did not change materially from the 2nd half of 2010 through the first half of 2011 (increased by about $20/MBF).

Table 28: Summary of Delivered Log Values

SUMMARY OF DELIVERED LOG VALUES							
	RW	DF	WH	POC	IC	PP	RA
Delivered Log Value	$ 625	$ 360	$ 295	$ 525	$ 525	$ 375	$ 345
Stump-truck	$ 175	$ 175	$ 175	$ 175	$ 175	$ 175	$ 175
Haul	$ 128	$ 112	$ 98	$ 153	$ 146	$ 101	$ 165
Net of logging costs	$ 322	$ 73	$ 22	$ 198	$ 204	$ 99	$ 5
NSO, THP, supervision	$ 25	$ 25	$ 25	$ 25	$ 25	$ 25	$ 25
Yield tax	$ 15	$ 5	$ 2	$ 9	$ 3	$ 3	$ (0)
Stumpage	$ 282	$ 44	$ (5)	$ 164	$ 176	$ 71	$ (20)
Indicated stumpage	$ 280	$ 45	$ -	$ 165	$ 175	$ 70	$ -

Table 29: Loggable Timber Valuation

SUMMARY OF LOGGABLE TIMBER VALUATION			
	MBF	$/MBF	Contributory Value
RW	390	$ 280	$ 109,200
DF	44658	$ 45	$ 2,009,610
WH	2033	$ -	$ -
POC	2721	$ 165	$ 448,965
IC	357	$ 175	$ 62,475
PP	835	$ 70	$ 58,450
RA	3586	$ -	$ -
Total	48,961		$ 2,688,700
Growth @ 2%/year, 2 yrs			1.0404
Discount rate at 7%/year, 2 yrs			1.1449
Total assuming 2 year lag to harvest			$ 2,434,314

If actual 2011 prices were used for Douglas-fir and all other prices remain as predicted above, Douglas-fir stumpage would increase from $45/MBF to $134/MBF which would increase the contributory value of Douglas-fir to $5,985,000 which would increase the total loggable timber valuation from the $2.4 million above to $6.032 million when accounting for growth and discount rate.

Indian Benefits

Benefits to Yurok tribal members from timber harvesting are both direct and indirect. The most obvious direct benefit is timber revenue. Ten percent (10%) of the revenues generated from trust timber sales is held in a forestry account by the BIA which is earmarked for timber related activities on the YIR. The remaining 90% of the revenues are held in accounts by the BIA, and the dispositions of these funds are then subject to the discretion of the Tribe and allottees/heirs. For example, if the Tribe considers it important to increase and consolidate the reservation land base, revenues could be used for this purpose.

Permit cutting can also generate important income to the Tribe. 53 BIAM 4-H describes the permit process, and what activities are eligible.

Indirect benefits of a timber management program include increased access to portions of the reservation for possible fuelwood cutting, collection of basketry materials, mushrooms, and hunting, etc. Employment opportunities will also be created for Tribal members. These jobs would include timber stand thinning, brush/hardwood removal, tree planting, road work, timber falling, truck driving, etc. In addition, existing roads can be improved in terms of drainage, surface, width and maintained. And finally, harvesting is an excellent means to ensure a forest structure that will provide an even flow of timber into the future. The following table reflects the seasonal payroll for a single seasonal worker.

Table 30: Income to a Seasonal Employee

Seasonal Employee	
Wage Rate $/hr.	13.5
Weekly hrs	40
Weeks	4
Months	3
Total	6480

Although these numbers are for only one seasonal employee the number of seasonal workers within the Forestry Department alone averages seven (7) to 10 depending on the specific projects being worked on.

Figure 24: The job is not done until the paper work is completed

Document Retention Plan

The YTFD will submit harvest plans to the Tribal Council and the BIA PRO for approval before the harvesting of commercial forestland species on any lands within the YIR. Harvesting of SYU restricted fee lands outside of the Reservation boundary will require the submission to and approval of a timber harvest plan (THP) from Cal Fire. Before any harvesting of woodland species on the YIR, a Timber Use Policy Statement approved by both Tribal Council and BIA must be in place, and cutting must be monitored by the YTFD. Firewood harvest volumes must be must be recorded by the FOC, and reported in the annual Report of Timber Cut (ROTC) to the BIA.

In addition to record keeping by the BIA, the YTFD and Tribe have an internal mechanism for document retention. The YTFD scans documents and archives them in a departmental MS Access database. The Tribe, as a whole, utilizes DocSTAR – a private cloud storage company – for the archival and retrieval of pertinent documents.

Glossary of Acronyms and Terms

AAC: Annual Allowable Cut, the volume of timber that may be harvested during a given period (usually a year) that is specified by a sustained-yield forest plan.

AHCP: Aquatic Habitat Conservation Plan.

Allotments: Indian Reservation lands held in trust by the Federal Government and allotted to an individual and heirs for private use.

BAER: Burn Area Emergency Rehabilitation.

BAR: Burn Area Rehabilitation.

BIA: Bureau of Indian Affairs.

BIAM: Bureau of Indian Affairs Manual.

BOE: Board of Equalization.

CA: Inland California and Southern Cascades variant used for growth modeling by FVS.

CalVeg: Classification and Assessment with Landsat™ of Visible Ecological Groupings.

CAR: Climate Action Reserve.

CB: Citizens' Band.

CCAA: Candidate Conservation Agreement with Assurances.

CCR: California Code of Regulations.

CDF: Californian Department of Forestry and Fire Protection.

CFI: Continuous Forest Inventory - a system of permanent plots set up to obtain field data and tree measurements every ten years.

CFR: Code of Federal Regulations.

CKGG: Cook Koppala Gerber Gleason – restricted fee lands in a sustained yield unit.

CMZ: Channel Migration Zone.

COW: Coastal Oak Woodland.

CWHR: California Wildlife Habitat Relationship.

DBH: The diameter of the stem of a tree measured at breast height (4.5 ft) from the ground.

DRC: Diameter at Root Collar.

EA: Environmental Assessment.

EEZ: Equipment Exclusion Zone. The area, as explained in a THP, where heavy equipment associated with timber operations is totally excluded for the protection of water quality, the beneficial uses of water, and/or other forest resources.

ELZ: Equipment Limitation Zone. The area, as explained in a THP, where heavy equipment associated with timber operations is limited for the protection of water quality, the beneficial uses of water, and/or other forest resources.

EPA: Environmental Protection Agency.

ESA: Endangered Species Act.

ESP: Enhancement of Survival Permit.

FBRI: Forest Biometric Research Institute.

FD: Forest Development.

Fee Lands: Lands owned by the Tribe in fee simple and not held in trust by the United States for the Tribe.

FIA: Forest Inventory Analysis.

FMP: Forest Management Plan.

FOC: Forest Officer in Charge.

Forest Structure: the horizontal and vertical distribution of components of a forest stand including the height, diameter, crown layers, and stems of trees, shrubs, herbaceous understory, snags, and down woody debris.

FPP: Forest Project Protocol.

FPS: Forest Projection & Planning System – a software package for forest growth modeling developed by FBRI.

FRAP: Fire and Resource Assessment Program.

FTE: Full tree equivalent.

Fuel Management: The act or practice of controlling flammability and reducing the resistance to control wildland fuels through mechanical, chemical, biological, or manual means.

FVS: Forest Vegetation Simulator – USFS software.

GIS: Geographic Information System is an organized collection of computer hardware, software, geographic and descriptive data, personnel, knowledge, and procedures designed to efficiently capture, store, update, manipulate, analyze, report, and display the forms of geographically referenced information and descriptive information.

HCP: Habitat Conservation Plan.

IAC: Indicated Allowable Cut.

IAM: Indian Affairs Manual.

ICS: Incident Command System - the facilities, equipment, personnel, procedures, and communications operating within an organizational structure and responsible for managing assigned resources to accomplish stated objectives pertaining to an incident.

IFM: Improved Forest Management.

IPM: Integrated Pest Management.

ITP: Incidental Take Permit.

Landsat ™: Land + Satellite Thematic Mapper.

LTO: Licensed Timber Operator.

LWD: Large Woody Debris.

MAI: Mean Annual Increment.

MAMU: Marbled Murrelet.

MBF: A thousand board feet.

MHW: Montane Hardwood.

MMBF: A million board feet.

NEPA: National Environmental Policy Act.

NOAA: National Oceanographic and Atmospheric Administration.

NMFS: National Marine Fisheries Service.

NRCS: Natural Resource Conservation Society.

NSO: Northern Spotted Owl.

O&S: Ordinances and Standards.

OPDR: Offset Project Data Report.

PDD: Project Design Document.

Pre-commercial Thinning: the removal of trees not for immediate financial return but to reduce stocking to concentrate growth on the more desirable trees.

PRO: Pacific Region Office.

RMZ: Riparian Management Zone.

ROTC: Report of Timber Cut.

RPF: Registered Professional Forester.

Silviculture: the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society.

SOD: Sudden Oak Death.

SOP: Standard Operating Procedures.

SYU: Sustained Yield Unit.

T&E: Threatened and Endangered.

tCO2e: ton(s) of carbon dioxide equivalent.

THP: Timber Harvest Plan.

Trust Lands: Lands whose title is held by the United States for the benefit of the Tribe, which may or may not be located on a Reservation.

TVA: Timber Value Area.

USCA: United States Code Annotated - an annotated version of the United States Code published by West (a part of Thomas Reuters).

USFS: United States Forest Service.

USFWS: United States Fish and Wildlife Service.

VER: Verified Emission Reduction.

WFIP: Wildland Fire Implementation Plan.

WLPZ: Watercourse and Lake Protection Zone.

YHCP: Yurok Habitat Conservation Plan.

YIA: Yurok Implementation Agreement.

YIR: Yurok Indian Reservation.

YISYL: Yurok Indian Sustained Yield Lands.

YTFD: Yurok Tribe Forestry Department

FOREST MANAGEMENT PLAN APPENDIX (Electronic)

AHCP Mainline Roads (map)
BIA Burn Permit System
BIA Forest Certification
Crosswalk between CWHR and CalVeg
CWHR Classification System
Final Yurok HCP Complete
Forest Project Protocols
Pacific Region Logging Practices
PDD
Sustainability Verification
Tribal Air Quality Ordinance
Tribal Burn Permit Application
Tribal Firewood Permit and Policy
Tribal Smoke Management Plan
USFS Pest Detection Form
Water Quality Control Plan
Yurok Acquisition Cooperative Agreement
Yurok Forest History 1994

ENVIRONMENTAL ASSESSMENT (Electronic)