The Conservation Fund Option A

Plan to Determine Long Term Sustained Yield

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1. Introduction

This document is intended to describe the sustainable management and harvest levels for The Conservation Fund's timberlands in Mendocino County, California. In 1973 the California Board of Forestry and Fire Protection (the Board) adopted the Z'berg-Nejedly Forest Practices Act authorizing the development and implementation of the Forest Practice Rules (FPRs) which govern timber-harvest-related activities on private and non-federal public forestlands in California. In 1994, the Board passed a series of regulations that require timberland owners to demonstrate "Maximum Sustained Production of High Quality Timber Products" (MSP) by either, (1) submitting an "Option A" timber harvest plan, (2) preparing a sustained yield plan ("Option B"), or (3) following a set of prescriptive silvicultural requirements ("Option C"). The three options for meeting the MSP requirement are named after Forest Practice Rules sections 913.11 (a), (b), and (c), respectively.

The Conservation Fund (TCF) currently owns and operates 53,403 acres of redwood and Douglas-fir forest land in Mendocino County, California, made up of the following tracts of land:

- Garcia River Forest, 23,769 acres, acquired in 2004
- Big River Forest, 11,707 acres, acquired in 2006
- Salmon Creek Forest, 4,213 acres, acquired in 2006; and additional adjoining 177 acres purchased in 2011
- Gualala River Forest, 13,537 acres, acquired in 2011.

All properties are permanently protected from development through conservation easements (held by The Nature Conservancy for Garcia and Gualala) and an Offer to Dedicate (held by the Wildlife Conservation Board for Big River and Salmon Creek). As described further below, this Option A is set up with separate descriptions and calculations of LTSY for each property to provide greater transparency regarding our management and operations. TCF anticipates that it will occasionally own other properties as part of its conservation real estate business that it does not anticipate conducting forest management operations on, those properties will not be included in the Option A.

TCF has elected to submit an Option A per California Forest Practice Rules 14CCR 913.11, which addresses management effects on timber resources, while considering watersheds, fisheries, wildlife, recreation, and employment. MSP is demonstrated by modeling specific silvicultural regimes while considering non timber resources such as stream zones, wildlife habitat requirements, visual resources and conservation easements. The results are termed The Long Term Sustained Yield.

In preparing this document we strove to follow the Guidelines for completing an Option A as described in the California Forest Practice Rules (14 CCR 913.11 (a)) by presenting an analysis of the following forest resources across TCF's ownership:

- Forest growth and harvest levels considering the proposed harvest regimes,
- silviculture implemented to realize the stated goals of the plan,

- consideration of non-timber forest values, including Watercourse and Lake Protection Zones, wildlife habitat retention, recreation, and visual considerations as they relate to the long term sustainability of the forest, regional economic vitality and employment and aesthetics.

1.1 Description of The Conservation Fund Forestlands

Orientation. The Conservation Fund owns and operates 53,403acres of redwood and Douglas-fir forest in four properties located between Fort Bragg and the Sonoma County border. The lands are segregated into four discrete management units which were acquired through four separate acquisitions. The Garcia River Forest was acquired in 2004. The Big River and Salmon Creek Forests were acquired in 2006, and the Gualala River Forest was acquired in 2011. The 177 acre Hardell property was also acquired in 2011 and is managed as part of the Salmon Creek Forest. The goal of the acquisitions is to protect the land in perpetuity from development or timberland conversion and maintain them as working commercial forests managed for timber production, wildlife habitat preservation and enhancement, as well as limited recreation. Funding for the purchases was made possible through low interest loans, grants from the Wildlife Conservation Board and State Coastal Conservancy, and private contributions from The Nature Conservancy, TCF and other organizations.

Location. TCF's forestlands are situated in the coast range of California from Highway 20 and west of Highway 101 extending south to the Sonoma County line. The Big River Forest (11,707 acres) is primarily within the Big River watershed adjacent to and south of Jackson Demonstration State Forest and Highway 20. Salmon Creek (4,204 acres) is in the Big Salmon Creek watershed bounded by Albion Ridge Road on the North and Navarro Ridge Road on the South. The Garcia River Forest (23,780 acres) is primarily within the Garcia River Watershed, bordered by Mountain View Road on the north and Fish Rock Road on the south. The Gualala Forest (13,542 acres) is south of and adjacent to the Garcia Forest and is bounded by Fish Rock Road on the north and the Sonoma County Line on the south.

Geology. The topography of TCF's forestlands ranges from gently sloping marine terraces along the Mendocino coastal plain in the western portions of the Big River and Salmon Creek Forests, to increasingly steep, rugged terrain in the eastern part of the Garcia and Gualala Forests. The Geology of the Coast Range is underlain by a variety of marine sandstones known as the Franciscan Formation. The geomorphology of the coastal mountains has been strongly influenced by two on-going processes: tectonic uplift and fluctuations in sea level. The landscape was especially affected during historic periods of low sea levels, when the coastline was farther west. During these events, streams down-cut and form deeply incised valleys with steep-sided inner gorges. Once sea level rises (as at present) and the coastline advances, streams aggrade, the deep coastal valleys partially in-fill and estuaries formed at the mouths of larger streams.

Climate. Average daily temperatures range from a high of 66.5 degrees (Fahrenheit) during July to a low of 43.6 degrees (Fahrenheit) in December. Annual precipitation ranges from 50 to 80 inches, primarily occurring in the winter.

Forest types. Redwood *(Sequoia sempervirens)* and Douglas-fir *(Pseudotsuga menziesii)* are the dominant conifer species on the forests. Other conifers present include sugar pine (*Pinus*

lambertiana), grand fir *(Abies grandis),* western hemlock *(Tsuga heterophylla),* and Knobcone/Monterey Pine hybrid pine. Hardwoods comprise a substantial secondary component and are represented principally by tanoak *(Lithocarpus densiforus* var. *densiflorus)* and madrone *(Arbutus menziesii).* The mixture of species shifts with distance from the coast, harvest history of the area, exposure, and soils. Redwood is dominant in the western portions of the properties with Douglas-fir and hardwood increasing from west to east. Some of the inland areas would be classified as Douglas-fir series by Sawyer and Keeler-Wolf (1995), and Holland (1986).

Unique ecological communities. As part of TCF's management planning process we have identified unique areas that are reserved from harvest. The Mendocino Pygmy Cypress Forest is a unique ecological community that occurs only in coastal Mendocino County and within the TCF ownership is only present on the Salmon Creek Forest. The California Natural Diversity Database (CNDDB) recognizes it as a community that is "rare and worthy of consideration" (2003). The pygmy forest series covers approximately 7 acres in Salmon Creek. It is reserved from harvest modeling for the purpose of calculating LTSY.

True oak stands composed largely of black oak (*Quercus kelloggii*) Oregon white oak (*Quercus garryana) and* Shreve's oak *(Quercus parvula var. shrevei*) are present on the Garcia River Forest and, to a lesser extent, the Gualala River Forest. Per the TCF management policies for wildlife habitat retention, true oak stands, individual true oak trees and California Chinkapin (Chrysolepis chrysophylla) will be retained (protected from harvest) wherever possible. Known true oak stands are reserved from harvest modeling for the purpose of calculating LTSY. Currently we track 613 acres of Oak Woodlands on the Garcia River Forest and 91 acres of Oak Woodlands on the Gualala River Forest in our GIS database.

In addition to these unique ecological areas, we also reserve from harvest planning certain riparian buffers and Northern Spotted Owl Activity Centers, as described further in Section 4: Non Timber Resources.

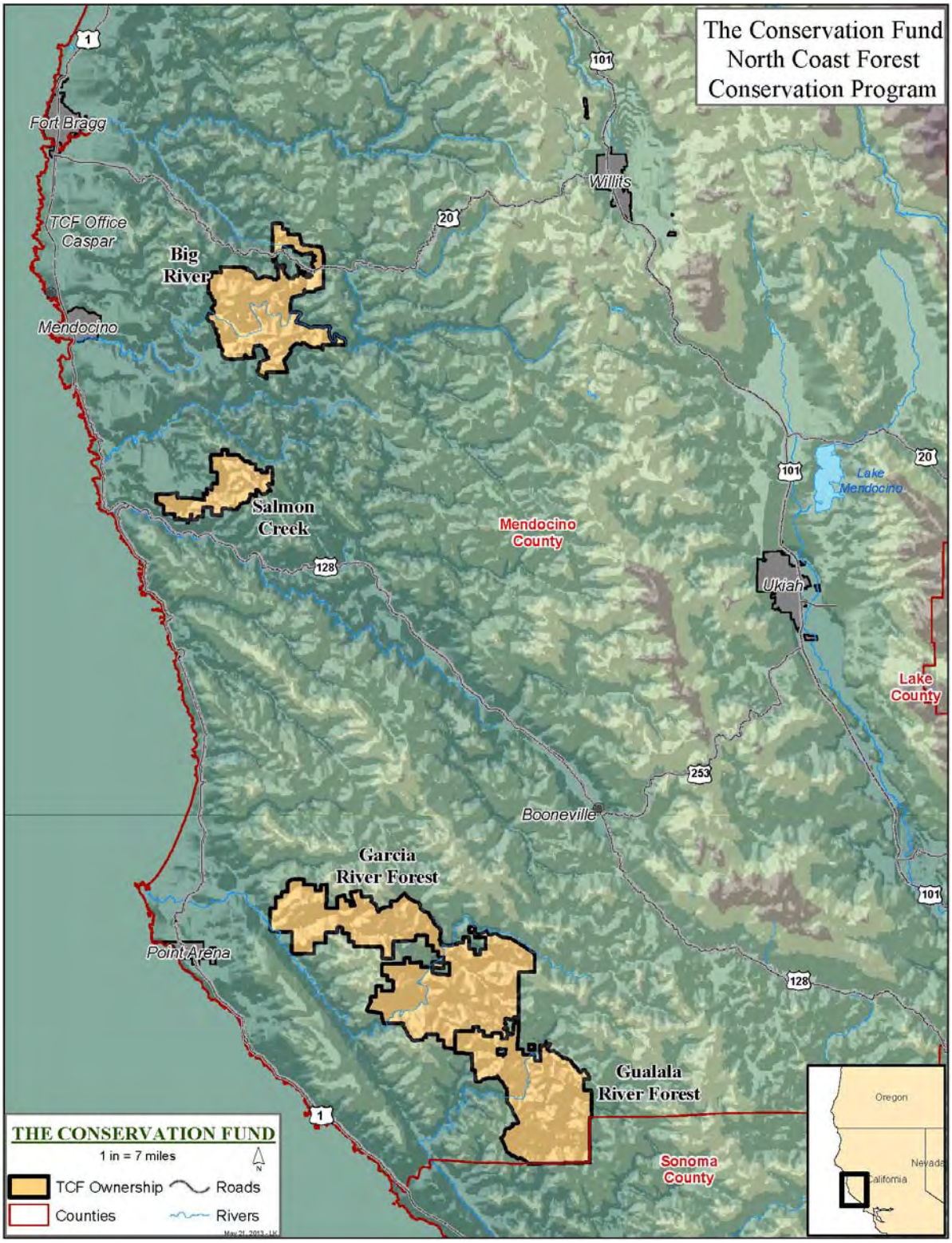


Figure 1: Location Map

Harvest History. All of TCF's ownership has been managed for forest products since the late 1800's or early 1900's. Early harvest efforts started at the mouths of watersheds and progressed upstream and up-slope to the ridgelines. Initial logging activities generally clearcut the old growth forests, then burned the slash while the logs were still on the ground before yarding them downhill to the river systems. Oxen were used to pull logs to mills or river systems. The rivers often served as the transportation routes to the mills and splash dams were commonly used to transport logs downstream on Big River. Subsequent entries into the forests further inland were commonly accomplished with steam donkeys and railroads. During the 1940s, crawler tractors replaced steam donkeys to yard logs and trucks replaced railroads to transport logs to the mills.

Improvements in technology and markets, coupled with tax laws in the 1940s and 1950s that encouraged landowners to remove 70% of their conifer stocking resulted in harvests that removed the larger, healthier trees leaving inferior trees and poorly stocked forests. Since that time the forests have been regrowing and harvested with variable intensities often in response to changes in ownership which necessitated harvesting to "pay for the land". Until the passage of the Z'Berg Nejedly Forest Practice Act in 1973, and the subsequent development of the Forest Practice Rules, little effort was made after harvest to ensure that harvested areas were restocked. The resulting forests consisted of unnaturally high densities of competing vegetation, primarily tanoak. This condition limited the ability of redwood and Douglas-fir to grow and achieve historic stocking levels in some stands.

Recent Harvests. More recent harvests by previous landowners on Salmon Creek and Big River have utilized the clearcutting regeneration method which has produced a variety of well-stocked 5-30 year old plantations. The selection regeneration method, where used, has resulted in unevenage or uneven size class forests with tree ages ranging from approximately 1-120 years of age. Recent harvests by the previous landowners on the Garcia and Gualala Forests predominantly utilized shelterwood removal or seed tree removal prescriptions which have resulted in young even-aged stands ranging from 30-60 years of age. Though conifers dominate the forests overall, tanoak and other hardwood species dominate some of the younger stands and lower quality sites found in the Garcia and Gualala Forests. Past silviculture has been market driven and has also influenced the species distribution. Historically, redwood has been preferentially selected for harvest. Therefore the forests contain a higher percentage of Douglas-fir than would be expected to occur naturally or in the absence of a market driven harvest regime.

Current Management. All of TCF's California holdings are managed to increase conifer stocking through uneven-aged silviculture, with sustainable harvest levels and significant environmental protections. Harvests typically consist of single-tree selection with some group selection and transition silviculture, supplemented with the occasional pre-commercial thinning or hardwood reduction treatment. The intent of our silviculture is to maintain and improve conifer stocking and volume as well as wildlife habitat conditions for both terrestrial and aquatic species. By the end of the planning horizon the target stocking for Big River and Salmon Creek is 50 MBF/acre, for Garcia River and Gualala River forests the target stocking is 35 MBF/acre. The targets were chosen based on observed timber productivity for each tract, major species composition, and initial stocking. Big River and Salmon Creek are predominantly redwood site

class II with average starting stocks of 21.2 MBF/acre and 27.9 MBF/acre respectively, whereas Garcia and Gualala are predominantly Douglas-fir site class III with average starting stocks of 10.7/MBF/acre and 8.6/MBF respectively. Timber harvests will be designed such that they meet the stated silvicultural goals in an economically and socially responsible manner. Management plans and policies for each property are publicly available and regularly reviewed by a local advisory council. All of TCF's forestry operations are designed to be in conformance with all applicable law as well as the protocols of the Sustainable Forestry Initiative (SFI) and the Forest Stewardship Council (FSC). Both SFI and FSC require that our forest practices utilize best management practices, utilize silvicultural practices which are sustainable, and preserve and protect valuable fish and wildlife habitat as well as other high conservation forest values such as pygmy forests. The overall goals of SFI and FSC are complimentary to TCF's overall forest management strategy including the requirement for a conservation easement restricting timberland conversion. In addition to SFI and FSC certification, TCF has four forest carbon offset projects verified and registered using the Climate Action Reserve (CAR) Forestry Offset Protocols (versions 2.1 and 3.2). As a result TCF can sell carbon offsets generated by the forests' sequestration of CO_2. TCF is audited annually by independent third party auditors both for the SFI and FSC forest certification programs and the CAR forest carbon offset program. TCF's ability to sell carbon offsets is dependent on our ability to demonstrate that we are voluntarily harvesting less than the allowable maximum volume per year as defined by the Forest Practice Rules. This Option A will complement TCF's desire to demonstrate sustainable harvest practices while providing for other forests values. More information is available at http://www.conservationfund.org/our-conservation-strategy/focus-areas/forestry/north-coast-conservation-initiative/

1.2 Maximum Sustained Production of High Quality Timber Products

As described in 14 CCR 913.11(a), MSP is achieved by meeting the requirements outlined below.

(a) *Where a Sustained Yield Plan (14 CCR § 1091.1) or Nonindustrial Timber Management Plan (NTMP) has not been approved for an ownership, MSP will be achieved by:*

(1) *Producing the yield of timber products specified by the landowner, taking into account biologic and economic factors, while accounting for limits on productivity due to constraints imposed from consideration of other forest values, including but not limited to, recreation, watershed, wildlife, range and forage, fisheries, regional economic vitality, employment and aesthetic enjoyment.*

(2) *Balancing growth and harvest over time, as explained in the THP for an ownership, within an assessment area set by the timber owner or timberland owner and agreed to by the Director. For purposes of this subsection the sufficiency of information necessary to demonstrate the balance of growth and harvest over time for the assessment area shall be guided by the principles of practicality and reasonableness in light of the size of the ownership and the time since adoption of this section using the best information available. The projected inventory resulting from harvesting over time shall be capable of sustaining the average annual yield achieved during the last decade of the planning horizon. The average annual projected yield over any rolling 10-year period, or over appropriately longer time periods for ownerships which project harvesting at intervals less frequently than once every ten years, shall not exceed the projected long-term sustained yield.*

(3) *Realizing growth potential as measured by adequate site occupancy by species to be managed and maintained given silvicultural methods selected by the landowner.*

(4) *Maintaining good stand vigor.*

(5) *Making provisions for adequate regeneration. At the plan submitter's option, a THP may demonstrate achievement of MSP pursuant to the criteria established in (b) where an SYP has been submitted but not approved.*

Long Term Sustained Yield (LTSY) is defined in the California Forest Practice Rules (14CR 895.1) as "the average growth sustainable by the inventory predicted at the end of a 100-year planning horizon." This Option A outlines such an approach to harvesting, related growth and overall inventory levels over the 100-year period.

The LTSY considers growth from all forested stands that are eligible for harvest. As described in more detail below, stands which are not eligible include a) class I and class II stream "no harvest" buffers as required by the California Forest Practice Rules and TCF's Integrated Resource Management Plan, b) NSO core habitat retention areas surrounding known NSO activity centers, c) oak woodlands, and d) areas designated as "no harvest" by a conservation easement which includes a 300 foot wide buffer between Mendocino Headlands State Park and TCF's Big River Forest. The LTSY was calculated with the use of FORSEE, a growth simulator for the redwood and Douglas-fir regions of coastal California that relies on the CRYPTOS growth and yield model.

The planning approach in this Option A reflects forest management and planning considerations, harvesting practices and silvicultural prescriptions that are compliant with the California Forest Practice Rules, adhere to the Forest Stewardship Council's Pacific Coast Standards, adhere to Sustainable Forestry Initiative standards, and are compatible with TCF's wildlife habitat management strategies and forest management policies. TCF's wildlife management strategies are discussed in detail in section 4. The intent of our silviculture is to maintain and improve conifer stocking and volume as well as wildlife habitat conditions for both terrestrial and aquatic species. Timber harvests will be designed such that they meet the stated silvicultural goals in an economically and socially responsible manner.

1.3 Plan Organization

LTSY for The Conservation Funds California holdings is calculated independently for each forest and combined to develop the total LTSY. This is advantageous for TCF and CALFIRE because it allows for greater transparency and in the event there is a change in RCF ownership pattern LTSY will not need to be re-calculated for the remaining forest. If a change in ownership occurs we will either calculate the individual LTSY for the new property or subtract a property out of the Option A without requiring major changes to the base document and calculations. LTSY will be presented for each forest along with the specific constraints and silvicicultural prescriptions particular to the forest. Although not anticipated, a partial sale of one or more forests exceeding 10% of the total ownership will trigger the need to recalculate the LTSY, similarly, a land purchase would also require that LTSY be recalculated.

This plan will present our inventory growth and yield methodology and findings, general silvicultural constraints and guidelines, constraints from wildlife, range and forage and other forest values as well as regional economic vitality.

1.4 Adaptive Management

This plan is subject to changes based on change in our ownership pattern, catastrophic events such as fire, or change in inventory due to inventory updates. The inventory will be updated approximately once every 10 years or as necessary to maintain our desired level of accuracy. The new inventory will be compared to our initial calculation of LTSY as well as our growth and regeneration estimates. Any necessary adjustments to the LTSY will be explained and amended to this Option A.

2. Summary of Inventory and Growth and Yield Methods

2.1. Overview of inventory methodology

TCF uses a stratified random sample to calculate the initial volume estimate on each property. TCF's timber inventory data is derived from two levels of forest stratification. First, the ownership is divided into four Management Units, based on the four individual properties. Second, within each Management Unit, timber stands are identified, which are groups of trees with similar tree heights and canopy densities. For the Big River and Salmon Creek properties, stands were identified using algorithms that analyze data derived from digital aerial photography and LiDAR imagery and recorded through a Geographic Information Systems database. Compared to the traditional stand-typing methodology (which works very well in even-aged forests), this quantitative approach offers greater ability to capture variability in uneven-aged mixed species forests where stands are less well defined. The stands are then assigned a vegetation label based on tree height, tree density and the coefficient of variation of height. In general, stands are between 5 and 30 acres although some stands are larger. For more details on this stand delineation and forest stratification methodology, see Golinkoff, J. S. 2013.

An example of the final stand delineation and stratification process is shown in Figure 2 below.

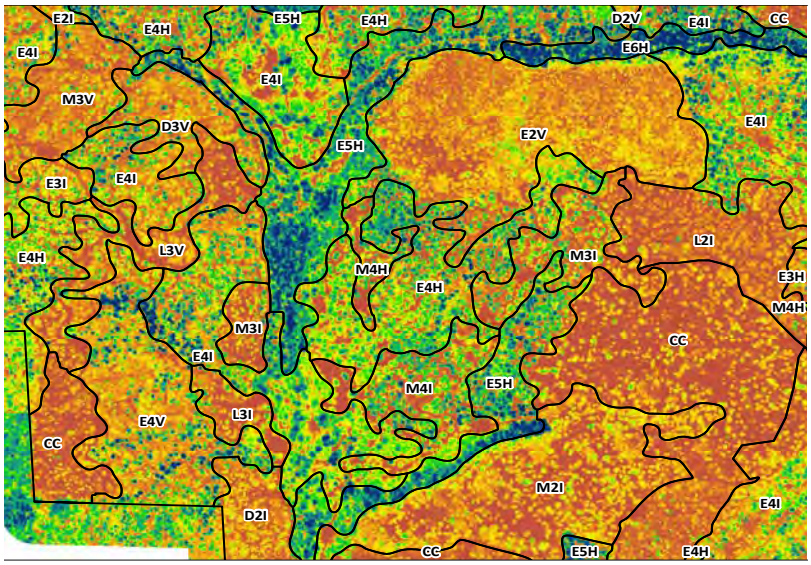


Figure 2: Example of final stand delineation and stratification.

The first letter of the strata is % Canopy Cover (O,L,M,D,E) O=open 0-20%, L=low 21-40% etc. The second letter is mean height of the dominant trees (1,2,3 etc) in 25' height increments. The third letter is the coefficient of variation of height which is an indicator of stand structure. (H=homogenous, I=intermediate and V=variable). CC is for recent Clearcut where the regeneration has not reached 25' in average height. For example an M3V stand has moderate canopy cover, the average height of 75 feet and the canopy ht is variable. M3V stands are young and have variable heights and are the kind of stands expected to develop from an older clearcut or shelterwood removal harvest.

A different approach to inventory was used on the Garcia and Gualala Forest due to their heterogeneous forest conditions and poorly defined stand boundaries resulting from past management. Micro stands or cells were used on the Garcia and Gualala Forests to stratify the forest. A cell is a small area between 1/10th and 1/2 acre in size in which the tree size and canopy condition is known through LiDAR data. The cells are then assigned a unique vegetation label based on tree height, tree density, and species composition which is the basis for the stratified sample. Once the cells are established with strata assigned to each cell, variable radius plots were installed within randomly selected cells (one plot per cell) to obtain estimates of conifer and hardwood stocking, volume, downed wood and conifer and hardwood regeneration. Plots are allocated to each stratum in order to meet statistical confidence targets. Unsampled cells are assigned tree lists based on the average cell within their stratum. All of the forests, Big River, Salmon Creek, Garcia River and Gualala River included in this Option A have an estimate of net conifer volume with at least 10% accuracy at the 90% confidence level. TCF's current inventory estimates are based on approximately 1,900 sample plots distributed across all four properties.

The cells were used in the inventory to account for stand variability; the cells were then grouped by tree height, tree density, and species composition (if known). The stands were then given a strata label based on those attributes identical to the system used in the cell nomenclature. The FORCEE model uses the stands to derive the harvest schedule presented in this Option A. A more detailed discussion of timber stand delineation can be found in Appendix A: "Big River and Salmon Creek Forest Stratification" and appendix B: "Garcia and Gualala Forest Stratification and Sampling Design".

2.2. Methodology to Determine Maximum Sustained Production

TCF used the FORESEE (4C) growth and yield simulator in combination with our inventory data and management prescriptions to make projections of forest growth and inventory over time. The model allows TCF to test different management scenarios over time and space to develop a comprehensive harvest plan which meets the silvicultural, environmental, social, and economic goals of TCF. Maximum Sustained Production (MSP) is calculated for the next 100 years by modeling forest growth and harvests with constraints on certain stands such as riparian corridors, NSO core areas and special prescriptions in some of the conservation easement areas. This modeling connects spatial timber stand information in TCF's GIS database to tree lists in a Microsoft Access databases. Each stand has a tree list which assists in inventory estimates and guides the activity in the growth and yield model. Information generated for each stand includes the following information:

- **Vegetation Type / Stratum** – Each stand is given a stratum label based on average tree height, variation of tree height, and crown closure. The strata are the basis for the stratified sampling design and are used to calculate volume and basal area for each stand.

- **Volume and basal area for conifer and hardwoods species** – Volume and basal area are calculated for each stand based on the inventory results. Inventory sampling intensity is based on the coefficient of variation within each stratum.
- **Site Class** –The Soil Survey Geographic database (SSURGO) was used to make an initial determination of site class. In addition a minimum 3 site trees were measured for each strata to validate the SSURGO site index. Site index was calculated for each species and then converted to the corresponding site class. The SSURGO data was generally in agreement with our findings therefore TCF's model uses the SSURGO site data. The average site class for each strata is assigned to all stands of similar strata in which site data was not specifically collected
- **Timing** – Harvest timing is based on the initial stand condition, pre-designated harvest cycles (for old clearcuts) and minimum harvest volume to trigger the initial and subsequent entries.

A stand is only considered for harvest if it satisfies the timing and volume requirements designated by the management prescriptions, described below and input into the model. Stand constraints are then evaluated which may affect the silvicultural regimes available for a particular stand. Silviculture in unconstrained stands is chosen by the model based on a hierarchal approach starting with selection as the preferred silviculture and working down through transition, commercial thinning, variable retention and finally rehabilitation. Some stands do not meet any of the criteria and consequently are grown forward with no harvest and are reviewed again by the model during the next harvest cycle.

Both growth and harvesting simulations occur using the 4C growth model. 4C runs within a Microsoft Access database and calls routines that grow tree lists forward. TCF's planning used an iterative approach to identify a blend of silvicultural methods, tanoak reduction, harvest levels, and re-entry interval that achieve TCF's management objectives.

2.2.1 Management Objectives

Some of the important management objectives and policies considered in TCF's modeling are:

- **A non-declining inventory at the ownership level.** For each property, overall harvest volume should be less than growth volume for a sufficient enough period of time to significantly increase conifer volume. By the end of the 100 year planning period harvest will increase to approach 100% of growth in the unconstrained (unrestricted for NSO, WLPZ, etc) forest and will represent MSP. When including the constrained acres, inventory increases significantly across all time periods.
- **Reliance on uneven-age management techniques.** TCF's long-term silvicultural objective is to primarily use single-tree and group selection. Harvests on less mesic (dryer) sites, which have a greater component of Douglas fir and sugar pine, may necessitate some variable retention harvests, in order to achieve successful natural regeneration.
- **Restoration of forested stands with high levels of tanoak competition.** In order to achieve adequate conifer stocking levels for future growth and management many stands, especially on the Garcia and Gualala forests, will require some form of tanoak reduction and control to occur concurrently with timber harvests. TCF currently uses a combination of techniques to control tanoak; Imazapyr applied by the "hack and squirt" technique is most commonly used to control

tanoak individual tree felling to release conifer seedlings and saplings is also used to control tanoak stocking levels.

- **Development and maintenance of desired habitat conditions.** The development and maintenance of desired conifer stocking and structural conditions in the forest will result in an increase in available forest habitat over time through the development increased forest cover and large tree habitat as indicated by an increase in volume and basal area over the 100 year planning horizon.
- **Appropriate management of sensitive areas such as riparian corridors and NSO habitat** Stands constrained by riparian corridors and sensitive species habitat or conservation easement have been identified and the silviculture regime is selected to accommodate the constraint. In some cases, the constrained harvest area will not be harvested.

2.3. Site Occupancy, Stand Vigor, and Regeneration

Ensuring adequate site occupancy, maintaining good stand vigor, and making provisions for adequate regeneration are important to TCF and necessary for ensuring Maximum Sustained Production (MSP). TCF's retention and restocking guidelines are designed to create future healthy stands for continued timber production and improved wildlife habitat. Silvicultural regimes are designed to ensure timber stand health and vigor is maintained or improved by targeting diseased or suppressed trees first.

For forest modeling tanoak is scheduled for reduction within each of the silviculture regimes if it exceeds 30% of the total pre harvest basal area. When tanoak is "removed" the post-harvest tanoak stocking was not allowed to exceed 30 ft^2 per acre for selection and transition silviculture and was not allowed to exceed 15 ft^2 per acre for Variable Retention or Rehabilitation silviculture. These hardwood retention levels were chosen to ensure that hardwoods are a component of our stands and supply necessary mast and structural diversity for wildlife habitat. It is our goal to restore the majority of tanoak dominated stands to a conifer-hardwood species mix that more closely resembles the conditions that existed prior to the commencement of commercial logging activities. Tanoak reduction strategies to be used in the field may vary by stand structure and the applied silviculture, these are discussed in section 3.3.3. True oak stands occur on the Gualala and Garcia Forests containing black oak (*Quercus kelloggii*) Oregon white oak (*Quercus garryana) and* Shreve's oak *(Quercus parvula var. shrevei*) which are restricted from conversion management. On all of TCF ownerships individual true oaks, madrone, alder, chinquapin, California bay and other less common hardwoods species shall be retained wherever possible.

3. Silviculture

The silviculture modeled in this Option A was developed to reflect the provisions of the individual property management plans and the TCF Policy Digest. In addition the silviculture and harvest schedule was designed to meet the target carrying capacity, expressed as volume per acre, of the forests. The carrying capacity of Big River and Salmon Creek was set to 50 MBF/acre, Garcia River and Gualala River forests were set to 35 MBF/acre. These targets were chosen to ensure a reasonable level of stocking was maintained which would result in adequate wildlife habitat throughout the forest and yield adequate harvest volumes. To achieve the volume targets, basal area targets were set for each stand.

Stands with more than 225 ft^2 of BA at the start of the planning period have a target stocking rate of 250 ft^2 of BA at the end of the 100 years. Stands with less than 225 ft^2 of BA at the start of the planning period have a target BA stocking rate of 200 ft^2 BA. It was determined through an iterative process that this combination of harvest and growth constraints results in a reasonable harvest level while leaving enough standing inventory to allow the forest to recover and add additional volume prior to the next entry.

TCF's primary goals are:

- To increase forest stocking over time through carefully applied selective harvesting which results in increased total growth and value of the residual stand as described above.
- Maintain or improve wildlife habitat and water quality by using selection silviculture.
- Contribute to the overall economic viability of the forest products industry by providing predictable employment for forest workers and raw products to the local saw mills.
- Generate revenue through sales of timber and carbon offsets to repay debt, cover operating expenses, invest in property improvements and provide return to funding partners.

There is an emphasis in our management plan(s) on uneven-age management and tanoak reduction to achieve the stated goals. Table 1 below shows the percentage of acres treated by each modeled silvicultural system by period for all of the Forests combined. The model utilizes stand level data generated from our inventory to choose silvicultural prescriptions on a hierarchal basis, selection being the preferred silviculture then transition followed by variable retention and rehabilitation. The modeled output does not choose all available silvicultural systems, however TCF anticipates the need to use all silvicultural systems at some time depending on site specific stand conditions. The modeling results presented in this plan demonstrates that TCF's general approach to achieve MSP is valid; they are not however presented as a concrete plan of action. TCF foresees the need deviate from the planned silviculture from time to time to account for site specific conditions and inherent stand variability. Therefore TCF shall be allowed to deviate from the modeled silvicultural output by a maximum of 10% of the harvested acres per forest on any 5 year rolling average. Reasons for silvicultural deviations may include: insufficient stocking, disease, damaged or decadent forest conditions, intolerant species, difficult site conditions or the need to improve the quality or quantity of important wildlife habitat . Deviations for silvicultural experimentation and investigations are allowed provided they are explained and justified in the THP.

Table 1: Modeled Siviculture treatments by percent of total acres harvested.

Year	WLPZ1	WLPZ2	Ecological Reserve Selection- GRF	Standard Selection	Transition	VR40	VR60	sum %	Sum acres
2014-2018	0.5	12.5	6.6	69.2	11.2	-	-	100.0	7,830.3
2019-2023	0.4	1.6	14.1	83.0	0.9	-	-	100.0	6,637.3

Year	WLPZ1	WLPZ2	Ecological Reserve Selection- GRF	Standard Selection	Transition	VR40	VR60	sum %	Sum acres
2024-2028	2.4	10.6	12.8	73.6	0.5	0.2	-	100.0	7,813.1
2029-2033	9.7	7.1	10.4	72.7	0.0	-	-	100.0	9,578.0
2034-2038	4.8	6.6	9.9	78.6	0.0	-	-	100.0	10,115.2
2039-2043	5.1	1.9	12.8	80.3	0.0	-	-	100.0	7,829.4
2044-2048	8.7	10.4	9.4	71.4	0.2	-	-	100.0	10,642.0
2049-2053	2.0	2.6	9.4	85.8	0.1	-	-	100.0	10,644.5
2054-2058	3.3	8.2	10.9	77.6	-	-	-	100.0	9,168.1
2059-2063	7.6	5.8	6.6	80.0	0.0	-	-	100.0	9,457.5
2064-2068	5.0	9.3	3.5	82.1	0.0	-	-	100.0	8,507.6
2069-2073	4.8	2.3	1.6	90.9	0.3	-	-	100.0	9,012.2
2074-2078	8.2	10.9	2.4	78.5	-	-	-	100.0	10,095.3
2079-2083	6.5	3.4	1.8	88.4	-	-	-	100.0	7,867.7
2084-2088	6.3	9.7	0.5	83.5	-	-	-	100.0	7,728.3
2089-2093	9.7	6.6	0.5	83.2	-	-	-	100.0	8,629.0
2094-2098	7.3	10.7	0.4	81.6	-	-	-	100.0	7,415.1
2099-2103	8.3	3.9	1.1	86.7	-	-	-	100.0	5,688.9
2104-2108	13.6	17.2	0.9	68.2	-	-	-	100.0	6,376.6
2109-2113	7.7	3.7	0.1	88.5	-	-	-	100.0	7,055.1

For modeling purposes the harvest and retention guidelines specified in the forest practice rules were used for all silviculture systems except in the case of single tree selection and group selection where the modeled retention generally exceeds the minimum retention requirements specified in the rules. Future THPs will comply with the Option A, the enforceable retention standards for Selection and Group Selection shall be stated by the submitting RPF in the THP. Unless stated otherwise in the THP, a timber stand shall be considered stocked if the stand meets the post-harvest stocking standards as required by the Article 3 of the FPR.

3.1. Uneven-aged Management

Uneven-aged management is utilized to establish or maintenance of a multi-aged, balanced stand structure, promote the growth of trees throughout a broad range of diameter classes, and encourage

natural reproduction. Typical silvicultural systems in uneven-aged management include single tree selection and group selection. Over time, uneven-aged management systems develop trees in at least three age or size classes. Periodic timber harvest in these stands will remove selected individual trees from all age classes or small groups of trees in order to promote the growth of the remaining trees and to create an opportunity for new trees to regenerate and occupy the site.

A majority of the area devoted to timber production will be managed using uneven-aged silvicultural systems. Within the redwood region, this is the most common system utilized by non-industrial forest landowners and others intent upon maintaining forest cover for wildlife habitat and visual quality.

RPF's submitting THP's utilizing selection silviculture will demonstrate compliance with this Option A by incorporating into the plan the following information:

- The site class.
- The average pre harvest conifer basal area and BF volume per acre for each THP or harvest block within THP's.
- The enforceable minimum BA retention standard shall be stated in the THP. The minimum BA must meet or exceed the minimum requirements stated in 14 CCR 913.2(a)(2)(A) for the first decade the Option A is in effect.

Deviations from the harvest cycle constraint by site class will be allowed for up to 10% of each THP or harvest block to allow RPF's to make logical harvest units.

3.1.1. Single Tree Selection

Single tree selection will be utilized to create growing space for younger trees through the development of small openings resulting from removing individual trees. The openings generally range in size between 1/100th and ¼ acre openings within the stand. Single tree selection leads to stands with continuous forest cover, small gaps between trees, and a diversity of tree sizes and ages. With this silvicultural system, the intent will be to enter each timber stand every 10 to 15 years to remove lower quality or defective trees, thin the dominants and co-dominants, and provide openings to accelerate the development of leave trees and a new age class.

Most stands to be managed under the selection system are essentially even-aged, single-canopy 2nd or 3rd growth stands that were initially clearcut and may have had one or more harvests following the initial entry. Thus, it will take multiple entries to achieve the balanced age and diameter distribution we are seeking.

For a stand to be considered for selection harvesting it must contain at least 125 sq ft of basal area. TCF has modeled the removal of a minimum of 25 sq ft of BA of trees between 8-48 inches. Fifteen square feet of basal area were retained from harvest from the largest trees in the stand. The maximum allowable harvest was 1/3 of the conifer BA and/or up to 40% of the standing volume whichever is less. Reentry cycles are determined by site class, site II and better lands are modeled with a ten year harvest cycle and site III lands are modeled with a 15 year harvest cycle. The site class is used as the trigger which indicates the earliest available date a stand can be reentered. In addition to meeting the site class

constraint stands must have at least 25 sq ft more basal area than it had prior to the previous entry, this requirement is the primary driver for increasing inventory over time.

3.1.2. Single Tree Selection- Garcia River Forest Ecological Reserve

The Ecological Reserve (ER) Area on the Garcia River Forest is designated for late seral stand recruitment. The ER is composed of approximately 8,000 acres of forest land including TCF's entire ownership within the Inman Creek watershed, a high priority Coho stream. In addition to the standard class I WLPZ there is an additional 100 feet of RMZ and on all class I streams except the mainstem of the Garcia which has an additional 200 foot RMZ. The RMZ is considered part of the Garcia Forest Ecological Reserve and shall be managed as such. To facilitate late seral stand recruitment, harvesting will be essentially thinning from below with some thinning of co-dominants to improve spacing. Defective trees and trees with complex crowns will be left on site to promote the development of a multi storied canopy. TCF has modeled 2 complete entries in the reserve then harvesting was terminated because we believe that the stand will have the appropriate BA, tree size, spacing and structural elements to be left free to grow after 2 harvests.

For a stand to be considered for selection harvesting it must contain at least 125 sq ft of basal area. TCF has modeled the removal of a minimum of 25 sq ft of BA of trees between 8-48 inches. Fifteen square feet of basal area were retained from harvest from the largest trees in the stand. The maximum allowable harvest was 1/3 of the conifer BA and/or up to 40% of the standing volume whichever is less. The minimum reentry cycle is 20 years and a stand must have at least 40 sq ft more basal area than it had prior to the previous entry before it is eligible for harvest again. Class I stream zones within the Ecological Reserve are modeled using the High Retention Single Tree Selection method described below and are restricted to 2 entries on a 20 year harvest cycle.

3.1.3. High Retention Single Tree Selection: Class I inner zone "A" and Class II Inner zones

The goal of the High Retention Selection is to protect and maintain the stream riparian zone and enhance water quality. WLPZ1 require 80% canopy retention and the 13 largest trees per acre be retained, per 14 CCR 916.9(f)(2)(B) and 916.9(g)(2)(B)). The TCF harvest model removes trees subject to these constraints. The canopy and stocking requirements within the WLPZ's shall be in conformance with the forest practice rules unless exceptions are made in the THP per 14 CCR 916.9(v). No other site specific reporting is required by submitting RPF's for WLPZ1 silviculture.

3.1.4. Moderate Retention Single Tree Selection: WLPZ2 , Standard class II zones

The harvest and growth constraints for the Moderate Retention Selection are identical to single tree selection with the following addition: at least 50% of the canopy covering the ground shall be retained per 14 CCR 916.5(e). The TCF harvest model removes trees subject to these constraints. The canopy and stocking requirements within the WLPZ's shall be in conformance with the forest practice rules unless exceptions are made in the THP per 14 CCR 916.9(v). No other site specific reporting is required by submitting RPF's.

3.1.5. Group Selection

Stands managed under the group selection system will consist of small forest patches or harvest groups. The resulting stand will be composed of various age classes and developmental stages concentrated within each group. For modeling purposes, there is no distinction between group selection and single tree selection the growth and harvest constraints for groups are the same as Individual tree selection.

To date groups have been used used when the average volume per acre is low and individual tree selection is uneconomical, stands dominated by Douglas fir or in stands with high hardwood competition. By concentrating harvest volume within groups TCF feels that harvesting costs can be reduced especially in low volume per acre cable yarding areas. In poorly stocked areas groups are useful in establishing regeneration of redwood and Douglas-fir which require direct sunlight to thrive. Groups are placed in all forest stand conditions to avoid the potential for high grading by targeting the best volume areas and, in the case of hardwood dominated areas, restore the site to conifer. To date, TCF's policy has been to supplement regeneration within group openings by planting conifer seedlings if in the opinion of the project forester planting is the best way to secure conifer regeneration. The location of group harvest areas will be on a site specific basis determined by the project RPF. Factors to include when considering groups will be volume per acre, tree species, stand stocking and vigor and current market conditions.

3.1.6. Transition

Transition harvests are designed to transition a stand from an even age state to an uneven-age condition over time. For our purposes, transition harvest will be used in young/small even-age stands resulting from clearcuts or shelterwood removal harvests that will benefit from some selective harvest of individual trees to release the conifers and increase growth and windfirmness of the residual stems. Small openings may be created to promote the development of another age class. Transition harvests will often be coupled with some form of hardwood reduction.

Transition silviculture includes the alternative prescription "Transition with Groups". This silviculture is analogous to group selection and is designed to improve stocking levels of younger age classes and reduce hardwood competition.

For a stand to be considered for transition harvesting it must contain at least 75 sq ft of basal area and no more than 124 sq ft of basal area. TCF has modeled the removal of a minimum of 25 sq ft of BA of trees between 8-48 inches. Fifteen square feet of basal area were retained from harvest from the largest trees in the stand and a total of 50 square feet was retained to meet minimum stocking requirements. Reentry cycles are determined by site class, site II and better lands are modeled with a ten year harvest cycle and site III lands are modeled with a 15 year harvest cycle. The site class is used as the trigger which indicates the earliest available date a stand can be reentered. In addition only one transition harvest is modeled per stand therefore stands harvested using transition silviculture must meet the minimum requirement for single tree selection prior to subsequent entries.

The minimum BA retention standard shall be stated in the THP. The minimum BA must meet or exceed the minimum requirements stated in 14 CCR 913.2(b) for the first decade the Option A is in effect.

TCF's current management is very similar to the management proposed in this Option A. The following table shows TCF's past and proposed THP's with silvicultureal treatments and yarding systems.

Table 2: TCF Management Practices 2007-2013

Property	THP Number	County	Tractor Selection	Cable Selection	Tractor Group Selection	Cable Group Selection	Tractor Transition	Cable Transition	Tractor Seed Tree Removal	Cable Seed Tree removal	Tractor Rehabilitation	Cable Rehabilitation	Tractor VR	Cable VR	Oak Treatment
Garcia River	1-11-109	MEN	94	60	22	82									
Garcia River	1-11-023	MEN	107		412										43
Garcia River	1-06-135	MEN	85	100			4	89							
Garcia River	1-07-035	MEN		370											
Garcia River	1-08-039	MEN	72	37		65		147							
Garcia River	proposed	MEN	200	**135**											
Garcia River	1-08-094	MEN						255			15				90
		MEN													
Salmon Creek	1-06-099	MEN	46	34	43	114			257	59					
Salmon Creek	1-07-191	MEN	219	206											
Salmon Creek	1-10-005	MEN	48	63											
		MEN													
Big River	1-07-060	MEN	105	52											
Big River	1-07-083	MEN	52	11			25		47				56	31	87
Big River	1-08-037	MEN	45	90		48	121	93	23	75					199
Big River	1-09-020	MEN	271	155			12	17							71
Big River	1-09-044	MEN	201				33								
Big River	1-09-097	MEN	100	279			65	47							152
Big River	1-10-030	MEN	271	190											37
Big River	1-11-009	MEN	144	12											
Big River	1-11-057	MEN	71	213	17	87									79
Big River	1-11-114	MEN	154	269	9	15	33								111
Big River	proposed	MEN		236											
Big River	proposed	MEN		196											

3.2. Intermediate Treatments

3.2.1. Commercial Thinning

Commercial thinning is the removal of trees in young growth stands to maintain or increase average stand diameter of the residual crop trees, promote timber growth, improve forest health and control species composition by removing low value forest species. TCF will occasionally use commercial thinning in young even-age stands resulting from prior clearcuts or shelterwood removal harvests.

For a stand to be considered for commercial thinning it must contain at least 75 sq ft of basal area and they must have at least 50% of the conifer basal area in trees less than 14" DBH. TCF has modeled a retention of 100 trees per acre 4" DBH and greater. Reentry cycles are determined by site class, site II and better lands are modeled with a ten year harvest cycle and site III lands are modeled with a 15 year harvest cycle. The site class is used as the trigger which indicates the earliest available date a stand can be reentered. A stand may be eligible for transition or selection harvest after the commercial thin harvest.

The pre and post-harvest stocking requirements listed in 913.3(A) or 913.3(B) shall be the enforceable standard for THP's.

3.3 Special Prescriptions

3.3.1 Variable Retention

Variable retention (VR) is the only even age final harvest system that is anticipated for use by TCF. VR is used to regenerate a new age class on a stand level. Variable retention retains mature trees in a variable configuration. A new even-aged stand is grown beneath or between the retained trees. Retained trees may occur as scattered individuals, in groups, or in combination. Mature trees are retained to improve or maintain habitat value, watershed function, and aesthetic value. VR offers the opportunity to meld the continuous canopy concept of uneven-aged management with larger openings to allow for sufficient sunlight to promote a second age class beneath and between the existing overstory. Per TCF current policy, VR will likely be used sparingly and on sites that are more suited for Douglas-fir and sugar pine. Research from the Pacific Northwest, (Johnson and Franklin 2013) indicates that early successional ecosystems important to some song birds (e.g. olive sided flycatcher) may be missing, VR harvest simulate the early Successional stages of forest development and may be an important component of future management. TCF anticipates at least one THP including VR harvest on each property in the near future.

The pre and post harvest stocking requirements listed in 913.4(d) shall be the enforceable standard for THP's.

3.3.2 Rehabilitation

Rehabilitation will be occasionally utilized for those stands that do not meet the minimum stocking standards set forth in 14 CCR 912.7 and are capable of growing conifers. Generally, these are stands that are currently hardwood dominated but were once conifer dominated as evidenced by conifer stumps, location, or soil type. Under the rehabilitation prescription, hardwood stocking will be reduced through mechanical removal or herbicide application and conifer seedlings will be planted in the vacated growing space.

The pre and post harvest stocking requirements listed in 913.4 (b) shall be the enforceable standard for THP's.

3.3.3 Tanoak Reduction

Hardwoods, specifically tanoak, are naturally occurring in the redwood region and are a minor component of a well-managed coastal conifer forest. Typically, hardwoods comprise 10-30% of a stand's basal area. However, as a result of past management practices, tanoak has become the

dominant species or is a significant portion of the forest basal area in some stands. Tanoak is both extremely shade tolerant and sprouts vigorously after being cut or damaged. Because of these physiological traits, once established tanoak is capable of out competing conifers for light and nutrients. Tanoak control will be a necessary part of many silvicultural treatments to ensure that tanoak does not become the dominant tree species within a stand after a commercial harvest has occurred. In the growth model tanoak is "harvested" if it represents represents more than 30% of the total stand BA a target BA of 30 ft^2 between 2 and 20" DBH.

In practice selective "harvesting" of tanoak is the method of control most often used in TCF's THP's. Selective harvesting is the application of Imazapyr or manual felling of tan oak trees such that suppressed conifers are released through the harvest of the tanoak. This method is preferred because it directly benefits suppressed conifers, reduces chemical use and is effective when used for manual tanoak control. In addition selective tanoak harvesting reduces dead and down material and helps maintain forest canopy cover for wildlife habitat. When selectively harvesting tanoaks the residual tanoak basal area is less important than effective tanoak removal, a THP shall be considered in compliance with 14CCR 912.7(d) when the selective tanoak control method is specified in a THP.

The herbicide primarily recommended for use of tanoak control is imazapyr. The primary application method will be via "hack and squirt." Using this method, a series of cuts are made around the stem of the tree and the herbicide is applied directly to the tree's vascular tissues. Additional herbicides for tanoak control may be considered in the future as they are developed and tested. No hardwood species other than tanoak shall be treated. Mandatory tanoak retention guidelines are listed below.

- Retain all tanoak 20" DBH and larger. These large hardwoods are of the highest value to wildlife because they tend to be the most prolific mast producers and they possess more desirable structural attributes than smaller trees. Exceptions to the general retentions guidelines may be adopted on sites with very high numbers of large tanoaks if retention of all 20" and greater tanoak will not result in sufficient sunlight and growing space for young conifers.
- There will be no tanoak control with herbicides in Class I, II or IV WLPZs or within 25 feet of a class III watercourse. Manual felling or girdling of small tanoaks less than 20" may be used within WLPZ's as part of a riparian shade enhancement project designed to increase conifer site occupancy and growth on a site specific basis.

Additional TCF policies on forest chemical use, monitoring, and reporting are available; this section focuses solely on the growth and yield considerations. As markets permit, we may choose to harvest tanoak, which will be subject to the same retention requirements as mentioned above. The results of different tanoak control techniques will be monitored over time and our policies will be revised as new information becomes available.

3.3.4 Timber Stand Improvement – Pre-Commercial Thinning and Conifer Release

Pre-commercial Thinning (PCT) is a thinning of smaller trees where merchantable sawtimber is not derived from the thinning operation and the cut material is left on site. PCT is undertaken to increase spacing or release desired conifer trees and control species composition by cutting

surrounding inferior conifers or hardwoods. It is designed to direct growth to the remaining trees, generally those with the best form or growth potential. Young conifer stands (typically 5-15 years old) are thinned to prescribed stocking levels, in an effort to produce a desired combination of tree species and density.

Release operations can be used where thinning is not feasible and involves releasing individual trees, or groups of trees, from immediate competition by eliminating over-topping or closely surrounding vegetation. This practice results in increased growth of the remaining trees and is a also a means of controlling tanoak, brush, and invasive weed species. Release is a non-commercial practice, generally utilizing direct stem injection of herbicides or manual felling.

Timber stand improvement activities will be modest in scope (200-400 acres/year for the whole ownership). For this reason timber stand improvement activities are not directly modeled in the Option A and are not expected to result in an increase in growth that would be significant at the ownership scale.

3.4 Even-aged Management

Clearcutting, seed tree removal and shelterwood removal are not modeled for this Option A. However, they may be used in the event of severe damage resulting from natural causes such as fire, wind, or bears to capture mortality and regenerate the site. The pre and post harvest stocking requirements listed in 912.7(b)(1) shall be the enforceable standard for THP's.

4 Non-Timber Forest Resources

Non-timber forest values considered in the calculation of Maximum Sustained Production (MSP) include the conservation and improvement of wildlife and fisheries habitat and attention to various legal restrictions specific to the properties including conservation easements. These considerations impact the determination of LTSY through the application of silvicultural prescriptions that are appropriate for the level of sensitivity in each stand. Community concerns such as viewsheds and recreational opportunities are thought to be minimal and our standard selection silviculture will mitigate those impacts.

The major non-timber forest values factored into determination of LTSY are:

- Protection and enhancement of riparian zones to improve fisheries habitat and water quality; and
- Recruitment and retention of NSO core areas as well as structural and compositional attributes to maintain and improve Northern Spotted Owl habitat and other terrestrial wildlife habitat in general.

In addition to the requirements of the Forest Practice Rules, TCF in cooperation with CDF&W has initiated a large woody debris (LWD) enhancement program on most of its property to accelerate wood production in the stream channel to improve habitat for coho salmon and steelhead trout. To reduce sediment inputs into streams and provide increased riparian canopy cover TCF adopted a 25 foot no harvest buffer on class I and class II stream on the Garcia River Forest in 2007 and a 50 foot no harvest buffer on class I streams on Big River and Salmon Creek. These buffers are utilized in combination with the Anadromous Salmonid Protection Rules adopted by CALFIRE in 2011. The Conservation Fund is also

proactively upgrading our road system to reduce sediment inputs into streams. To date we have upgraded almost one hundred miles (at a cost of about $3 million) and we expect our current level of road improvement activity to be maintained.

To promote the maintenance and development of wildlife habitat, TCF has implemented various levels of hardwood reduction to achieve conifer release and maintain forest cover where possible. The following paragraphs describing wildlife tree retention and recruitment are excerpted from TCF's management policies as revised January 2013.

4.1 Wildlife Trees, Recruitment Trees, and Snags

Target: four per acre on average across stand. The following criteria have been developed to assist field foresters to recruit suitable wildlife trees. Trees shall be retained from any of the following groups until a minimum of four recruitment trees per acre have been identified.

- **Snags:** Retain all snags, (all should be retained but only those greater than 18-inch DBH and 20 foot height shall count towards the retention targets).
- **Conifers greater than 48-inch DBH***:* Retain or recruit a minimum of two and not more than four 48" trees per acre for recruitment (unless old growth). In the event there are less than two 48" trees per acre, two trees per acre from the largest size class shall be designated for recruitment from the harvest area.
- **Old-growth trees:** Retain all old growth. Old growth is defined as any conifer tree greater than 200 years old that exhibits outward signs of being old or decadent: such as rounded or flat crown, dead top, excessive branching, or platy bark.
- **Raptor nest trees (active or likely to be re-used):** Retain all.
- **Any hardwood except tanoak:** Retain all.
- **Tanoak:** Retain all tanoak 20" and greater unless site specific conditions exist as justified by the project forester
- **Murrelet habitat trees:** Retain all. Typically large diameter Douglas-fir or other conifer with at least one mossy branch platform capable of supporting an egg: at least 6" in diameter, nearly horizontal, within the canopy of the stand but lower than the surrounding tree tops within 100' radius, covered directly above by at least 50% canopy, and allowing ready flight access and landing paths.
- **Den trees:** Retain all den trees which are defined as trees which have a cavity greater than three inches in diameter and greater than ten feet above ground
- **Trees with basal hollows or other significant features:** Retain all trees with basal hollows defined as trees with significant burn scars protruding 1/3 or more into the bole of the tree, as well as retain all trees with acorn granaries, significant or unusual lichen accumulation, signs of deformity, decadence, unusual bark patterns, or other unique structure or features, eg large excessive branching or flat tops.

4.1.1 Retention Tree General Guidelines

- Wildlife trees or large trees marked for retention are not intended for future harvest and should be retained throughout the planning period. The project forester may "trade" designated retention trees if other more suitable retention trees develop over time.

- Marking of the wildlife trees (with paint or tags) is intended to communicate the recognition of the importance of that stem to future foresters, agency reviewers, and the public.
- In areas with insufficient wildlife trees (less than 4 trees per acre), snags may be created by girdling. For the next 20 years some preference for snag creation and wildlife tree recruitment will be given to cull trees and whitewoods (because of their low financial value) even though they may have a shorter lifespan as a snag compared to redwood.
- All retention is subject to operational considerations; the felling of any tree is permitted when necessary for operator safety, road right of way, or yarding corridors.
- Targets shall be assessed across the entire harvest stand, not on an individual acre basis.
- Preference shall be given for spatial grouping of wildlife trees (clumps of downed wood, snags, and/or wildlife trees).

All of the foregoing requirements and guidelines are subject to further review and amendment as the science and practice of forest management evolves and new research is developed and applied. Because of past practices, some portions of the forests do not have sufficient wildlife features and the initial targets set forth above are intended to guide the long-term retention and recruitment of these features, recognizing it may take two decades or entries to achieve the target distribution.

4.2 Ecological Reserve

The Ecological Reserve was established on the Garcia River Forest in 2006 and is comprised of approximately 8,000 acres set aside for the development of late seral stage forest. Its establishment was required by the terms of the California State Coastal Conservancy's grant to acquire the property. The Ecological Reserve is primarily within the Inman Creek watershed and an interconnecting network of watercourse buffers and other smaller reserve areas which capture the forest biodiversity across the Garcia River Forest ownership. Silviculture within the Reserve is described in section 3.1.2, tanoak control may be used to maintain conifer dominance in harvest areas, however pre commercial stand manipulation is not anticipated. The reserve network is displayed on the GRF map in Section 10.

4.3 Anadromous Salmonids

TCF forestlands are bisected by approximately 87 miles of class I stream capable of supporting anadromous fish. Protecting and improving fisheries habitat is a priority for TCF and its partners. Fishery and riparian corridor protection measures are defined in the Forest Practice Rules. Other restrictions imposed by our management plans or conservation easements may be more restrictive that the FPR's. For modeling purposes the streams and riparian corridors are buffered per the forest practice rules and other TCF constraints as applicable. The buffers are described in detail in table 12, Appendix C. In total approximately 1,743 acres are excluded from harvest and an additional 4,561 acres have harvest restrictions totaling approximately 12% of the forest. Field surveys for each THP may supersede the current modeling. Because of recent LIDAR analysis we are confident in the accuracy of our stream GIS layer and do not anticipate any large changes.

4.4 Northern Spotted Owls

The USF&WS listed the Northern Spotted Owl (NSO) as threatened under the Endangered Species Act in 1990. Each NSO territory is provided a 100 acre core area in which timber harvest is severely limited or prohibited. The Conservation Fund currently tracks 24 NSO territories with activity centers on the properties. For modeling purposes each NSO territory with an activity center on TCF ownership is given a 100 acre core area consisting of the "best" habitat surrounding

the nest site. NSO which reside off property are buffered with a 1,000 foot radius and that portion of the radius which falls within TCF ownership is considered a "no harvest" area, in a total of 2,737 acres or approximately 5.1% of the forest is restricted from harvest. NSO territories and corresponding core areas may change yearly and will likely change over time in response to environmental conditions, competition from barred owls or mortality. These changes are not expected to effect the calculation of LTSY.

4.5 Range and Forage

The dominant vegetation type on TCF's ownership is redwood/Douglas-fir forest. Tanoak and Pacific madrone are the major hardwood species both of which produce significant mast for forage by birds and mammals. Other major conifer species include sugar pine and grand fir whose cones are favored by grey squirrels. Redwood cambium is favored by bears, porcupines and grey squirrels in some areas where other forage is lacking. Brush species favored for wildlife foraging include blackberry, thimbleberry, huckleberry and various grasses and clovers which occupy permanent openings in the forest. It is felt that the species component and percent occupancy will not change due to our management techniques. As openings are created desirable forage species will occupy the site temporally. There are no management activities proposed which would prevent or discourage forest forage species.

Grasslands occur on the Garcia and Gualala forests, some of them are natural with native grasses and some may be relics of conversion attempts earlier in the century either by homesteaders or Native Americans. Native American fire management also had a role in the current distribution of grasslands on the ownership. Grasslands are used by the black tail deer for forage, and feral pigs till up grasslands in search of grubs and mushrooms. TCF's policy is to maintain the native grasslands and is considering a plan to reintroduce fire to help maintain the grasslands and promote the growth of the native grasses.

5 Regional Economic Vitality and Employment

Since its inception in 1985, The Conservation Fund (TCF) has focused on programs which further both environmental and economic goals. TCF believes that maintaining a strong balance between conservation and economic vitality will in the long run benefit our projects and partners while preserving land in perpetuity. TCF's goal is to maintain the forest as a commercially viable working forest while simultaneously reinvesting proceeds from the sale of timber and carbon offsets to reduce sediment inputs from roads and improve salmonid and wildlife habitat. TCF believes this strategy helps to maintain the current economic forest products economy and keeps forestland out of development or conversion to non timber resources (which would increase the cost of county services and decrease the viability of the forest industry).

Employment

Within the local area, TCF currently employs 3 full-time foresters and 10 part-time employees or contractors. This group includes our forestry staff and security, contract wildlife biologist, geologists, botanists and other professional foresters. In addition to direct employment, TCF purchases products with approximately 35 vendors and engages in contracts with approximately 53 contractors, most of which are located in Mendocino County. TCF's forest operations

support approximately 50 additional part time jobs. These are primarily logging and log hauling, road construction and reconstruction, and biological studies which support the forest operations.

Historically the majority of the jobs and revenue generated in Mendocino County have come from the timber and fishing industries. Both industries have suffered a severe decline in the last few decades with no clear replacement of the economic inputs.

Forestry jobs, such as those generated by TCF's property management activities, are especially important to the North Coast regional economy. The north coast is in transition to a more diversified economy with fewer forest jobs and increased tourism related service industry jobs. However, on average, North Coast service jobs pay less than forest based jobs. As calculated by the California Department of Forestry and Fire Protection, mean annual wages in 2003 were $19,700 for the tourism sector and $31,721 for timber industry occupations (III-42).

One measure typically used to determine the economic impact of forestry activities is "number of jobs created." TCF maintains a field office in Caspar, California to support the North Coast Forest Conservation Program, providing full-time and part-time employment for local residents. The local office is supported by various staff (legal, human resources, accounting, real estate, etc.) at the main office in Arlington, Virginia.]

Table 3: Direct and Indirect Annual Employment (6 year average)

Employee Group	Number
TCF full-time employees	4
TCF part-time employees	2
Contractors	53
Vendors[1]	35

Although the number of local employees is small, the number of local jobs generated directly by the program is significantly greater since TCF retains many different contractors each year (see Table 1) to perform services on the properties. In selecting contractors, TCF strives to hire local individuals and small businesses. In addition, program activities indirectly support local businesses and related industries by purchasing services from a total of 35 local vendors that have supplied the program since 2006.

As shown in Table 3, North Coast Forest Conservation Program payments for contractual services from 2006-2012 totaled over $2.5 million. The equivalent number of contractor jobs generated by these service payments is estimated based on the mean annual wage of $31,721.

Table 4: Contractual Service Annual Payments (6 year average).

Contract Type	Payment
Logging & trucking	$1,129,194.33

[1] Vendors include non-contractual payments for a range of goods and services from field and office supplies to appraisals, utilities, vehicle expenses, etc.

Contract Type	Payment
SFI, FSC, CAR Certifications	$19,940.33
Inventory & carbon(local)	$68,714.33
Inventory & carbon (fees)	$136121.67
Firefighting	$22,033.83
Professional Services	$1,198,547.33
TOTAL	**$2,574,551.83**
ESTIMATED JOBS	**81.16**

Additional indirect jobs and employment in associated industries, such as milling and lumber sales, are not included in these figures, but also important to the local economy

5.1 Direct and Indirect Economic Impacts

Select direct and indirect economic impacts of the North Coast Forest Conservation Program are summarized in Table 4. Direct economic impacts are "the initial, immediate economic activities (jobs and income) generated by an industry". For the Program, these include the local employment and contractual service payments described in the section above. A significant portion of the Program's direct economic impacts are produced by sustainable logging activities. Unfortunately, recent declining timber prices have affected harvest levels, reducing the quantity of contract payments as harvest levels from the properties has been uneven flow in response to market conditions.

Table 5: Select Direct and Indirect Annual Economic Impacts (6 year average).

Impact Types	Impact Dollar Amount
Direct Impacts	
Contractual service payments	$2,574,551.83
Vendor service payments	$60,670.33
Vendor materials payments	$99,477.17
Permits (DFG & Water Board)	$11,316.00
Timber taxes (State)	$36,326.17
Property taxes (County)	$107,263.67
ANNUAL TOTAL	$2,889,605.17
ANNUAL $/ACRE	$65.57

Economic impacts are "production, employment and income changes occurring in other businesses/industries in the community" as the supply inputs. For the Program, these include payments to vendors for materials and services, and taxes paid. The Program's activities from 2006-2012 have generated $218,000 in timber taxes for the State of California and $644,000 in property tax revenues for Mendocino County. Since 2006, the annual direct economic impacts of TCF's North Coast Forest Conservation Program have averaged approximately 2.9 million dollars annually.

6 Monitoring

The Conservation Fund is in a continual process of improving its knowledge about the forests it manages. The projections described in this Option A serve as a baseline that will be used to make management decisions in the future as we gain experience with the silvicultural prescriptions that have been modeled. It is anticipated that some adjustments may be made to reflect actual (measured vs modeled) growth or other unforeseen changes. In addition to the current inventories and assumptions under which the Option A is based, TCF expects to re inventory all of the forest tracts subject to this option A. Property inventories are expected to be conducted approximately once every 10 years. conduct regular forest inventory updates. In addition to the property wide inventory TCF will continue to measure and monitor the following forest metrics:

- Continual measurement of permanent growth plots
- Sample post-harvest stands
- Experiment with different vegetation management alternatives
- Monitor and inventory some wildlife metrics such as NSO and instream habitat
- Monitor pre-commercial thinning and hardwood reduction success

The periodic inventory updates will be used to check the accuracy of the option A and used to verify the current growth model or re-calculate LTSY. The permanent plots will be used to calibrate or verify our growth assumptions within the growth model. Actual harvest silviculture and acreage will be tracked and compared to the model outputs in the Option A.

The following information will be supplied to CALFIRE on an annual basis:

- Harvest volume and acres by even-aged, uneven-aged, and variable retention silviculture and acres treated for hardwood reduction
- Any ownership changes
- Any changes of forest conditions due to catastrophic events that result in a net change of more than 10 percent of TCF's net conifer volume

7 Harvest Schedule

The harvest schedule projects growth and development of each forest for the next 100 years. Specifically the harvest schedule projected future stand conditions and harvest, growth and inventory levels.

In this TCF Option A plan harvest scheduling was accomplished using the FORSEE growth model, our forest inventory database and a GIS database. Every unique stand was assigned an initial entry period based on the date of the previous entry or past silviculture. For example stands which were previously selected were unavailable for harvest for 10 years following the last entry; stands which were previously clearcut were unavailable for harvest for 40 years following the date of the clearcut entry. One of TCF's primary goals with our forest management is to improve forest stocking and maintain a high level of stocking over time. Therefore, in addition to the silvicultural rules, TCF has developed a set of global

harvest constraints unique to each forest, which prevent the harvest model from harvesting every available stand every period. The global constraints control BA and volume removal for each stand and control the rate at which volume removal increases overtime until such time as the modeled harvest does not exceed growth. This results in a relatively steady increase in forest stocks until the constraints are released. The table below shows the global constraints for each forest.

Table 6: Global Harvest Constraints

Global Harvest Constraints						Harvest Cycle (Years)	
Forest	Initial harvest level: MBF/Yr	rate of increase in harvest	Maximum Allowable BA harvest	Maximum Allowable BF harvest	Year Restrictions Lifted	Site Class I & II	Site Class III & IV
BR	3.5	1.5%	25%	35%	2034	10	15
SC	1.5	1.5%	25%	35%	2034	10	15
GRF	1.5	3%	33%	40%	2079	10	15
GUAL	1.5	3%	33%	40%	2114	10	15

The harvest cycle was constrained by site class and lower sites were given a longer harvest cycle. Site class I-II is modeled with a 10 year harvest cycle and site class III and IV is modeled with a 15 year harvest cycle. To accommodate the variation in harvest cycle by class, 5 year planning periods were used in which each stand became eligible for harvest every 5 years subject to environmental constraints and harvest timing constraints.

7.1 Harvest Schedule Deviations

As mentioned above silvicultural treatments were determined by the model using stand data developed from the inventory or growth model. Based on this data the model chose selection silviculture over 90% of the time as the harvest method, however we expect some deviation on the ground from the inventory and modeling assumptions. The modeling results presented in this plan demonstrates that TCF's general approach to achieve MSP is valid; they are not however presented as a concrete plan of action. TCF foresees the need deviate from the planned silviculture from time to time to account for site specific conditions and inherent stand variability. Therefore TCF shall be allowed to deviate from the modeled silvicultural output by a maximum of 10% of the harvested acres per forest on any 5 year rolling average. Allowable prescriptions will include selection, transition and commercial thinning. In the event that onsite conditions dictate that evenage management be used only variable retention or rehabilitation harvests are allowed. Evenage management shall be restricted to 500 acres per 5 year planning period on the Garcia River Forest, 300 acres per 5 year planning period on Big River and Gualala River Forests, and 100 acres per 5 year planning period on the Salmon Creek Forest.

The Garcia River Forest has a large acreage in the Conservation Easement known as the Ecological Reserve (ER) in which the ER silviculture is slightly different from the Standard Selection silviculture. The decision to enter the ER will be based on site specific factors such as stocking, disease or damage, or market conditions. These factors can be difficult to model therefore TCF shall be allowed to deviate freely between the ER silviculture and the standard selection silviculture as long as the total acres

harvested per period do not change by more than 10%. TCF will maintain GIS records of all harvests to ensure that the harvest cycle restrictions respected. Catastrophic events such as fire, insect attack or floods may initiate changes in the proposed plan and those changes will be disclosed in THP's or Emergency Notices filed with CALFIRE.

8 Long Term Sustained Yield Tables and Charts

LTSY was calculated for each forest for a 100 year planning horizon. The calculation of LTSY considered for unconstrained timber stands and limited harvesting in riparian zones. Areas designated as "no harvest" due to wildlife or water quality constraints were omitted from the LTSY calculation. The following tables and charts display data related to the calculation of Maximum Sustained Production. All data displayed is the result of the 4C growth and yield model.

8.1 Salmon Creek Forest

The Salmon Creek Forest (4,389 acres) is primarily within the Big Salmon Creek watershed. The calculated LTSY over the one hundred year planning horizon is 2,766 MBF/year.

Table 7: LTSY Acres

Forest	Total Acres	Class I WLPZ No Harvest	Class I WLPZ Restricted Harvest	Class II WLPZ No Harvest	Class II WLPZ Restricted Harvest	NSO	Pygmy	LTSY Acres
Salmon Creek	4,389	124	123	66	238	731	7	3,100

Table 8: Growth and Yield Over 100 Year Planning Horizon.

	Salmon Creek All Acres MBF Totals						Salmon Creek Unconstrained MBF Totals					
Period	**Pre-Harvest Standing**	**Harvested**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**	**Pre-Harvest Standing**	**Harvest**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**
2014-2018	133,489	8,269	148,021	22,800	4,560	**36%**	81,918	7,726	90,193	16,000	3,200	**48%**
2019-2023	148,021	8,552	162,292	22,824	4,565	**37%**	90,193	8,322	97,911	16,041	3,208	**52%**
2024-2028	162,292	9,457	175,093	22,257	4,451	**42%**	97,911	8,945	104,460	15,494	3,099	**58%**
2029-2033	175,093	9,654	187,910	22,471	4,494	**43%**	104,460	9,636	110,306	15,482	3,096	**62%**
2034-2038	187,910	14,017	196,186	22,293	4,459	**63%**	110,306	13,975	111,452	15,121	3,024	**92%**
2039-2043	196,186	6,298	212,723	22,835	4,567	**28%**	111,452	6,288	120,683	15,519	3,104	**41%**
2044-2048	212,723	11,155	224,221	22,654	4,531	**49%**	120,683	11,067	124,845	15,229	3,046	**73%**
2049-2053	224,221	13,939	232,593	22,311	4,462	**62%**	124,845	13,938	125,697	14,790	2,958	**94%**
2054-2058	232,593	10,600	244,257	22,263	4,453	**48%**	125,697	10,551	129,831	14,685	2,937	**72%**
2059-2063	244,257	8,683	258,030	22,456	4,491	**39%**	129,831	8,609	136,052	14,830	2,966	**58%**
2064-2068	258,030	9,112	271,404	22,487	4,497	**41%**	136,052	9,065	141,842	14,855	2,971	**61%**
2069-2073	271,404	13,988	279,566	22,150	4,430	**63%**	141,842	13,984	142,373	14,516	2,903	**96%**
2074-2078	279,566	13,041	288,391	21,866	4,373	**60%**	142,373	13,014	143,615	14,256	2,851	**91%**
2079-2083	288,391	6,815	303,632	22,055	4,411	**31%**	143,615	6,811	151,282	14,477	2,895	**47%**
2084-2088	303,632	5,083	320,880	22,331	4,466	**23%**	151,282	4,985	161,106	14,809	2,962	**34%**
2089-2093	320,880	13,985	328,886	21,991	4,398	**64%**	161,106	13,975	161,652	14,521	2,904	**96%**
2094-2098	328,886	14,073	336,613	21,800	4,360	**65%**	161,652	13,987	162,066	14,401	2,880	**97%**
2099-2103	336,613	13,695	344,377	21,459	4,292	**64%**	162,066	13,692	162,491	14,118	2,824	**97%**
2104-2108	344,377	11,955	353,592	21,170	4,234	**56%**	162,491	11,929	164,464	13,903	2,781	**86%**
2109-2113	353,592	10,480	364,142	21,030	4,206	**50%**	164,464	10,478	167,818	13,832	2,766	**76%**

Table 9: Growth and yield/acre over 100 year planning horizon

	Salmon Creek MBF/acre Results					
Period	Pre-Harvest Standing (All Acres)	Pre-Harvest Standing (Unconstrained Acres)	Harvest (All Harvested Acres)	Harvest (Unconstrained Acres)	Post-Harvest Standing (All Acres)	Post-Harvest Standing (Unconstrained Acres
2014-2018	32.1	26.4	7.4	7.7	35.6	29.0
2019-2023	35.6	29.0	13.8	14.0	39.0	31.5
2024-2028	39.0	31.5	11.5	13.3	42.1	33.6
2029-2033	42.1	33.6	9.9	10.2	45.1	35.5
2034-2038	45.1	35.5	10.5	11.1	47.1	35.9
2039-2043	47.1	35.9	10.7	11.0	51.1	38.9
2044-2048	51.1	38.9	8.9	10.0	53.9	40.2
2049-2053	53.9	40.2	11.0	11.3	55.9	40.5
2054-2058	55.9	40.5	9.1	10.5	58.7	41.8
2059-2063	58.7	41.8	13.1	13.8	62.0	43.8
2064-2068	62.0	43.8	9.3	11.1	65.2	45.7
2069-2073	65.2	45.7	13.1	13.5	67.2	45.8
2074-2078	67.2	45.8	11.1	12.8	69.3	46.2
2079-2083	69.3	46.2	12.1	13.0	72.9	48.7
2084-2088	72.9	48.7	8.5	11.7	77.1	51.9
2089-2093	77.1	51.9	15.0	15.7	79.0	52.1
2094-2098	79.0	52.1	15.2	18.5	80.9	52.2
2099-2103	80.9	52.2	15.4	16.0	82.7	52.3
2104-2108	82.7	52.3	12.0	14.5	84.9	53.0
2109-2113	84.9	53.0	16.1	17.1	87.5	54.0

Table 10: Acres Harvested By Silviculture.

	Salmon Creek Silvicultural Acres by Period									
Year	WLPZ1	WLPZ2	Standard Selection	transition	VR40	VR60	Commercial Thin	Conifer Release	Rehab	Sum
2014-2018	9	18	594	0	0	0	0	0	0	**620**
2019-2023	19	132	660	0	13	0	0	0	0	**824**
2024-2028	13	12	945	0	0	0	0	0	0	**970**
2029-2033	1	82	1,258	0	0	0	0	0	0	**1,341**
2034-2038	1	18	571	0	0	0	0	0	0	**591**
2039-2043	17	125	1,110	0	0	0	0	0	0	**1,252**
2044-2048	9	25	1,232	0	0	0	0	0	0	**1,266**
2049-2053	26	133	1,003	0	0	0	0	0	0	**1,162**
2054-2058	12	26	623	0	0	0	0	0	0	**661**
2059-2063	28	133	819	0	0	0	0	0	0	**980**
2064-2068	13	25	1,033	0	0	0	0	0	0	**1,070**
2069-2073	30	135	1,014	0	0	0	0	0	0	**1,178**
2074-2078	13	25	524	0	0	0	0	0	0	**562**
2079-2083	37	134	426	0	0	0	0	0	0	**597**
2084-2088	13	26	891	0	0	0	0	0	0	**929**
2089-2093	37	134	757	0	0	0	0	0	0	**928**
2094-2098	13	25	853	0	0	0	0	0	0	**891**
2099-2103	40	135	821	0	0	0	0	0	0	**996**
2104-2108	13	25	612	0	0	0	0	0	0	**650**

8.2 Big River Forest

The Big River Forest (11,707 acres) is primarily within the Big River watershed adjacent to and south of Jackson State Forest and Hwy 20. The calculated LTSY over the 100 year planning horizon is 7,840 MBF/ Year.

Table 11: LTSY Acres

Forest	Total Acres	Class I WLPZ No Harvest	Class I WLPZ Restricted Harvest (including flood plain)	Class II WLPZ No Harvest	Class II WLPZ Restricted Harvest	NSO	CE No Harvest	LTSY Acres
Big River	11,707	295	420	141	487	870	113	9,381

Table 12: Growth and Yield Over 100 Year Planning Horizon.

	Big River All Acres MBF Totals						Big River Unconstrained MBF Totals					
Period	**Pre-Harvest Standing**	**Harvested**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**	**Pre-Harvest Standing**	**Harvest**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**
2014-2018	268,328	18,288	306,060	56,020	11,204	**33%**	201,068	18,008	227,958	44,898	8,980	**40%**
2019-2023	306,060	17,929	344,644	56,513	11,303	**32%**	227,958	17,362	255,647	45,051	9,010	**39%**
2024-2028	344,644	21,724	379,489	56,569	11,314	**38%**	255,647	20,860	279,794	45,007	9,001	**46%**
2029-2033	379,489	22,616	414,506	57,632	11,526	**39%**	279,794	22,488	302,962	45,656	9,131	**49%**
2034-2038	414,506	34,534	437,134	57,162	11,432	**60%**	302,962	34,277	313,520	44,835	8,967	**76%**
2039-2043	437,134	20,967	474,383	58,217	11,643	**36%**	313,520	20,759	338,356	45,595	9,119	**46%**
2044-2048	474,383	26,955	505,959	58,531	11,706	**46%**	338,356	26,831	357,176	45,652	9,130	**59%**
2049-2053	505,959	43,046	519,983	57,070	11,414	**75%**	357,176	42,834	358,342	44,000	8,800	**97%**
2054-2058	519,983	23,613	553,654	57,284	11,457	**41%**	358,342	23,544	378,849	44,050	8,810	**53%**
2059-2063	553,654	41,867	568,086	56,299	11,260	**74%**	378,849	41,820	379,968	42,939	8,588	**97%**
2064-2068	568,086	28,698	595,653	56,266	11,253	**51%**	379,968	28,643	394,157	42,832	8,566	**67%**
2069-2073	595,653	41,020	609,791	55,157	11,031	**74%**	394,157	40,937	394,895	41,675	8,335	**98%**
2074-2078	609,791	29,068	635,742	55,019	11,004	**53%**	394,895	28,857	407,579	41,541	8,308	**69%**
2079-2083	635,742	25,514	665,434	55,206	11,041	**46%**	407,579	25,478	423,841	41,739	8,348	**61%**
2084-2088	665,434	25,680	695,076	55,321	11,064	**46%**	423,841	25,633	440,102	41,894	8,379	**61%**
2089-2093	695,076	40,929	708,691	54,545	10,909	**75%**	440,102	40,900	440,373	41,171	8,234	**99%**

	Big River All Acres MBF Totals						Big River Unconstrained MBF Totals					
Period	**Pre-Harvest Standing**	**Harvested**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**	**Pre-Harvest Standing**	**Harvest**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**
2094-2098	708,691	39,023	723,283	53,614	10,723	**73%**	440,373	38,987	441,700	40,314	8,063	**97%**
2099-2103	723,283	35,066	741,195	52,978	10,596	**66%**	441,700	34,965	446,498	39,763	7,953	**88%**
2104-2108	741,195	23,856	770,409	53,070	10,614	**45%**	446,498	23,829	462,622	39,953	7,991	**60%**
2109-2113	770,409	38,796	783,834	52,221	10,444	**74%**	462,622	38,737	463,086	39,201	7,840	**99%**

Table 13: Growth and yield/acre over 100 year planning horizon

	Big River MBF/acre Results					
Period	**Pre-Harvest Standing (All Acres)**	**Pre-Harvest Standing (Unconstrained Acres)**	**Harvest (All Harvested Acres)**	**Harvest (Unconstrained Acres)**	**Post-Harvest Standing (All Acres)**	**Post-Harvest Standing (Unconstrained Acres**
2011-2013	21.2	19.2	NA	NA	NA	NA
2014-2018	24.5	22.8	7.2	7.3	28.0	25.8
2019-2023	28.0	25.8	9.4	9.7	31.5	28.9
2024-2028	31.5	28.9	10.9	11.5	34.7	31.7
2029-2033	34.7	31.7	8.9	9.3	37.9	34.3
2034-2038	37.9	34.3	9.8	10.1	40.0	35.5
2039-2043	40.0	35.5	10.1	10.4	43.4	38.3
2044-2048	43.4	38.3	9.8	10.5	46.3	40.4
2049-2053	46.3	40.4	10.7	11.1	47.5	40.6
2054-2058	47.5	40.6	9.9	10.8	50.6	42.9
2059-2063	50.6	42.9	12.8	13.4	51.9	43.0
2064-2068	51.9	43.0	11.7	12.8	54.5	44.6
2069-2073	54.5	44.6	11.9	12.5	55.8	44.7
2074-2078	55.8	44.7	11.3	12.6	58.1	46.1
2079-2083	58.1	46.1	12.4	13.6	60.9	48.0
2084-2088	60.9	48.0	12.1	13.7	63.6	49.8
2089-2093	63.6	49.8	14.5	15.7	64.8	49.8
2094-2098	64.8	49.8	13.0	14.2	66.1	50.0
2099-2103	66.1	50.0	13.6	14.6	67.8	50.5
2104-2108	67.8	50.5	12.0	14.0	70.4	52.4

	Big River MBF/acre Results					
Period	Pre-Harvest Standing (All Acres)	Pre-Harvest Standing (Unconstrained Acres)	Harvest (All Harvested Acres)	Harvest (Unconstrained Acres)	Post-Harvest Standing (All Acres)	Post-Harvest Standing (Unconstrained Acres
2109-2113	70.4	52.4	15.1	16.3	71.7	52.4

Table 14: Acres Harvested By Silviculture.

	Big River Silvicultural Acres by Period									
Year	WLPZ1	WLPZ2	Standard Selection	transition	VR40	VR60	Commercial Thin	Conifer Release	Rehab	Sum
2014-2018	8	65	2,371	109	0	0	0	0	0	**2,553**
2019-2023	20	90	1,736	55	0	0	0	0	0	**1,901**
2024-2028	26	150	1,781	40	0	0	0	0	0	**1,997**
2029-2033	41	61	2,427	0	0	0	0	0	0	**2,529**
2034-2038	38	122	3,379	0	0	0	0	0	0	**3,538**
2039-2043	8	77	1,988	0	0	0	0	0	0	**2,073**
2044-2048	63	138	2,544	17	0	0	0	0	0	**2,762**
2049-2053	21	122	3,853	15	0	0	0	0	0	**4,010**
2054-2058	46	159	2,183	0	0	0	0	0	0	**2,388**
2059-2063	39	105	3,132	0	0	0	0	0	0	**3,276**
2064-2068	68	159	2,234	0	0	0	0	0	0	**2,461**
2069-2073	45	116	3,287	0	0	0	0	0	0	**3,447**
2074-2078	119	156	2,290	0	0	0	0	0	0	**2,564**
2079-2083	59	124	1,874	0	0	0	0	0	0	**2,058**
2084-2088	80	160	1,876	0	0	0	0	0	0	**2,116**
2089-2093	107	121	2,600	0	0	0	0	0	0	**2,829**
2094-2098	91	159	2,750	0	0	0	0	0	0	**2,999**
2099-2103	56	126	2,400	0	0	0	0	0	0	**2,582**
2104-2108	136	156	1,703	0	0	0	0	0	0	**1,995**
2109-2113	65	124	2,382	0	0	0	0	0	0	**2,571**

8.3 Garcia River Forest

The Garcia River Forest (23,769 acres) is primarily within the Garcia River Watershed, bordered by Mountain View Road on the north and Fish Rock Road on the south. The calculated LTSY for Garcia is 7,175 MBF/year.

Table 15: LTSY Acres

Forest	Total Acres	Class I WLPZ No Harvest	Class I WLPZ Restricted Harvest	Class II WLPZ No Harvest	Class II WLPZ Restricted Harvest	NSO	Oak Woodlands	Grasslands	Ecological Reserve	LTSY Acres
Garcia River	23,769	260	636	303	1,132	1,034	613	369	6,257	13,165

Table 16: Growth and Yield Over 100 Year Planning Horizon.

	Garcia River All Acres MBF Totals						Garcia River Unconstrained MBF Totals					
Period	**Pre-Harvest Standing**	**Harvested**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**	**Pre-Harvest Standing**	**Harvest**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**
2014-2018	252,291	11,304	289,682	48,695	9,739	**23%**	147,904	7,964	168,495	28,555	5,711	**28%**
2019-2023	289,682	13,209	335,546	59,073	11,815	**22%**	168,495	9,232	193,862	34,598	6,920	**27%**
2024-2028	335,546	15,225	389,964	69,643	13,929	**22%**	193,862	10,702	224,045	40,886	8,177	**26%**
2029-2033	389,964	19,140	447,556	76,733	15,347	**25%**	224,045	12,407	257,201	45,563	9,113	**27%**
2034-2038	447,556	19,628	497,450	69,522	13,904	**28%**	257,201	14,382	283,845	41,026	8,205	**35%**
2039-2043	497,450	22,991	543,659	69,199	13,840	**33%**	283,845	16,674	307,886	40,716	8,143	**41%**
2044-2048	543,659	26,512	586,710	69,562	13,912	**38%**	307,886	19,329	329,423	40,865	8,173	**47%**
2049-2053	586,710	28,790	627,447	69,528	13,906	**41%**	329,423	22,408	347,499	40,485	8,097	**55%**
2054-2058	627,447	32,587	664,118	69,258	13,852	**47%**	347,499	25,977	361,483	39,961	7,992	**65%**
2059-2063	664,118	34,227	698,730	68,840	13,768	**50%**	361,483	30,114	370,509	39,140	7,828	**77%**
2064-2068	698,730	36,794	730,068	68,132	13,626	**54%**	370,509	34,911	373,489	37,892	7,578	**92%**
2069-2073	730,068	30,508	767,511	67,950	13,590	**45%**	373,489	29,504	381,093	37,108	7,422	**80%**
2074-2078	767,511	36,988	797,732	67,209	13,442	**55%**	381,093	35,282	381,744	35,934	7,187	**98%**
2079-2083	797,732	35,394	828,864	66,526	13,305	**53%**	381,744	34,481	382,063	34,800	6,960	**99%**
2084-2088	828,864	31,843	863,121	66,099	13,220	**48%**	382,063	31,627	384,349	33,913	6,783	**93%**

	Garcia River All Acres MBF Totals						Garcia River Unconstrained MBF Totals					
Period	**Pre-Harvest Standing**	**Harvested**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**	**Pre-Harvest Standing**	**Harvest**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**
2089-2093	863,121	26,051	902,967	65,897	13,179	**40%**	384,349	25,600	392,136	33,387	6,677	**77%**
2094-2098	902,967	10,910	958,866	66,809	13,362	**16%**	392,136	10,653	415,477	33,994	6,799	**31%**
2099-2103	958,866	7,981	1,018,770	67,885	13,577	**12%**	415,477	7,407	442,918	34,848	6,970	**21%**
2104-2108	1,018,770	11,933	1,075,452	68,615	13,723	**17%**	442,918	11,236	467,088	35,406	7,081	**32%**
2109-2113	1,075,452	11,810	1,132,902	69,260	13,852	**17%**	467,088	11,695	491,269	35,876	7,175	**33%**

Table 17: Growth and yield/acre over 100 year planning horizon

	Garcia River MBF/acre Results							
Period	**Pre-Harvest Standing (All Acres)**	**Pre-Harvest Standing (Unconstrained Acres)**	**Harvest (All Harvested Acres)**	**Harvest (Unconstrained Acres)**	**Post-Harvest Standing (All Acres)**	**Post-Harvest Standing (Unconstrained Acres**	**Harvest/Year (All Acres)**	**Harvest/Year (Unconstrained Acres)**
2014-2018	11.5	11.4	5.1	6.8	13.2	13.0	2,261	1,593
2019-2023	13.2	13.0	5.8	6.9	15.3	15.0	2,642	1,846
2024-2028	15.3	15.0	6.2	7.7	17.8	17.3	3,045	2,140
2029-2033	17.8	17.3	4.9	8.4	20.4	19.9	3,828	2,481
2034-2038	20.4	19.9	7.0	9.5	22.7	21.9	3,926	2,876
2039-2043	22.7	21.9	7.4	9.2	24.8	23.8	4,598	3,335
2044-2048	24.8	23.8	6.5	9.5	26.7	25.4	5,302	3,866
2049-2053	26.7	25.4	8.6	10.3	28.6	26.8	5,758	4,482
2054-2058	28.6	26.8	9.9	11.8	30.3	27.9	6,517	5,195
2059-2063	30.3	27.9	9.1	13.7	31.8	28.6	6,845	6,023
2064-2068	31.8	28.6	12.0	13.6	33.3	28.8	7,359	6,982
2069-2073	33.3	28.8	11.1	12.7	35.0	29.4	6,102	5,901
2074-2078	35.0	29.4	9.4	12.4	36.4	29.5	7,398	7,056
2079-2083	36.4	29.5	10.9	12.6	37.8	29.5	7,079	6,896

	Garcia River MBF/acre Results							
Period	Pre-Harvest Standing (All Acres)	Pre-Harvest Standing (Unconstrained Acres)	Harvest (All Harvested Acres)	Harvest (Unconstrained Acres)	Post-Harvest Standing (All Acres)	Post-Harvest Standing (Unconstrained Acres	Harvest/Year (All Acres)	Harvest/Year (Unconstrained Acres)
2084-2088	37.8	29.5	12.0	13.1	39.3	29.7	6,369	6,325
2089-2093	39.3	29.7	8.9	13.5	41.2	30.3	5,210	5,120
2094-2098	41.2	30.3	10.0	13.8	43.7	32.1	2,182	2,131
2099-2103	43.7	32.1	9.1	15.0	46.4	34.2	1,596	1,481
2104-2108	46.4	34.2	7.0	14.6	49.0	36.1	2,387	2,247
2109-2113	49.0	36.1	5.1	6.3	51.6	37.9	2,362	2,339

Table 18: Acres harvested by silviculture

	Garcia River Silvicultural Acres by Period										
Year	WLPZ1	WLPZ2	Conservation Easement Selection	Standard Selection	transition	VR40	VR60	Commercial Thin	Conifer Release	Rehab	Sum
2014-2018	0	534	516	1,152	22	0	0	0	0	0	**2,224**
2019-2023	0	0	934	1,345	2	0	0	0	0	0	**2,281**
2024-2028	2	73	1,000	1,393	0	0	0	0	0	0	**2,468**
2029-2033	800	604	999	1,483	1	0	0	0	0	0	**3,887**
2034-2038	248	46	1,000	1,508	0	0	0	0	0	0	**2,801**
2039-2043	297	0	1,000	1,817	0	0	0	0	0	0	**3,114**
2044-2048	625	440	1,000	2,041	0	0	0	0	0	0	**4,106**
2049-2053	90	69	1,000	2,172	1	0	0	0	0	0	**3,331**
2054-2058	42	50	1,000	2,196	0	0	0	0	0	0	**3,287**
2059-2063	578	359	622	2,198	0	0	0	0	0	0	**3,757**
2064-2068	127	87	302	2,560	0	0	0	0	0	0	**3,076**
2069-2073	280	9	149	2,293	25	0	0	0	0	0	**2,756**
2074-2078	464	395	243	2,850	0	0	0	0	0	0	**3,952**
2079-2083	340	54	138	2,729	0	0	0	0	0	0	**3,262**

	Garcia River Silvicultural Acres by Period										
Year	**WLPZ1**	**WLPZ2**	**Conservation Easement Selection**	**Standard Selection**	**transition**	**VR40**	**VR60**	**Commercial Thin**	**Conifer Release**	**Rehab**	**Sum**
2084-2088	150	46	36	2,417	0	0	0	0	0	0	**2,650**
2089-2093	622	359	43	1,894	0	0	0	0	0	0	**2,918**
2094-2098	196	88	29	773	0	0	0	0	0	0	**1,086**
2099-2103	306	9	65	493	0	0	0	0	0	0	**873**
2104-2108	473	395	60	768	0	0	0	0	0	0	**1,697**
2109-2113	371	52	7	1,869	0	0	0	0	0	0	**2,298**

8.4 Gualala River Forest

The Gualala River Forest (13,537 acres) is primarily within the Gualala River Watershed, bordered by Fish Rock Road on the north and extending to the Sonoma County line on the south. The calculated LTSY for Gualala is 7,984 MBF/year.

Table 19: LTSY Acres

Forest	Total Acres	Class I WLPZ No Harvest	Class I WLPZ Restricted Harvest	Class II WLPZ No Harvest	Class II WLPZ Restricted Harvest	NSO	Oak Woodlands	Grasslands	LTSY Acres
Gualala River	13,537	119	277	151	779	102	91	115	11,903

Table 20: Growth and Yield Over 100 Year Planning Horizon

	Gualala River All Acres MBF Totals						Gualala River Unconstrained MBF Totals					
Period	**Pre-Harvest Standing**	**Harvested**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**	**Pre-Harvest Standing**	**Harvest**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**
2014-2018	120,074	8,748	147,849	36,523	7,305	**24%**	109,034	7,998	134,372	33,336	6,667	**24%**
2019-2023	147,849	10,000	180,172	42,324	8,465	**24%**	134,372	10,000	162,861	38,489	7,698	**26%**
2024-2028	180,172	13,387	207,530	40,745	8,149	**33%**	162,861	11,999	188,235	37,373	7,475	**32%**
2029-2033	207,530	14,021	243,658	50,148	10,030	**28%**	188,235	13,999	220,217	45,982	9,196	**30%**
2034-2038	243,658	15,718	279,409	51,470	10,294	**31%**	220,217	14,999	252,377	47,158	9,432	**32%**
2039-2043	279,409	16,241	310,912	47,743	9,549	**34%**	252,377	15,990	280,052	43,665	8,733	**37%**
2044-2048	310,912	17,510	341,326	47,925	9,585	**37%**	280,052	16,995	306,987	43,930	8,786	**39%**
2049-2053	341,326	17,983	371,419	48,076	9,615	**37%**	306,987	17,966	333,000	43,979	8,796	**41%**
2054-2058	371,419	19,098	400,372	48,050	9,610	**40%**	333,000	18,989	357,907	43,896	8,779	**43%**

	Gualala River All Acres MBF Totals						Gualala River Unconstrained MBF Totals					
Period	**Pre-Harvest Standing**	**Harvested**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**	**Pre-Harvest Standing**	**Harvest**	**Post-Harvest Standing**	**Growth**	**Growth / Year**	**Harvest as a % of Growth**
2059-2063	400,372	19,977	428,415	48,019	9,604	**42%**	357,907	19,963	381,720	43,775	8,755	**46%**
2064-2068	428,415	22,100	454,467	48,152	9,630	**46%**	381,720	21,989	403,602	43,871	8,774	**50%**
2069-2073	454,467	22,971	479,383	47,888	9,578	**48%**	403,602	22,946	424,203	43,548	8,710	**53%**
2074-2078	479,383	24,115	502,621	47,352	9,470	**51%**	424,203	23,984	443,224	43,005	8,601	**56%**
2079-2083	502,621	26,004	523,263	46,646	9,329	**56%**	443,224	25,975	459,510	42,260	8,452	**61%**
2084-2088	523,263	28,097	541,155	45,989	9,198	**61%**	459,510	27,975	473,145	41,611	8,322	**67%**
2089-2093	541,155	30,009	556,379	45,234	9,047	**66%**	473,145	29,982	483,989	40,826	8,165	**73%**
2094-2098	556,379	32,106	568,689	44,416	8,883	**72%**	483,989	31,992	492,021	40,023	8,005	**80%**
2099-2103	568,689	29,405	583,695	44,411	8,882	**66%**	492,021	29,378	502,642	39,999	8,000	**73%**
2104-2108	583,695	18,482	609,783	44,570	8,914	**41%**	502,642	18,376	524,444	40,178	8,036	**46%**
2109-2113	609,783	24,865	629,241	44,323	8,865	**56%**	524,444	24,837	539,526	39,919	7,984	**62%**

Table 21: Growth and yield/acre over 100 year planning horizon

	Gualala River MBF/acre Results							
Period	**Pre-Harvest Standing (All Acres)**	**Pre-Harvest Standing (Unconstrained Acres)**	**Harvest (All Harvested Acres)**	**Harvest (Unconstrained Acres)**	**Post-Harvest Standing (All Acres)**	**Post-Harvest Standing (Unconstrained Acres**	**Harvest/Year (All Acres)**	**Harvest/Year (Unconstrained Acres)**
2013	8.6	8.6	NA	NA	NA	NA	0	0
2014-2018	9.4	9.4	4.5	4.9	11.6	11.6	1,750	1,600
2019-2023	11.6	11.6	5.4	5.4	14.2	14.1	2,000	2,000
2024-2028	14.2	14.1	5.3	6.3	16.3	16.2	2,677	2,400
2029-2033	16.3	16.2	6.4	6.6	19.1	19.0	2,804	2,800
2034-2038	19.1	19.0	6.5	8.3	21.9	21.8	3,144	3,000
2039-2043	21.9	21.8	7.9	8.4	24.4	24.2	3,248	3,198
2044-2048	24.4	24.2	6.9	8.9	26.8	26.5	3,502	3,399
2049-2053	26.8	26.5	8.8	9.6	29.2	28.7	3,597	3,593
2054-2058	29.2	28.7	8.2	11.0	31.4	30.9	3,820	3,798

	Gualala River MBF/acre Results							
Period	Pre-Harvest Standing (All Acres)	Pre-Harvest Standing (Unconstrained Acres)	Harvest (All Harvested Acres)	Harvest (Unconstrained Acres)	Post-Harvest Standing (All Acres)	Post-Harvest Standing (Unconstrained Acres	Harvest/Year (All Acres)	Harvest/Year (Unconstrained Acres)
2059-2063	31.4	30.9	11.3	12.3	33.6	33.0	3,995	3,993
2064-2068	33.6	33.0	11.1	16.0	35.7	34.8	4,420	4,398
2069-2073	35.7	34.8	13.2	14.5	37.6	36.6	4,594	4,589
2074-2078	37.6	36.6	10.0	13.5	39.5	38.3	4,823	4,797
2079-2083	39.5	38.3	13.1	14.2	41.1	39.7	5,201	5,195
2084-2088	41.1	39.7	11.9	16.1	42.5	40.8	5,619	5,595
2089-2093	42.5	40.8	15.4	16.7	43.7	41.8	6,002	5,996
2094-2098	43.7	41.8	13.4	18.1	44.7	42.5	6,421	6,398
2099-2103	44.7	42.5	21.9	24.8	45.8	43.4	5,881	5,876
2104-2108	45.8	43.4	10.9	17.4	47.9	45.3	3,696	3,675
2109-2113	47.9	45.3	16.2	18.0	49.4	46.6	4,973	4,967

Table 22: Acres harvested by silviculture

	Gualala River Silvicultural Acres by Period									
Year	WLPZ1	WLPZ2	Standard selection	transition	VR40	VR60	Commercial Thinning	Conifer Release	Rehab	Sum
2014-2018	15	290	892	743	0	0	0	0	0	**1,940**
2019-2023	0	0	1,834	1	0	0	0	0	0	**1,835**
2024-2028	142	470	1,913	0	0	0	0	0	0	**2,525**
2029-2033	78	4	2,107	3	0	0	0	0	0	**2,192**
2034-2038	204	421	1,808	2	0	0	0	0	0	**2,435**
2039-2043	90	52	1,910	0	0	0	0	0	0	**2,052**
2044-2048	218	400	1,904	0	0	0	0	0	0	**2,522**
2049-2053	95	61	1,881	0	0	0	0	0	0	**2,037**
2054-2058	189	412	1,729	0	0	0	0	0	0	**2,330**
2059-2063	86	62	1,617	0	0	0	0	0	0	**1,764**
2064-2068	204	412	1,374	0	0	0	0	0	0	**1,990**
2069-2073	95	62	1,582	0	0	0	0	0	0	**1,738**

	Gualala River Silvicultural Acres by Period									
Year	**WLPZ1**	**WLPZ2**	**Standard selection**	**transition**	**VR40**	**VR60**	**Commercial Thinning**	**Conifer Release**	**Rehab**	**Sum**
2074-2078	218	412	1,771	0	0	0	0	0	0	**2,401**
2079-2083	97	62	1,828	0	0	0	0	0	0	**1,986**
2084-2088	219	412	1,734	0	0	0	0	0	0	**2,366**
2089-2093	97	62	1,794	0	0	0	0	0	0	**1,953**
2094-2098	221	412	1,769	0	0	0	0	0	0	**2,402**
2099-2103	97	62	1,184	0	0	0	0	0	0	**1,342**
2104-2108	221	412	1,056	0	0	0	0	0	0	**1,689**
2109-2113	97	62	1,377	0	0	0	0	0	0	**1,535**

8.5 Cumulative LTSY

The Calculated LTSY for The Conservation Fund Mendocino County Ownership is 25,766 MBF/year

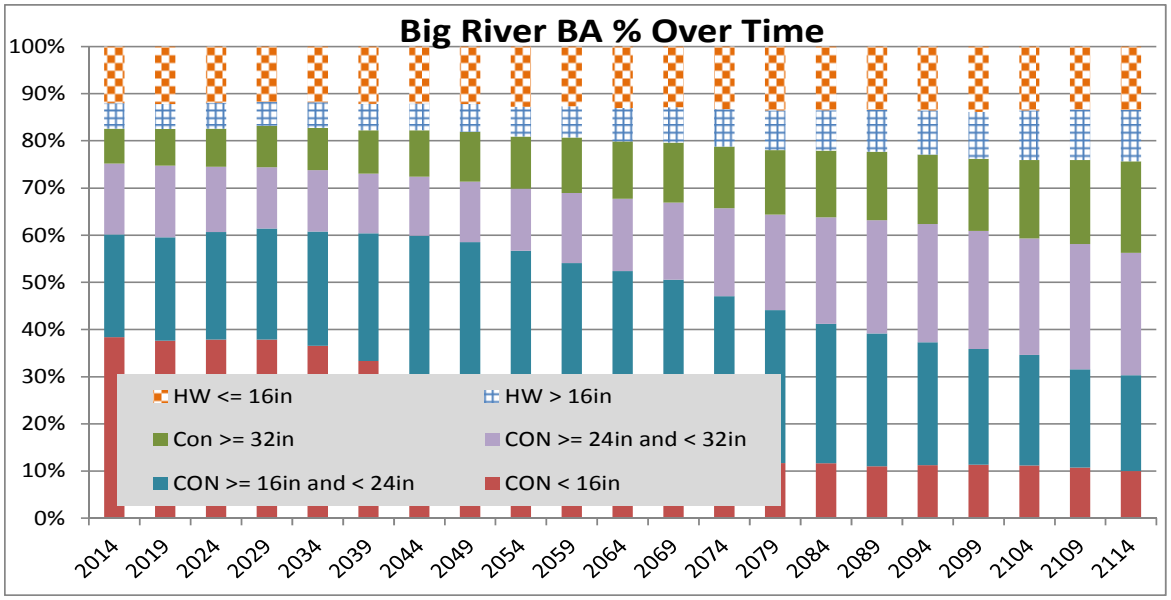
Table 23: Cumulative LTSY for all tracts combined.

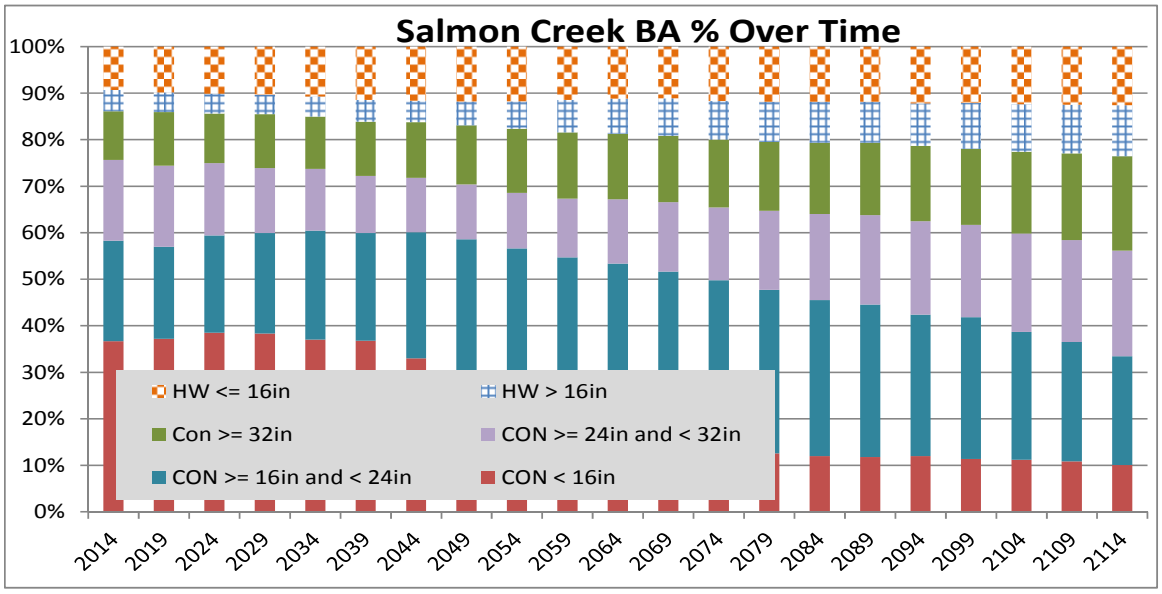
All Tracts All Acres MBF Totals							All Tracts Unconstrained MBF Totals					
Period	Pre-Harvest Standing	Harvested	Post-Harvest Standing	Growth	Growth / Year	Harvest as a % of Growth	Pre-Harvest Standing	Harvest	Post-Harvest Standing	Growth	Growth / Year	Harvest as a % of Growth
2014-2018	774,183	46,610	891,611	164,038	32,808	28	539,924	41,695	621,018	122,789	24,558	34
2019-2023	891,611	49,690	1,022,655	180,734	36,147	27	621,018	44,916	710,280	134,178	26,836	33
2024-2028	1,022,655	59,793	1,152,076	189,214	37,843	32	710,280	52,506	796,534	138,759	27,752	38
2029-2033	1,152,076	65,430	1,293,630	206,984	41,397	32	796,534	58,530	890,686	152,682	30,536	38
2034-2038	1,293,630	83,898	1,410,179	200,447	40,089	42	890,686	77,633	961,193	148,141	29,628	52
2039-2043	1,410,179	66,496	1,541,677	197,994	39,599	34	961,193	59,710	1,046,978	145,495	29,099	41
2044-2048	1,541,677	82,132	1,658,217	198,672	39,734	41	1,046,978	74,223	1,118,431	145,676	29,135	51
2049-2053	1,658,217	103,759	1,751,442	196,984	39,397	53	1,118,431	97,147	1,164,538	143,254	28,651	68
2054-2058	1,751,442	85,898	1,862,400	196,855	39,371	44	1,164,538	79,061	1,228,070	142,593	28,519	55
2059-2063	1,862,400	104,754	1,953,260	195,615	39,123	54	1,228,070	100,506	1,268,249	140,685	28,137	71
2064-2068	1,953,260	96,704	2,051,592	195,036	39,007	50	1,268,249	94,608	1,313,090	139,449	27,890	68
2069-2073	2,051,592	108,487	2,136,251	193,145	38,629	56	1,313,090	107,372	1,342,565	136,847	27,369	78
2074-2078	2,136,251	103,211	2,224,486	191,447	38,289	54	1,342,565	101,137	1,376,163	134,736	26,947	75
2079-2083	2,224,486	93,726	2,321,193	190,434	38,087	49	1,376,163	92,745	1,416,695	133,276	26,655	70

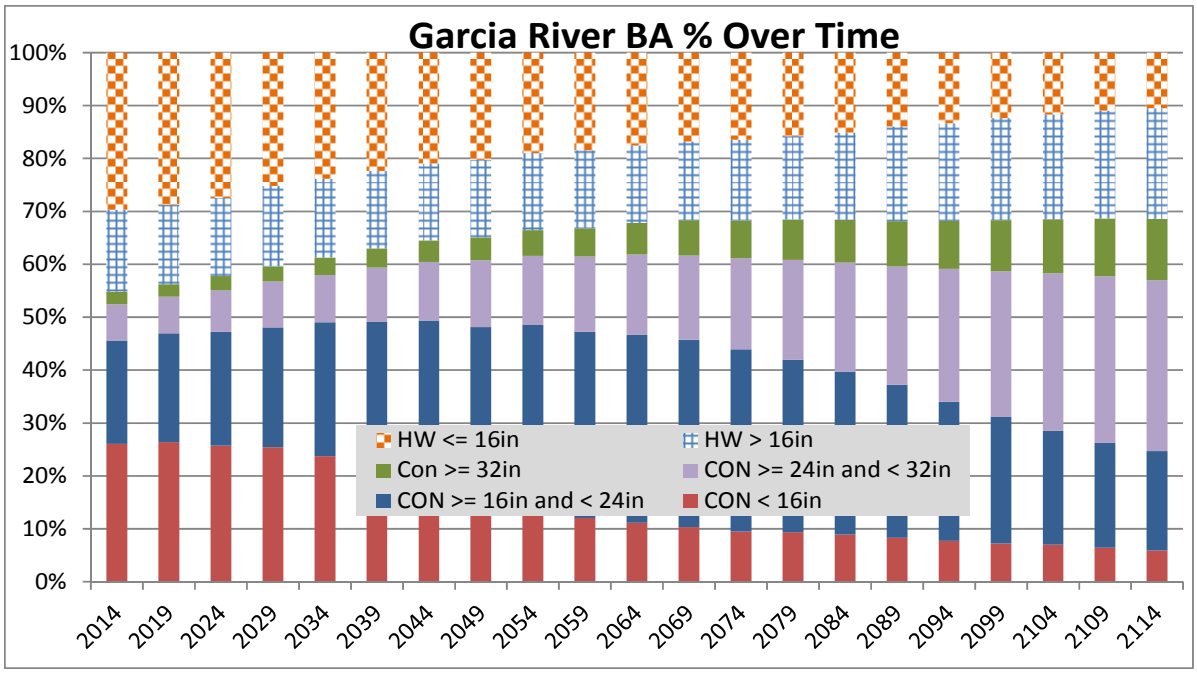
All Tracts All Acres MBF Totals							All Tracts Unconstrained MBF Totals					
Period	Pre-Harvest Standing	Harvested	Post-Harvest Standing	Growth	Growth / Year	Harvest as a % of Growth	Pre-Harvest Standing	Harvest	Post-Harvest Standing	Growth	Growth / Year	Harvest as a % of Growth
2084-2088	2,321,193	90,702	2,420,232	189,741	37,948	48	1,416,695	90,219	1,458,702	132,227	26,445	68
2089-2093	2,420,232	110,974	2,496,923	187,666	37,533	59	1,458,702	110,457	1,478,150	129,905	25,981	85
2094-2098	2,496,923	96,112	2,587,451	186,639	37,328	51	1,478,150	95,620	1,511,263	128,732	25,746	74
2099-2103	2,587,451	86,148	2,688,036	186,733	37,347	46	1,511,263	85,442	1,554,549	128,728	25,746	66
2104-2108	2,688,036	66,226	2,809,236	187,426	37,485	35	1,554,549	65,370	1,618,619	129,440	25,888	51
2109-2113	2,809,236	85,951	2,910,119	186,834	37,367	46	1,618,619	85,748	1,661,700	128,829	25,766	67

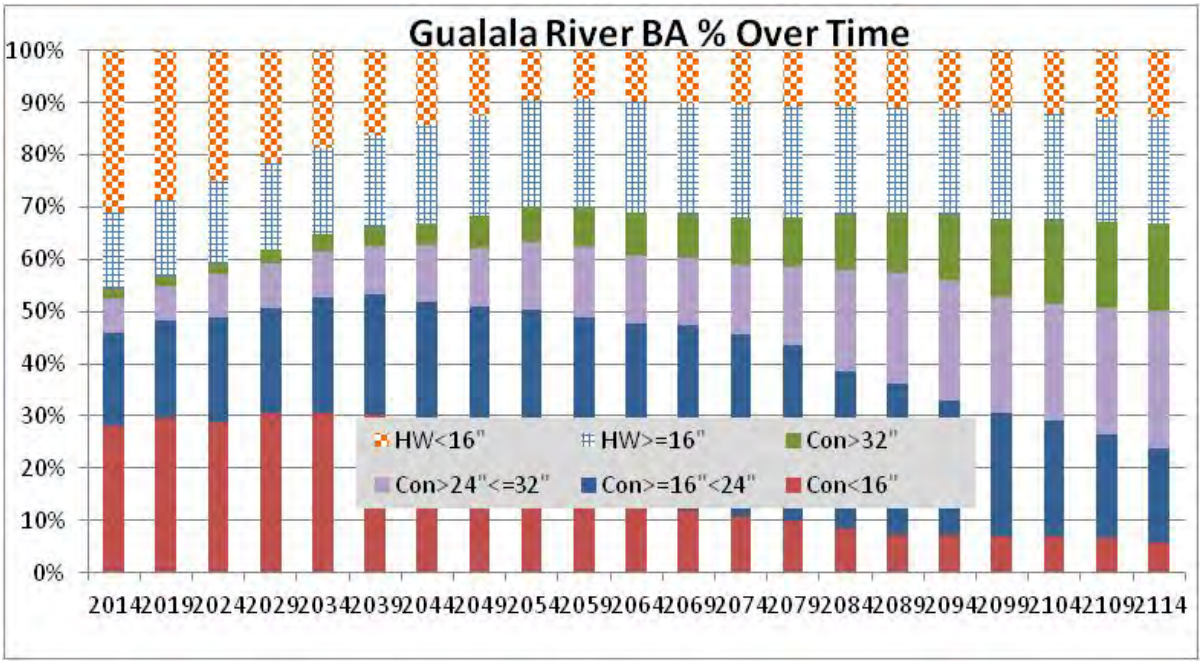
The following tables show the change in diameter class distribution over time for the unconstrained acres on Big River and Salmon Creek, in particular the increase in large conifers.

Table 23: Change in BA distribution over time






Garcia River BA % Over Time
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2014
2019
2024
2029
2034
2039
2044
2049
2054
2059
2064
2069
2074
2079
2084
2089
2094
2099
2104
2109
2114
HW <= 16in
HW > 16in
Con >= 32in
CON >= 24in and < 32in
CON >= 16in and < 24in
CON < 16in


Gualala River BA % Over Time
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2014
2019
2024
2029
2034
2039
2044
2049
2054
2059
2064
2069
2074
2079
2084
2089
2094
2099
2104
2109
2114
HW<16"
HW>=16"
Con>32"
Con>24"<=32"
Con>=16"<24"
Con<16"

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9 Appendices

- **Appendix A:** BRSC Forest Stratification
- **Appendix B:** Garcia River and Gualala River Forest Stratification
- **Appendix C:** Modeling Plan
- **Appendix D:** Inventory Collection Summary
- **Appendix E:** Property Maps

Appendix A: Big River and Salmon Creek Forest Stratification

1. 2011 Remote Sensing Data

In August 2011, GeoDigital flew the Big River and Salmon Creek Forests to acquire high-resolution color-infrared (CIR) imagery as well as LiDAR (Light Detection and Ranging) data. The CIR data was acquired at .5m^2 resolution. The LiDAR data was collected with at least 5 points per square meter. The LiDAR data was used to generate a 1 m^2 resolution Digital Elevation Map (DEM) and Canopy Height Model (CHM).

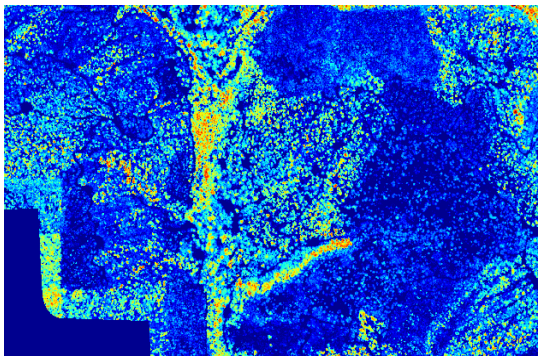
2. 2012 Stand Delineation and Stratification Method

A new stand layer was created for the Big River and Salmon Creek Forests using the LiDAR and CIR remote sensing data. The stand delineations are based on the CHM but several processing steps are required before stands of the appropriate size are made. The basic outline of the steps required to create the new stand layer is:

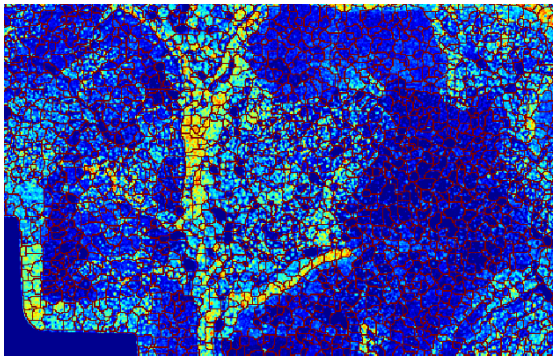
Create micro stands less than 1 acre by identifying timber with similar height and density attributes. (Figure a)
Merge micro stands by combining micro stands with similar attributes that are adjacent to one another. There is some tolerance built into the merging routine which allows dissimilar stands to be merged together to form stands which meet the minimum acreage criteria desired. (Figure b)
Once the microstand polygons were created, each polygon was placed into a strata based on 3 criteria. Polygons were classified based on the percent crown cover of canopy over 25 feet tall, the mean of the maximum heights found within tree crowns (i.e. – mean tree height), and the variability of the height of the trees within the stand polygon. The table below details the stratification system. All metrics are calculated on trees greater than or equal to 25 feet tall. A summary of the stratification can be seen below in table 4.[2]

[2] See Golinkoff, J. S. 2013. Area Dependent Region Merging: A Novel, User-Customizable Method to Create Forest Stands and Strata. European Journal of Remote Sensing 46:511–533.

a) **Original CHM (1m^2 resolution)**



b) **Final Watershed Microstand over CHM**



c) **Final Stand Delineation over CHM**

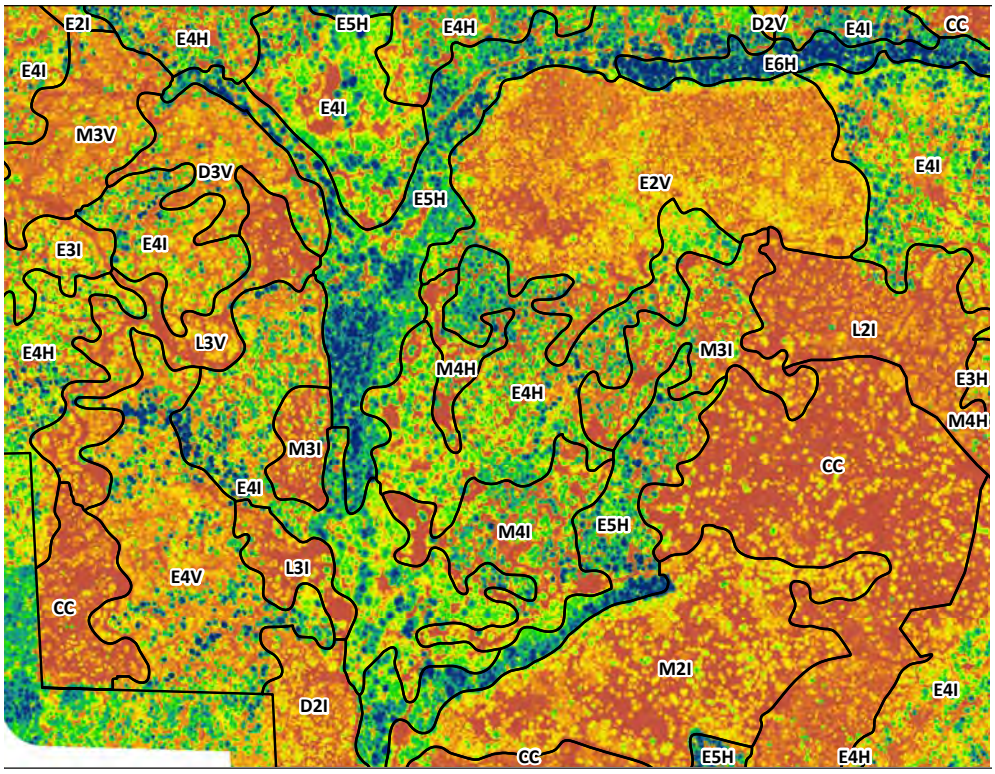


Table 1: Big River / Salmon Creek Statification Categories

Category	Class Names	Class Breaks
Percent Canopy Cover over 25ft	O (Open) L (Low) M (Medium) D (Dense) E (Extremely Dense)	20% canopy cover bins where % cover is defined as crown elements above 25ft
Mean Tree Height	1, 2, 3, 4, 5, 6, 7	25 foot height bins of mean tree heights

Tree Height Variability (Coefficient of Variation of Tree Height)	H (Homogeneous) I (Intermediate) V (Variable)	Homogeneous stands are any stand with CV < .23 Intermediate: .24< CV < .33 Variable: CV > .34

Table 2: Big River / Salmon Creek Stratification Results.

Strata	Sampled Area	Total Acres	Sampled Stands	Total Stands	Plots	Area Weight
CC	210	1,301	9	59	36	0.0876
D2H	68	93	2	5	8	0.0063
D2I	626	803	4	12	44	0.0541
D2V	65	148	2	5	9	0.0100
D3H	78	239	2	9	8	0.0161
D3I	316	476	5	14	35	0.0321
D3V	35	142	2	10	8	0.0096
D4H	82	209	1	8	9	0.0141
D4I	17	45	1	2	4	0.0031
D4V	13	13	1	1	4	0.0009
D5H	3	30	1	3	4	0.0021
E2H	83	192	3	9	15	0.0129
E2I	297	880	4	19	36	0.0592
E2V	62	120	2	5	9	0.0081
E3H	864	1,381	6	30	44	0.0930
E3I	883	2,303	8	45	75	0.1551
E3V	177	365	4	12	20	0.0246
E4H	446	1,186	6	43	51	0.0799
E4I	307	1,355	5	55	32	0.0912
E4V	20	86	2	5	8	0.0058
E5H	135	504	4	34	26	0.0339
E5I	115	182	3	9	15	0.0123
E5V	4	16	1	2	4	0.0011
E6H	85	197	3	12	16	0.0133
E6I	17	17	1	1	4	0.0012
E7H	5	16	1	2	4	0.0011
ES12	189	189	1	1	22	0.0127
L2H	54	111	2	9	8	0.0075
L2I	145	378	4	17	18	0.0255
L2V	71	143	1	3	8	0.0096
L3H	8	47	1	6	4	0.0032
L3I	28	162	2	13	8	0.0109
L3V	55	89	2	5	9	0.0060
L4H	9	21	1	2	4	0.0014
L4I	47	50	2	3	8	0.0033
LP12	121	121	1	1	10	0.0081
M2H	49	76	1	3	5	0.0051
M2I	55	97	2	3	8	0.0065

M2V	116	217	2	6	15	0.0146
M3H	12	42	1	3	4	0.0028
M3I	121	249	3	12	18	0.0168
M3V	38	49	2	3	12	0.0033
M4H	21	74	1	7	4	0.0050
M4I	19	63	1	4	8	0.0043
M4V	2	2	1	1	4	0.0001
PC12	372	372	1	1	41	0.0250

3. Inventory Design and Methodology Details

The 2012 Big River and Salmon Creek (BRSC) inventory used a multi-stage probability proportional to size sample.[3] The cruise was completed in the June, 2012. There were 43 forested strata sampled using a total of 677 plots. The sampled stands were randomly selected with replacement with probability proportional to their area. All plots were installed on a 5 by 5 chain grid. Stands that were selected more than once had plots installed on grids that were offset by 2.5 chains. Sampled stands received 1 plot per 10 acres with all stands getting at least 4 and at most 8 plots per random selection. If a sampled stand was selected more than once, this same sampling intensity was used.

The 2012 inventory plots used exactly the same design as in past cruises. A basal area factor (BAF) prism was established in each stand to select 5 to 10 trees per plot greater than 5.5 inches DBH. Trees less than 5.5in DBH were measured in a 1/100 acre regeneration plot. Standing dead trees and snags were measured if they were counted in the variable radius prism plot. Old growth stumps were measured in 1/10th acre fixed area plots. Down dead material was measured using two 50ft long transects.

The 2012 BRSC inventory proceeded in 2 stages. In the first stage, the first randomly selected stand within each stratum was sampled. Based on this first stage, the coefficient of variation of all strata was used to estimate the number of plots needed in the second stage. There were 231 plots sampled in the first stage and 446 plots sampled in the second stage.

4. Post-Harvest Cruising

Areas subject to timber harvest or other disturbance such as fire or insect attack are inventoried each year utilizing the cruise specifications and design mentioned here. THP areas are delineated as new stands with new, unique strata calls. Each new stratum was then cruised using a systematic 10 by 10 chain grid with a random start. In this way, the inventory is updated with new strata and plot data information and the inventory recalculated to reflect yearly harvests.

[3] See Borders, B. E., B. D. Shiver, and M. L. Clutter. 2005. Tmber Inventory of Large Acreages Using Stratified Two-Stage List Sampling. Southern Journal of Applied Forestry 29:152–157.
Shiver, B. D., and B. E. Borders. 1996. Sampling techniques for forest resource inventory. John Wiley & Sons, Inc., New York, NY.

Appendix B: Garcia and Gualala Forest Stratification

The following sections describe the stand delineation process and sampling design for the Garcia River and Gualala River Forests. The sampling design used LiDAR and high-resolution color infrared imagery to create a cell based stratified inventory. These initial cells were then combined to create forest management units. This is similar in concept to the mirostand combination process described for Big River and Salmon Creek (BR/SC) except that cells size was predefined. The process described below is the precursor to the BR/SC stratification process.

1. 2010 Garcia River Forest Stratification and Sampling Design

A full-property wide inventory of the GRF was completed in 2010 using a pixel-based (cell) stratification. This inventory broke the GRF into 1 square chain (1/10 acre) grid cells and used high-resolution color-infrared and LIDAR data collected in 2009 to characterize each cell. The 2009 remote sensing data, correlated with 199 new inventory plots, was used to create a set of strata across the property that optimally partition the variability of conditions found in the forest. The 199 plots were then supplemented with 611 plots and all of these 810 plots were used to describe the forest conditions across the GRF.

The 2010 inventory classified each cell into a forest stratum. There were 43 different strata identified as a result of this methodology and each stratum had about 20 plots measured in it. Plots were randomly placed within strata with the number of plots allocated in each strata based on the variability of the strata. The plot data collected across the property was compiled and expanded into cells that had not been inventoried (similar to how a traditional stand-based stratified forest inventory works). Using the plot data paired with the remote sensing data, forest attributes for any individual cell or any region within the ownership can be estimated and used for management purposes. [4]

The 2010 inventory used a simple stratified random sample. Plots were randomly located within each strata and were not located on a grid. All plots were cruised using a 20 Basal Area Factor (BAF) prism for trees larger than 5.5 inches DBH. Regeneration was measured in 1/100th acre plots.

2. 2014 Gualala River Forest Stratification and Sampling Design

A full-property wide inventory of the Gualala River Forest was completed in 2014 using a pixel-based (cell) stratification. This inventory broke the Gualala Forest into 1/2 acre grid cells and used the high-resolution color-infrared and LIDAR data to characterize/stratify each cell. A total of 339 plots were installed on the property.

3. 2013 Stand Delineation

Using the remote sensing data, the individual cells were combined into forest management units using the same approach as was described in Appendix A for the Big River and Salmon Creek forests. Forest inventory data was assigned to the stands by using the tree lists from the cell based inventory data. In this way, each stand received a unique tree list based on recent inventory data. These stands

[4] See Golinkoff, J., M. Hanus, and J. Carah. 2011. The use of airborne laser scanning to develop a pixel-based stratification for a verified carbon offset project. Carbon Balance and Management 6:9.

were all classified based on the remote sensing data and assigned strata calls using the same method as was used on the BRSC property. The same strata categories as were used on the Big River and Salmon Creek Forests were used for the Garcia and Gualala forest (see table above).

4. Results

The 2010 sample of the GRF used 43 strata (42 forested and 1 non-forest) across the property. Each strata is at least 10 acres in size composed of at least 100 cells of similar characteristics recognized in the remote sensing data. The final sample had better than 10% accuracy at the 90% confidence level. The 2013 stand delineation using this data resulted in 870 stands that averaged about 25 acres per stand.

5. Post-Harvest Cruising

Areas subject to timber harvest or other disturbance such as fire or insect attack are inventoried each year utilizing the cruise specifications mentioned above. THP areas are delineated as new stands with new, unique strata calls. Each new stratum is then cruised using a systematic 10 by 10 chain or 5 by 5 chain grid with a random start such that at least 4 plots per stand are installed and there are on average 1 plot per every 10 acres. In this way, the inventory is updated with new strata and plot data information and the inventory recalculated to reflect yearly disturbance.

Appendix C: Modeling Plan

The FORSEE (4C) growth and simulation model was used to project changes in forest conditions over time. 4C was developed by the California Growth and Yield Model Cooperative and runs the CRYPTOS model developed by the Cooperative Redwood Yield Project Timber Output Simulator. 4C grows each tree in a tree list based on the tree species, crown canopy and competition, as well as the site conditions in each stand. This model also accounts for tree mortality over time and forest regeneration after disturbance. Growth estimates of the forest include user provided assumptions on regeneration after harvest. Harvest is simulated in the model based upon user defined harvest routines. TCF has developed a set of stand level targets and constraints that guide the choice of silviculture and timing of harvests within each stand. As a result of this, 4C will only initiate harvest provided that the set of management constraints are met for each individual stand. All stands have minimum BA removal constraints to control entry and minimum residual stocking constraints to control final stand conditions. Subsequent entries into the same stand cannot occur until the stand has increased in BA sufficiently to allow for another harvest. This ensures long term site occupancy and a continual increase in standing inventory.

Before modeling the management activities on in a given area, an accurate representation of the size of buffers based on the laws governing forest management is needed. The California Forest Practice Rules define the buffer area (linear distance from objects) requirements in terms of silvicultural limitations, which may be based on retention standards defined by either basal area or canopy cover retention, or disallowing any harvest. The CA FPR mandates that streams, certain rare and endangered species, and areas that are highly sensitive to erosion be buffered so as to reduce the potential impact of forest management activities on riparian areas and sensitive species. These areas constrain harvest and are mapped in GIS to capture the stands constrained from harvest by other forest resources.

1. Management Buffers

The first calculation applied to the gross property acreage is to remove non-forest areas. This involves removing rock pits, bare ground, grassland, and shrub-land areas that do not support forest. The next step is to remove all road surfaces from the forest land area using an 18 foot linear buffer on each side of all mapped truck roads. The forest area is then the basis for all future modeling steps.

1.1. No Harvest Area

No harvest areas are defined in the California Forest Practice Rules (CA FPR) for certain sensitive species and to provide watershed protection for anadromous fisheries. The primary species of concern which have mandated protection zones in the coastal northern California region are Northern Spotted Owls (14 CCR 919.9) and Coho Salmon (14 CCR 916). The forest non-harvestable area is calculated next by removing non-harvestable Northern Spotted Owl (NSO) areas, non-harvestable stream areas.

1.2. Constrained Harvest Area

Some degree of harvesting is allowed outside of the inner stream zones according to the CA FPR. The CA FPR requires that class 1 watercourses have a 30 ft inner no harvest area but allowed limited harvest to occur in an outer 70 foot buffer area on class 1 and large class 2 streams. Similarly, no

harvest is allowed within an inner 15 foot area on class 2 streams but limited harvest is allowed in an outer buffer area. For a standard class II an outer buffer of 60 feet on average was used to capture the variable width allowed by the FPR's. Class 1 and large class 2 streams (WLPZ1) require that harvest within the constrained area retain at least 80% canopy cover and the largest 13 trees per acre (TPA). Class 2 streams (WLPZ2) require that at least 50% canopy cover is retained at all times. These two separate classes of constrained acres (WLPZ1 and WLPZ2) were then modeled and tracked separately for the full 100 year assessment period.

The tables below summarize the acres of constrained areas for each forest.

Table 1: Watercourse Buffers

WLPZ Management Buffers				
Salmon Creek Forest		Acres		
Forest Management Consideration	**Description**	**No Harvest**	**High Retention Selection**	**Medium Retention Selection**
Class I stream Buffer	*Management buffers along fish-bearing watercourses and watercourses used for domestic water supply.* TCF 's management plan requires a 50 foot no harvest buffer and an additional 50 foot buffer in which 80% of the overstory canopy is retained. For Modeling; Stream Buffers are measured from the centerline of the mapped Cass I watercourse or from the watercourse or lake transition zone (WLTZ) if it is discernible on the map layer, per CCR 916.9.	124	123	NA
Large Class II Watercourse Buffers	*Watercourses that support non- fish aquatic life with a watershed area equal to 100 acres or mapped on a current USGS quad as a blue line stream.* The FPR require a 30 foot no harvest buffer and an additional 70 foot buffer in which 80% of the overstory is retained per 916.9. Stream buffers are measured from the centerline of the mapped Cass II watercourse	20	50	NA
Standard Class II stream buffer	*Small class II watercourses that support aquatic life that are non-fish-bearing and have watershed area less than 100 acres in size.* The FPR require a variable buffer width depending on side slope. TCF has determined that the average buffer width implemented on Salmon Creek is a 15 foot no harvest buffer and an additional 60 foot buffer in which 50% of the overstory canopy is retained. The actual buffer widths implemented in the field will vary based on stream side slopes.	46	NA	188

Big River Forest		Acres		
Forest Management Consideration	**Description**	**No Harvest**	**High Retention Selection**	**Medium Retention Selection**
Class I stream Buffer	*Management buffers along fish-bearing watercourses and watercourses used for domestic water supply.* TCF 's management plan requires a 50 foot no harvest buffer and an additional 50 foot buffer in which 80% of the overstory canopy is retained. For Modeling; Stream Buffers are measured from the centerline of the mapped Cass I watercourse or from the watercourse or lake transition zone (WLTZ) if it is discernible on the map layer, per CCR 916.9.	295	289	NA
Class I flood zone	*Management buffers along fish-bearing watercourses and watercourses used for domestic water supply in unconfined class I channels*. For Modeling the Option A TCF delineated the flood prone zone from a digital elevation model developed from LiDAR imagery.	NA	131	NA
Large Class II Watercourse Buffers	*Watercourses that support non- fish aquatic life with a watershed area equal to 100 acres or mapped on a current USGS quad as a blue line stream.* The FPR require a 30 foot no harvest buffer and an additional 70 foot buffer in which 80% of the overstory is retained per 916.9. Stream buffers are measured from the centerline of the mapped Cass II watercourse	60	151	NA
Standard Class II stream buffer	*Small class II watercourses that support aquatic life that are non-fish-bearing and have watershed area less than 100 acres in size.* The FPR require a variable buffer width depending on side slope. TCF has determined that the average buffer width implemented on Big River is a 15 foot no harvest buffer and an additional 60 foot buffer in which 50% of the overstory canopy is retained. The actual buffer widths implemented in the field will vary based on stream side slopes.	81	NA	336

Gualala River Forest		Acres		
Forest Management Consideration	**Description**	**No Harvest**	**High Retention Selection**	**Medium Retention Selection**
Class I stream Buffer - including main stem	*Management buffers along fish-bearing watercourses and watercourses used for domestic water supply*. The FPR require a 30 foot no harvest buffer and an additional 70 foot buffer in which 80% of the overstory canopy is retained. For Modeling; Stream Buffers are measured from the centerline of the mapped Cass I watercourse or from the watercourse or lake transition zone (WLTZ) if it is discernible on the map layer, per CCR 916.9.	119	277	NA
Large Class II Watercourse Buffers	*Watercourses that support non- fish aquatic life with a watershed area that is equal to 100 acres or more or is mapped on a current USGS quad as a blue line stream*. The FPR require a 30 foot no harvest buffer and an additional 70 foot buffer in which 80% of the overstory canopy is retained. Stream Buffers are measured from the centerline of the mapped Cass I watercourse or per CCR 916.9.	27	68	NA
Standard Class II stream buffer	*Small class II watercourses that support aquatic life that are non-fish-bearing and have watershed area less than 100 acres in size.* The FPR require a variable buffer width depending on side slope. TCF has determined that the average buffer width implemented on the Gualala River Forest is a 15 foot no harvest buffer and an additional 60 foot buffer in which 50% of the overstory canopy is retained. The actual buffer widths implemented in the field will vary based on stream side slopes.	124	NA	502

	Garcia River Forest			
Forest Management Consideration	**Description**	**No Harvest**	**High Retention Selection**	**Medium Retention Selection**
Class I stream	*Management buffers along fish-bearing watercourses and watercourses used for domestic water supply*. The FPR require a 30 foot no harvest buffer adjacent to Class I streams and an additional 70 foot buffer in which 80% of the overstory canopy is retained. The Garcia Forest Management requires an additional 100' RMZ adjacent to class I stream zones and an addition 200' RMZ adjacent to the mainstem Garcia River. For Modeling; Stream Buffers are measured from the centerline of the mapped Cass I watercourse or from the watercourse or lake transition zone (WLTZ) if it is discernible on the map layer, per CCR 916.9. The RMZ' are modeled with the ER Selection silviculture.	260	602	NA
Class I flood zone	*Management buffers along fish-bearing watercourses and watercourses used for domestic water supply in unconfined class I channels*. For Modeling the Option A TCF delineated the flood prone zone from a digital elevation model developed from LiDAR imagery	NA	35	NA
Large Class II Watercourse	*Watercourses that support non- fish aquatic life with a watershed area that is equal to 100 acres or more or is mapped on a current USGS quad as a blue line stream*. The FPR require a 30 foot no harvest buffer and an additional 70 foot buffer in which 80% of the overstory canopy is retained. Stream Buffers are measured from the centerline of the mapped Cass I watercourse or per CCR 916.9.	66	166	NA
Standard Class II stream	*Description: Small class II watercourses that support aquatic life that are non-fish-bearing and have watershed area less than 100 acres in size*. TCF's management plan requires a 25 foot no harvest buffer and an additional buffer of 50 feet in which 50% of the overstory canopy shall remain after harvest. The actual buffer widths implemented in the field will vary based on stream side slopes.	237	NA	966

Table 2 Non Timber Resources

Non Timber Resources		Acres			
Resource	**Description**	**Big River**	**Salmon Creek**	**Gualala River**	**Garcia River**
Northern Spotted Owl	Northern Spotted Owl habitat retention and maintenance is required wherever a valid NSO activity center is known to occur. Protection measures consist of maintaining a 100 acre core habitat area as well as 200 acres of nesting and roosting habitat within .7 miles of the activity center. This table shows core habitat acres only.	7 Territories 870 acres	7 Territories 731 acres	1 Territory 102 acres	9 Territories 1,034 acres
Pygmy Forest	Pygmy forests are rare and unique ecosystems that exist close to the Pacific Ocean shore. There are many rare plants which are found only in these vegetation communities, including dwarfed pines (bolander pine). No harvest will occur in the pygmy forest. The pygmy forest occurs only on TCF's Salmon Creek Forest.	0	7	0	0
Oak Woodlands	Description: Forested areas consisting largely of true oaks.	0	0	91	613
Grasslands	Description: Areas dominated by grass either native or converted	0	0	115	369

Table 3: Conservation Easements

Conservation Easement		Acres	
Forest	**Description**	**No Harvest**	**High or Moderate Retention Selection Harvest**
Big River	The Big River Conservation Easement extends from the northwest corner to the southwest corner for the property and extends from the western property line east for approximately 300 feet parallel to the property line and adjacent to The Mendocino Headlands State Park. No Harvest is allowed with the Easement area, the remainder of the property is restricted from development or conversion by a recorded Offer to Dedicate, allowed uses include wildlife management, sustainable timber harvesting, recreation and education.	113	NA
Salmon Creek	The property is restricted from development or conversion by a recorded Offer to Dedicate; allowed uses include wildlife management, sustainable timber harvesting, recreation and education.	NA	NA
Gualala River	The property is restricted from development or conversion by a recorded conservation easement; allowed uses include wildlife management, sustainable timber harvesting, recreation and education.	NA	NA
Garcia River	Approximately one third of the forest is within The Ecological Reserve which is dedicated to the development of late seral stage forest. The remainder of the property is restricted from development or conversion by a recorded conservation easement; allowed uses include wildlife management, sustainable timber harvesting, recreation and education.	NA	8,321

2. Tree List Inputs

A tree list for each cruised stand was generated by combining the plots measured in each cruised stand of similar strata and expanding the plot estimates to per acre values. Uncruised stands were given the tree list of the averaged cruised stands in the same strata. All stands' tree lists were the basis for all future growth and yield modeling.

3. Regeneration Assumptions

The FORESEE model only applies regeneration after harvest events. The regeneration tree counts are defined as the number of viable trees surviving to at least five years after the harvest event.

Table 4: Regeneration by harvest type.

Prescription	Description	Conifer Regen (TPA)	HW Regen (TPA)
Single Tree Selection	Natural regeneration only	25	10
Transition	Natural regeneration only	50	10
Variable retention 40	Natural regeneration and planted seedlings are used for this treatment.	270	10
Commercial Thin	Natural regeneration only.	30	10
Rehabilitation	Natural regeneration and planted seedlings are used for this treatment.	270	10

4. Management Description

The forest model considers four distinct management areas when modeling forest growth and yield. As described in the management buffer section above, the modeling separately projects no-harvest forest areas, class 1 and large class 2 (WLPZ1) forest areas, class 2 forest areas (WLPZ2), and unconstrained forest areas. The management of unconstrained areas uses primarily uneven-aged forest management approaches to harvest timber. The growth and yield modeling is done using 5 year planning periods and stand re-entry occurs no more frequently than once every 10 years for site class I and II and 15 years for site class III and IV.

The Garcia River Forest Reserve Area is designated for the development of a late seral stage forest. Therefore silviculture has been restricted to long rotation thin from below harvesting. The model uses as 20 year reentry period on all stands. TCF expects that harvesting will cease in the reserve after two or three entries, this Option A models 2 full entries into the reserve area.

4.1. No Harvest Acres

The non-harvestable acres were grown forward with no harvest for the full 100 year planning period.

4.2. WLPZ Constrained Harvestable Acres

The WLPZ acres were harvested according to the CA FPR which state that for class 1 and large class 2 streams at least 80% canopy cover and the largest 13 trees per acre (TPA) are retained. For class 2 streams at least 50% canopy cover is retained at all times. To model these constraints, a FORESEE batch script was developed to leave the 13 largest TPA for WLPZ1 areas and to calculate the canopy cover for all WLPZ areas so as to meet the canopy cover constraints. The canopy cover was calculated using a modified version Beer-Lambert law that scales the overlapping individual tree crown area to non-overlapping canopy cover. The individual tree crown area is calculated by

FORESEE based on equations from the literature. The non-overlapping canopy is then calculated using the following formula[5]:

Equation 1: Non-Overlapping Canopy Cover

$$CCnon = (1 - Exp(CCoverlapping))$$

In this formula, CCoverlapping is the overlapping canopy cover as a percentage of the ground area based on FORESEE's crown width models.

4.3. Unconstrained Harvestable Acres

After removing the non-forest acres, the non-harvestable acres, and the constrained harvested acres from the gross project acreage the remaining area is then available to be modeled without constraints.

The forest area unconstrained by streams or owls is managed using a tiered system of stand structure metrics. There were six different management approaches used when modeling. Single tree selection and transition silviculture are uneven-aged approaches. Variable Retention, commercial thinning, rehabilitation, are considered even-aged silvicultural approaches. Stands which contain more than 30% of the total basal area in tanoak pre harvest are also managed for tanoak reduction during the initial conifer harvest. Tanoak is removed to make growing space for conifer seedlings and saplings. Only tanoak is modeled for harvest all other true oaks and hardwood species are retained for wildlife habitat. Each harvesting approach is briefly described in the table below. The next table outlines the decision framework used to determine which silviculture to apply when entering a stand.

Table 5: Silvicultural systems descriptions.

Silviculture	Description
Single Tree Selection and Group selection	The goal of this prescription is to create and maintain multistoried, uneven-aged stands with varied ages classes, diameter distribution and tree heights. Trees are harvested individually, or in small groups up to 1 acre in size.
Ecological reserve Selection	The Garcia River Forest Reserve Area is designated for the development of a late seral stage forest. Silviculture has been restricted to longer rotations and thinning from below. The model uses as 20 year reentry period on all stands. TCF expects that harvesting will cease in the reserve after two or three entries, this Option A models 2 full entries into the reserve area.

[5] The Beer-Lambert law can be seen in Waring, R. H., and S. W. Running. 2007. Forest Ecosystems: Analysis at Multiple Scales. Elsevier Academic Press, San Francisco, CA. The conversion of this relationship to calculate non-overlapping canopy can be seen in Crookston, N. L., and A. R. Stage. 1999. Percent Canopy Cover and Stand Structure Statistics from the Forest Vegetation Simulator. Pages 16. General Technical Report, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Rocky Mountain Research Station.

Silviculture	Description
Transition	The goal of this prescription is to develop uneven-aged stands from stands that currently have an even-aged or irregular stand structure. Trees are harvested individually, or in small groups up to 1 acre in size.
Variable Retention	Variable retention is a harvesting approach based on the retention of structural elements or biological legacies (trees, snags, logs, etc.) from the pre-harvest stand for integration into the post-harvest stand to achieve various ecological, social and geomorphic objectives. Retained trees may be intended to become part of future stands managed by the Selection regeneration method. Retained trees are often designated as decadent tree or snag recruitment and therefore not ever intended for harvest.
Commercial Thinning	Commercial thinning is the removal of trees in a young-growth stands to maintain or increase average stand diameter and height 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 co-dominant trees from the pre-harvest stand.[10]
Rehabilitation	The goal of this prescription is to regenerate stands that do not meet minimum stocking standards. Successive harvests will utilize uneven-aged silviculture.
Conifer Release	The goal of this prescription is to improve growth in stands that are primarily experiencing excessive hardwood competition, and that are also well stocked with conifer seedlings. Successive harvests will utilize uneven-aged silviculture.

The following table is the basic decision matrix table used in modeling the Option A

Table 6: Decision Matrix Table

			First Entry Triggers						General Targets	
Type	**Prescription**	**Miscellaneous**	**Con BA Lower Limit**	**Con BA Upper Limit**	**Con TPA (0 to 6in)**	**Minimum Con BA available for Harv (ft2/acre)**	**Min BA-Harv TO**	**Acreage Limit**	**Con BA Retention (ft2/acre)**	**TO BA Retention (ft2/acre)**
WLPZ Mngmt	**Class I and Large Class II**	From 30-100 feet from the WLTL retain 13 largest trees and 80% canopy	No triggers for WLPZ management as these stands are entered as neighboring non-WLPZ stands are entered. **No** HW harvest occurs in WLPZ areas.						75	NA
	Standard Class II	From 15-75 feet use Single tree selection silviculture only							75	NA
CE Mngmt	**GRF Ecological Reserve**	Each successive entry increases the Con BA target by 25ft2.	125	None	NA	25	NA	NA	3/4 starting ConBA	NA
Uneven Age Mngmt	**Single Tree Selection**	Final Target BA depends on the stands starting BA. Stands over 225 have a target of 250. Stands under 225 have a target of 200 ft2 BA. The min ConBA for entry increases by 25 ft2 BA until the target BA is reached.	125	None	NA	25	30% of Total BA	NA	2/3 of starting ConBA	30
	Transition	This only occurs once per stand.	75	125	NA	25	30% of Total BA	NA	50	30
Even Age Mngmt	**Variable retention 40**	Greater than 50% of conifer basal area in trees larger than 18" DBH (this is a surrogate for tree age >60 yrs)	30	125	< 125	25	30%	40	7.5	15
	Variable retention 60	same as VR40	30	125	< 125	25	30%	60	10	15
	Variable retention 80	same as VR40	30	125	< 125	25	30%	80	12.5	15
	Variable retention 120	same as VR40	30	125	< 125	25	30%	120	15	15
	Commercial Thin	50% of conBA < 14in DBH.	15	75	NA	25	30%	NA	8.72	15
	Conifer Release (HW treatment)	NA	0	50	>= 125	NA	30%	NA	No Con Harv	15
	Rehabilitation	NA	25	50	NA	25	NA	NA	8	15
	Just Grow	if none of the above, just grow.	NA	NA	NA	NA	NA	NA	NA	NA

		Conifer Tree Level Targets				Regeneration		Harvesting Approach				
Type	**Prescription**	**% Canopy Cover**	**TPA to Leave**	**BA to Leave (ft2/acre**	**BA or TPA constraints**	**Con (TPA)**	**TO (TPA)**	**Conifer Harvesting Approach**	**Conifer DBH range (in)**	**TO Harvesting Approach**	**TO DBH range (in)**	**Time to Next Treatment**
WLPZ Mngmt	**Class I and Large Class II**	80%	13	NA	largest	15	5	from below DBH	8 to 48	None	NA	At Least 10 Years
	Standard Class II	50%	NA	NA	NA	15	5	from below DBH	8 to 48	None	NA	At Least 10 Years
CE Mngmt	**GRF Ecological Reserve**	NA	NA	15	in trees >= 18in DBH	15	5	from below DBH	14 to 48	None	NA	At Least 20 Years
Uneven Age Mngmt	**Single Tree Selection**	NA	NA	15	in trees >= 18in DBH	25	10	Uniform across DBH	8 to 48	from above tallest	2 to 20	At Least 10 Years
	Transition	NA	NA	15	in trees >= 12in DBH	50	10	Uniform across DBH	8 to 48	from above tallest	2 to 20	Selection after at least 10 years
Even Age Mngmt	**Variable retention 40**	NA	NA	NA	NA	270	10	from above tallest	8 to 48	from above tallest	2 to 20	Selection after at least 30 years
	Variable retention 60	NA	NA	NA	NA	270	10	from above tallest	8 to 48	from above tallest	2 to 20	Selection after at least 30 years
	Variable retention 80	NA	NA	NA	NA	270	10	from above tallest	8 to 48	from above tallest	2 to 20	Selection after at least 30 years
	Variable retention 120	NA	NA	NA	NA	270	10	from above tallest	8 to 48	from above tallest	2 to 20	Selection after at least 30 years
	Commercial Thin	NA	100	NA	in trees >= 4in	30	10	from below DBH	8 to 14	from above tallest	2 to 20	Selection when BA >= 125
	Conifer Release (HW treatment)	NA	NA	NA	NA	20	5	from above tallest	NA	from above tallest	2 to 20	Commercial Thin after 30 years
	Rehabilitation	NA	300 POINT COUNT	NA	NA	270	10	from above tallest	8 to 48	from above tallest	2 to 20	Selection after at least 30 years

Appendix D: Timber Inventory procedures

1. Sampling Design

1.1. Plot Location

Stands to be sampled will be chosen with probability proportional to size within each stratum. Chosen stands will have a random set of plots chosen such that there is at least 1 plot per every 10 acres with a minimum of 4 plots per stand. Every 4th plot, starting with the first plot, will have heights measured on all trees.

Cruisers received a list of the randomly chosen plots within each stand in the order these plots should be cruised. This will aid in plot relocation for check-cruising and future audits.

1.2. Plot Design

The plot design consists of a variable radius plot for trees over 5.5 inches, a 1/100 acre regeneration plot for small trees. A 1/10 fixed radius plots for brush and old growth stumps, and a 100 ft transect for down dead material. On all properties, the basal area should be chosen such that most plots count 4 to 8 trees. Once a BAF is chosen for a stratum, all plots must have the same BAF within that stratum.

Variable Radius Plot Measurements (<u>standing live and dead trees</u> >=5.5 inches DBH):

species
diameter at breast height (DBH)
height to the nearest foot (on every 4th plot starting with the first plot)
and height to crown base (on every 4th plot starting with the first plot)
Crown Position (Dominant or Co-dominant, Intermediate, or Suppressed)

Fixed Radius <u>Regeneration</u> Plot Measurements (1/100th of an acre = 11.8 ft radius):

Species
Count of Trees < 5.5 inches DBH within 2 size classes by species (0 to 3 inches Diameter, and 3 to 5.4 inches diameter)

Fixed Radius <u>Shrub and Old Growth Stump</u> Plot Measurements (1/10th of an acre = 37.2 ft radius):

Dominant Shrub Type and Total Shrub % Cover
DBH and Height for Stumps between 6ft and 12ft tall, stump ht is calculated as the average of the uphill side and downhill side of the stump.

<u>Down Dead</u> Transect Measurements (Two 50ft Transects starting at Plot Center):

Length of Pieces (pieces must be greater than 6ft long)
Average Diameter of piece
Soundness of Piece (Hard or Soft)

1.3 Plots Falling on Roads:

Plots that fall on unmapped roads are sampled. Plots that fall on mapped truck roads shall be offset 1 chain to the west, and if still on truck road offset 1 chain north. The offset shall be in a cardinal direction moving clockwise on the compass until a bearing is found that will lead to a vegetated plot. Landings are included as part of the truck road and not sampled. New plot centers will be mapped and the GPS coordinates provided to TCF.

1.4 Site Class Sampling:

A minimum of **3 redwood or Douglas-fir** trees per strata should be selected and measured for species, DBH (to the nearest 10th inch), height to nearest 1 foot, HTCB (height to crown base), and age. Each plot should be evaluated for the presence of potential site trees.

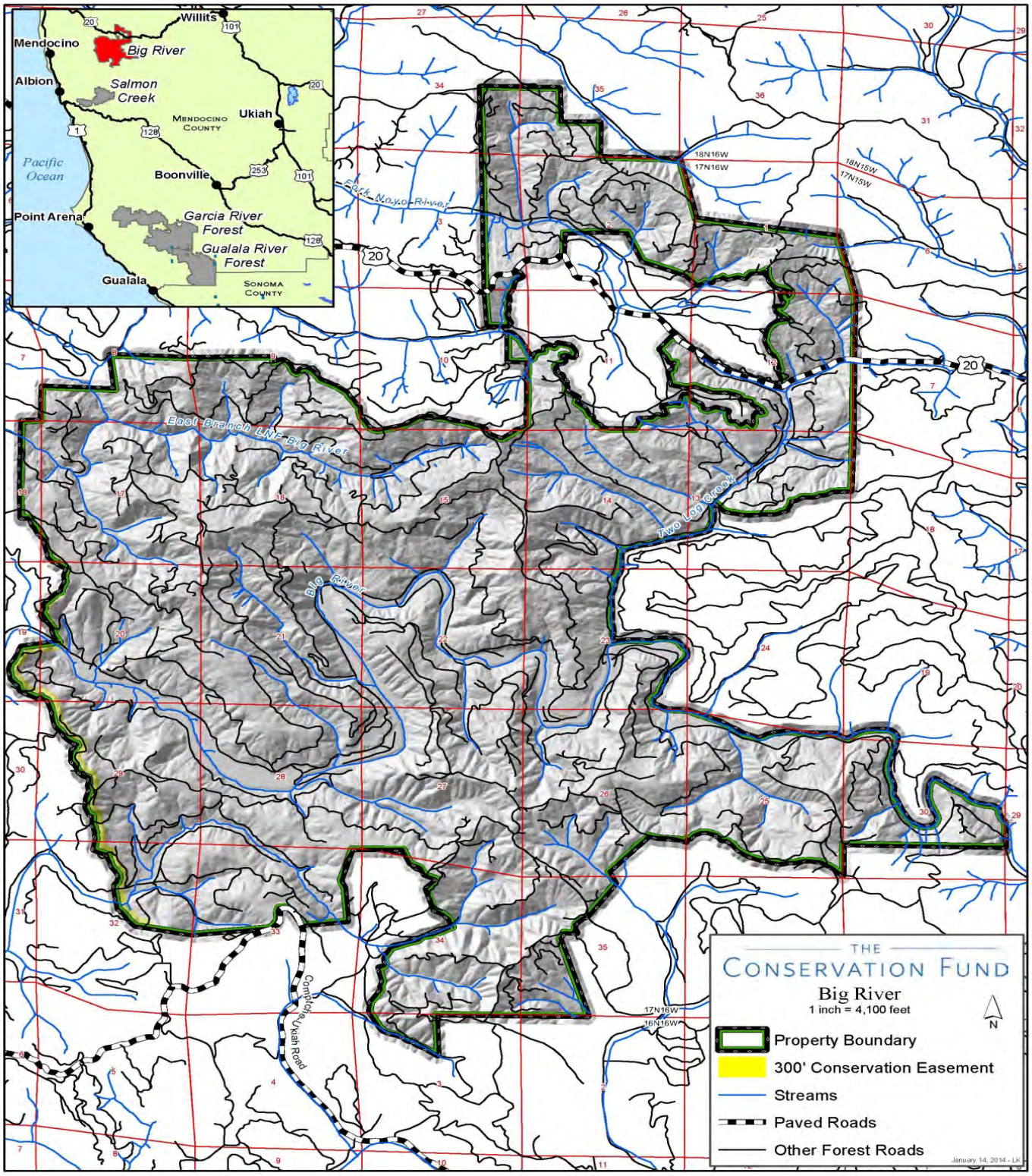
To be considered eligible for site tree measurement, a tree must have the following qualities:

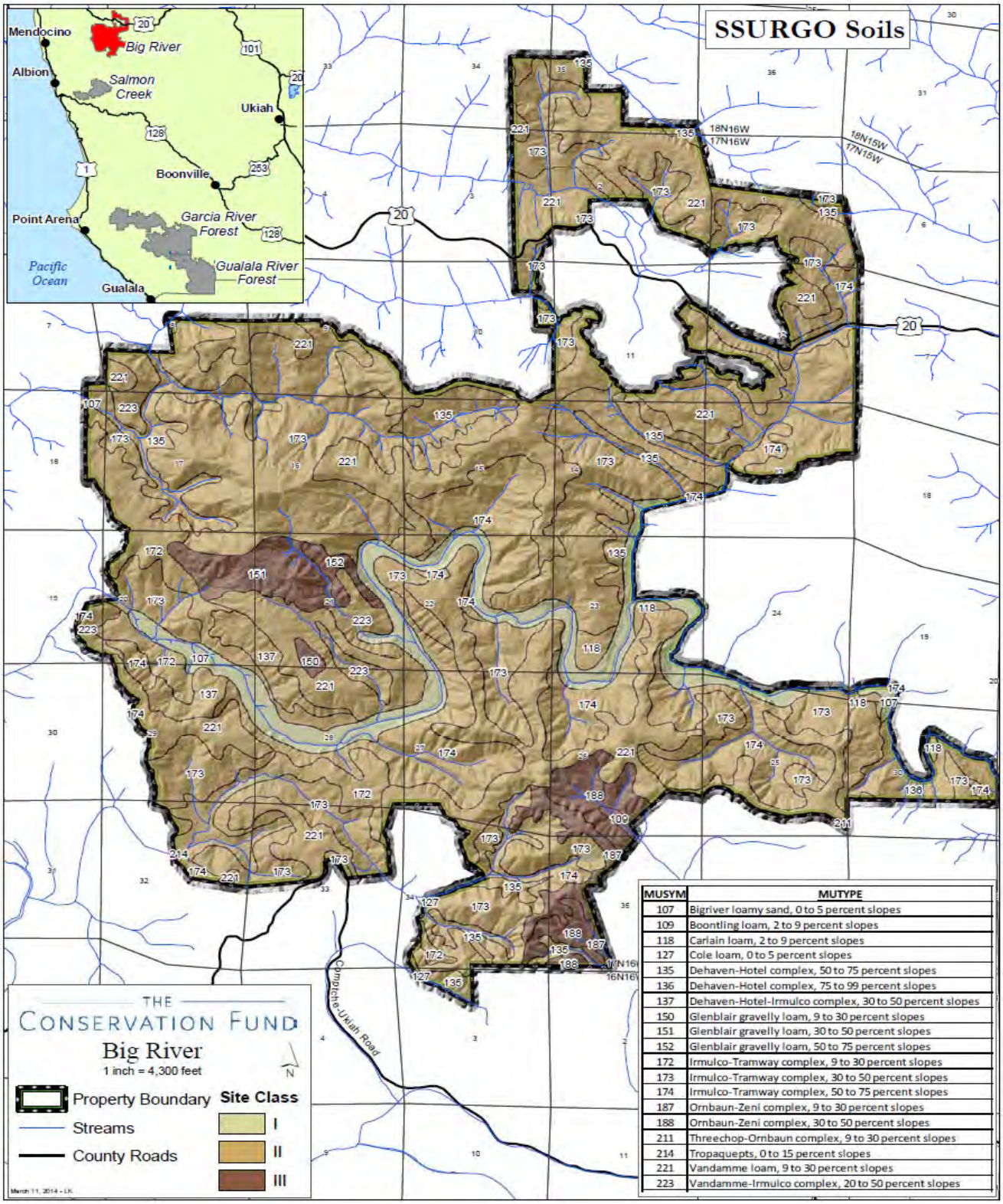
Be a conifer located within or near the plot (preferably within).
Have a dominant or co-dominant crown class.
Free of defect and disease and demonstrate good phenotype and vigor.

Final selection should be made on the basis of determining which of the eligible trees is the most vigorous. Relative vigor should be assessed by evaluating the crown condition, foliage complement, and bole condition of the trees present on the plot. Trees with full, healthy crowns, and no apparent disease or damage should be considered more vigorous than trees lacking these qualities. In many stands it may be difficult to find trees meeting these criteria; thus, it is important to look for such trees at each plot (until the minimum number have been identified and measured within a given stand). Tree selected for site tree measurement shall be marked with orange flagging with writing on the flag stating that it is selected as a site tree.

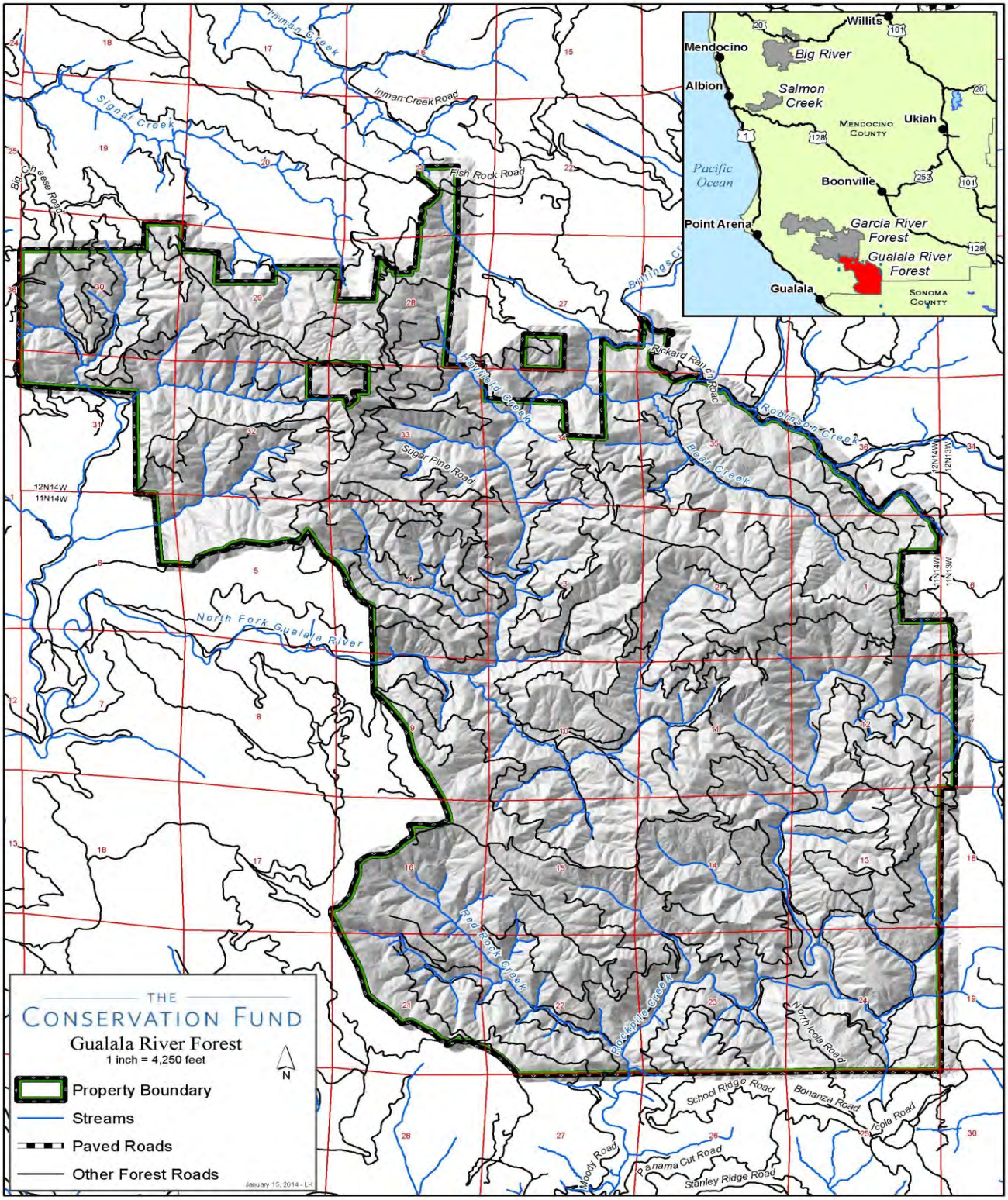
If no site trees are found meeting the criteria mentioned above, the cruiser shall find an appropriate site tree by seeking a tree off of the plot. In this case the cruise notes shall clearly indicate that the measurement occurred off plot.

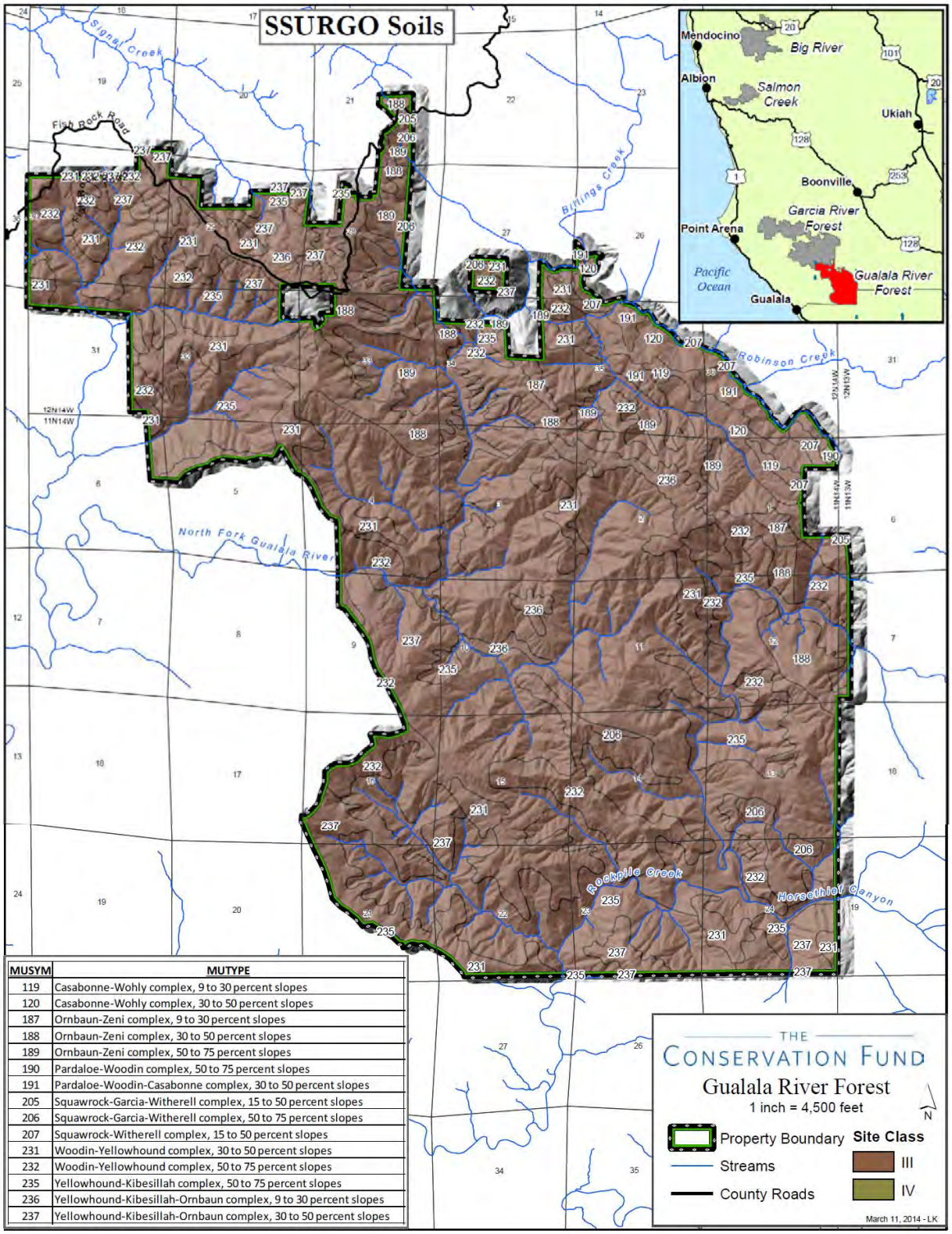
Appendix E: Maps



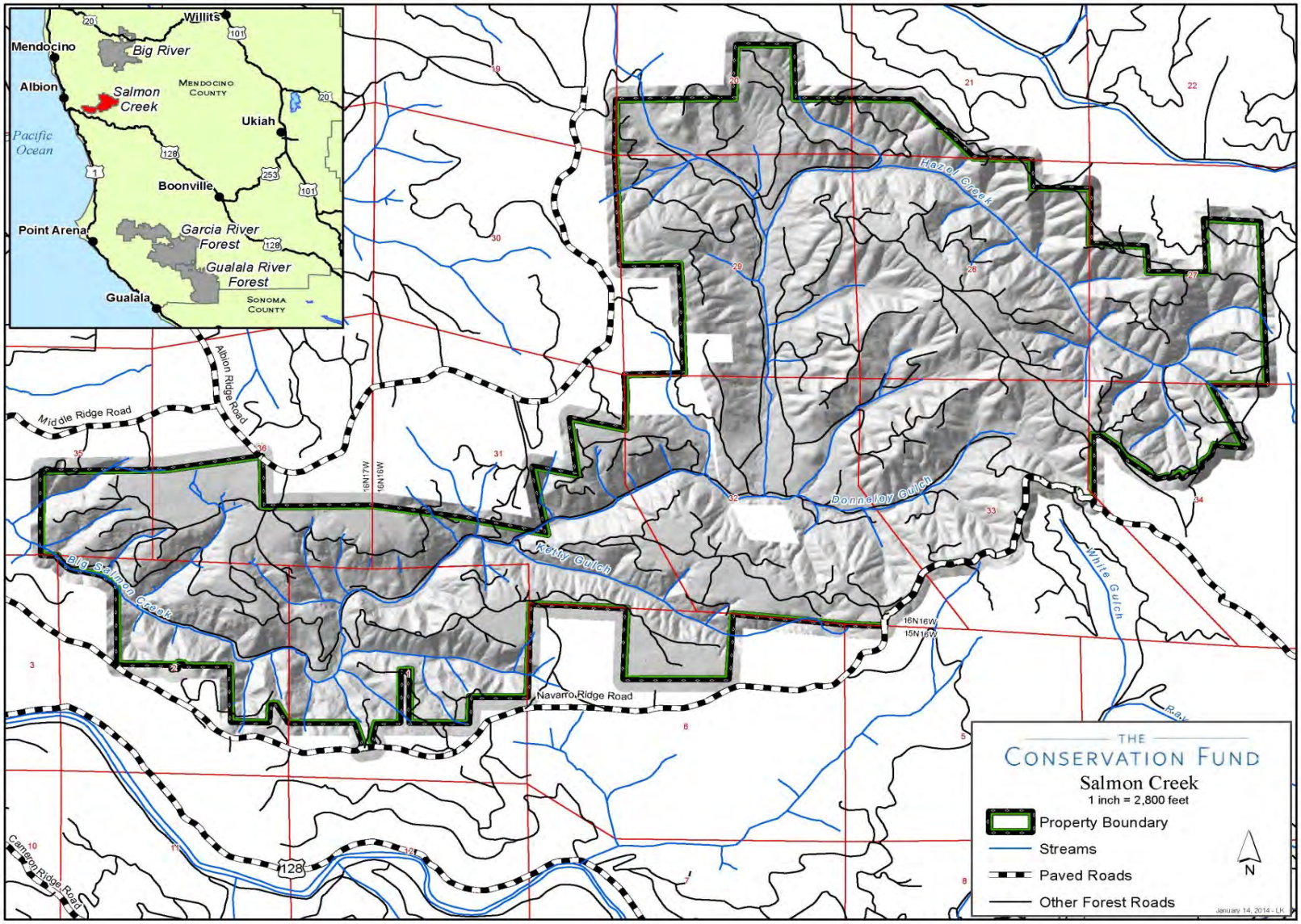


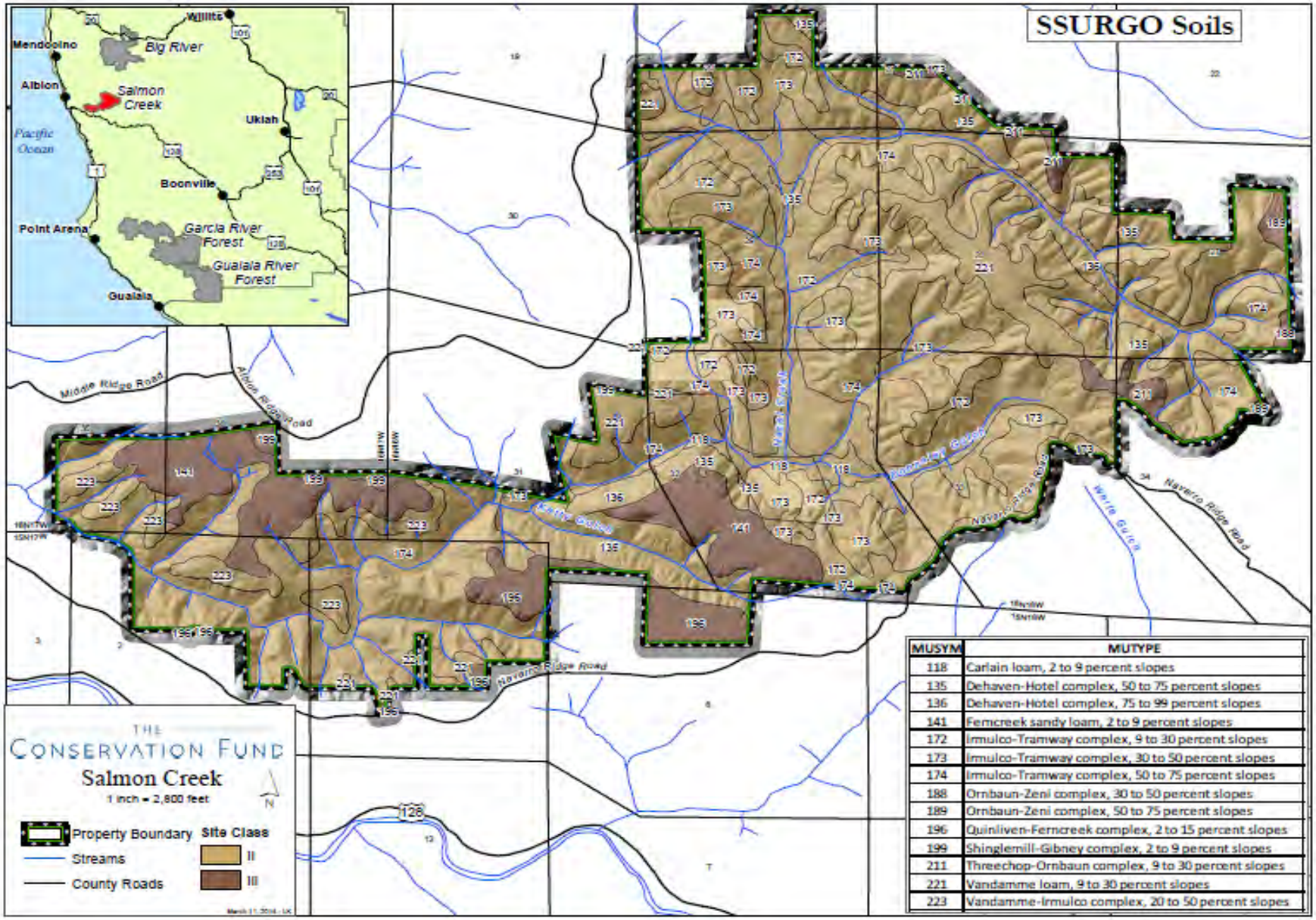
MUSYM	MUTYPE
107	Bigriver loamy sand, 0 to 5 percent slopes
109	Boontling loam, 2 to 9 percent slopes
118	Carlain loam, 2 to 9 percent slopes
127	Cole loam, 0 to 5 percent slopes
135	Dehaven-Hotel complex, 50 to 75 percent slopes
136	Dehaven-Hotel complex, 75 to 99 percent slopes
137	Dehaven-Hotel-Irmulco complex, 30 to 50 percent slopes
150	Glenblair gravelly loam, 9 to 30 percent slopes
151	Glenblair gravelly loam, 30 to 50 percent slopes
152	Glenblair gravelly loam, 50 to 75 percent slopes
172	Irmulco-Tramway complex, 9 to 30 percent slopes
173	Irmulco-Tramway complex, 30 to 50 percent slopes
174	Irmulco-Tramway complex, 50 to 75 percent slopes
187	Ornbaun-Zeni complex, 9 to 30 percent slopes
188	Ornbaun-Zeni complex, 30 to 50 percent slopes
211	Threechop-Ornbaun complex, 9 to 30 percent slopes
214	Tropaquepts, 0 to 15 percent slopes
221	Vandamme loam, 9 to 30 percent slopes
223	Vandamme-Irmulco complex, 20 to 50 percent slopes

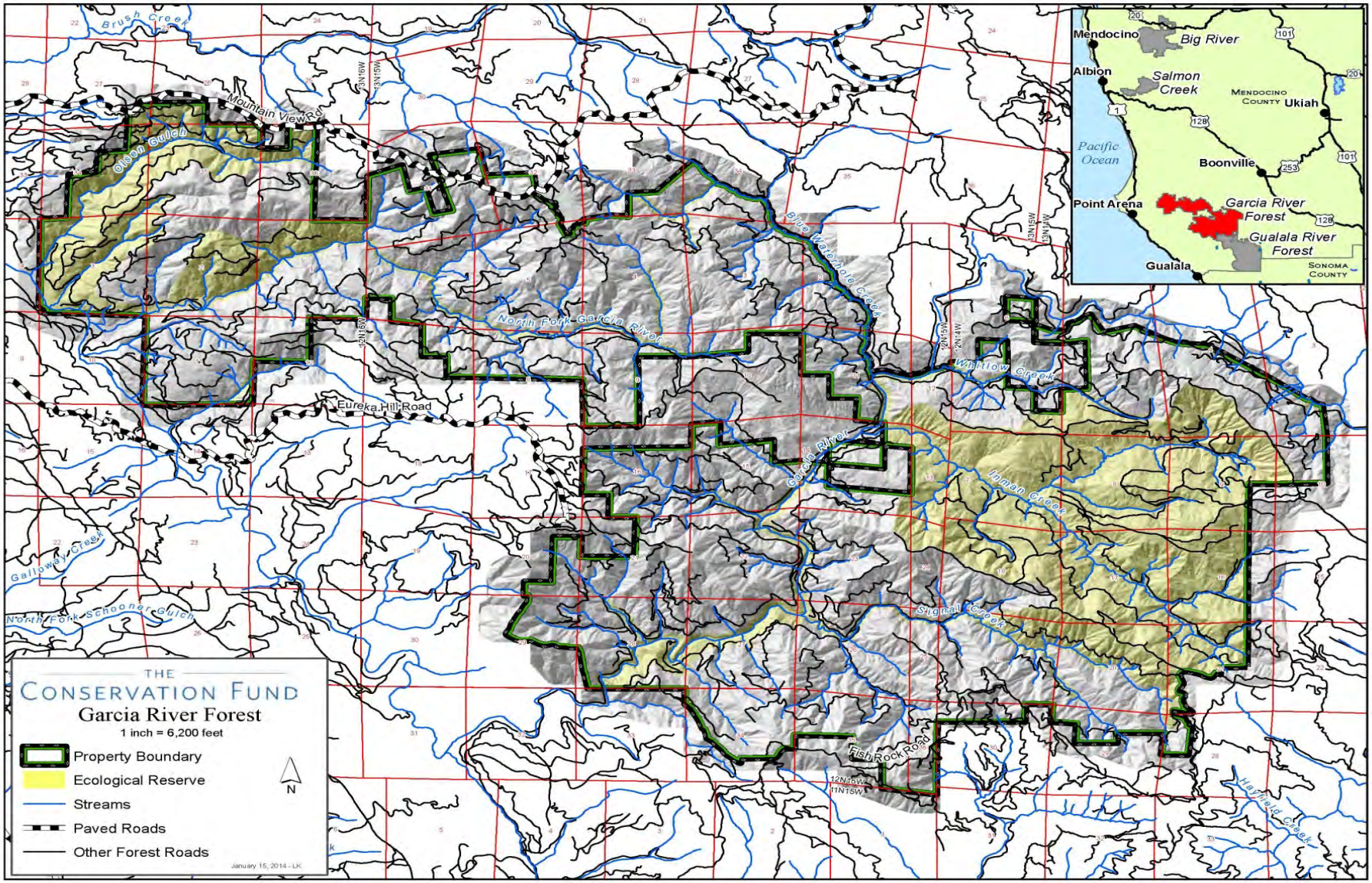

Willits
Mendocino
Big River
Albion
Salmon Creek
Ukiah
Mendocino County
Pacific Ocean
Boonville
Point Arena
Garcia River Forest
Gualala River Forest
Gualala
Sonoma County
Inman Creek
Inman Creek Road
Signal Creek
Big Cheese Road
Fish Rock Road
Rickard Ranch Road
Robinson Creek
Hayfield Creek
Sugar Pine Road
Bear Creek
12N14W
11N14W
12N13W
11N13W
North Fork Gualala River
Red Rock Creek
Rockpile Creek
Northcoast Road
School Ridge Road
Bonanza Road
Cola Road
Moody Road
Panama Cut Road
Stanley Ridge Road
THE CONSERVATION FUND
Gualala River Forest
1 inch = 4,250 feet
N
Property Boundary
Streams
Paved Roads
Other Forest Roads
January 15, 2014 - LK

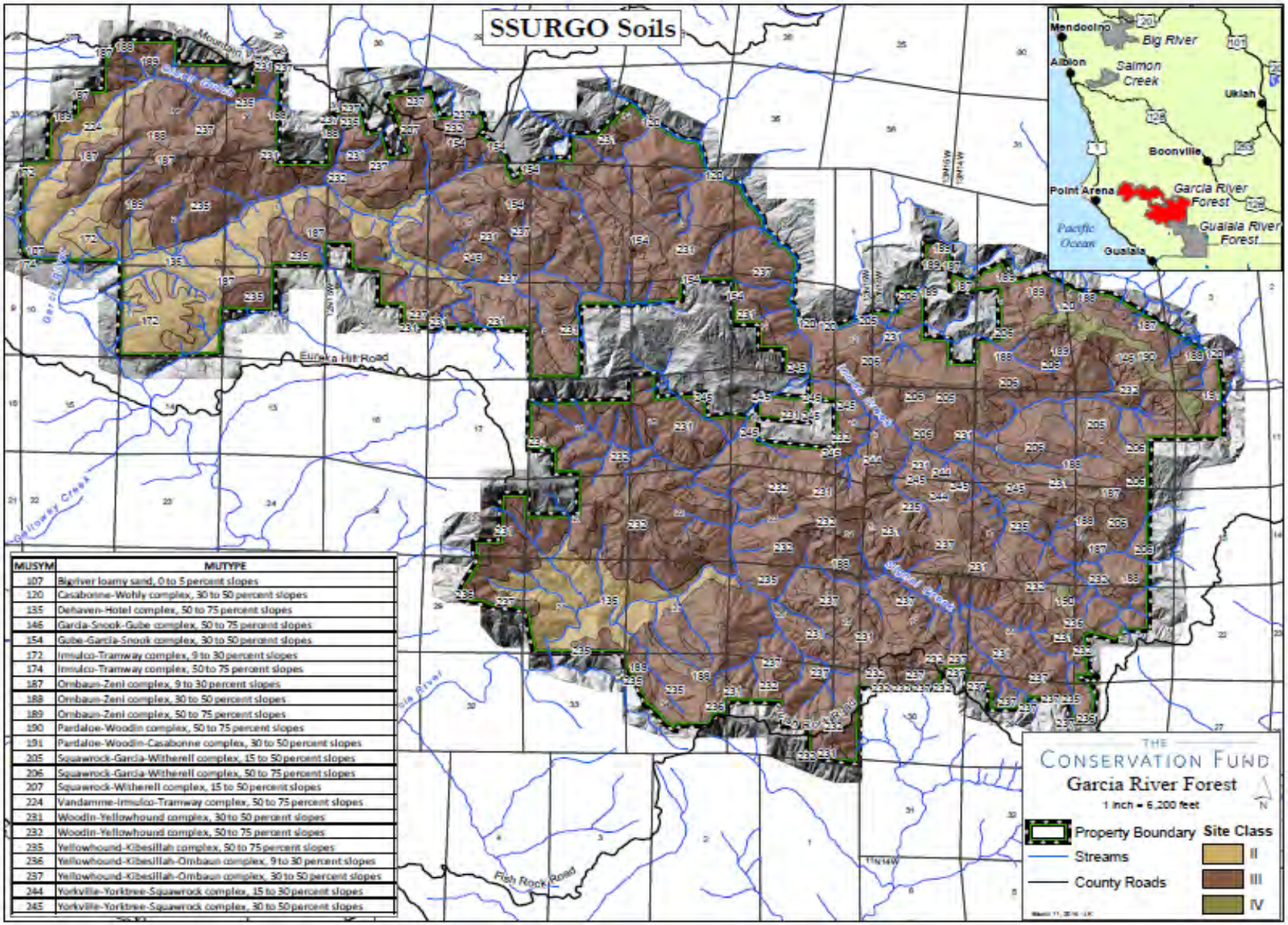


MUSYM	MUTYPE
119	Casabonne-Wohly complex, 9 to 30 percent slopes
120	Casabonne-Wohly complex, 30 to 50 percent slopes
187	Ornbaun-Zeni complex, 9 to 30 percent slopes
188	Ornbaun-Zeni complex, 30 to 50 percent slopes
189	Ornbaun-Zeni complex, 50 to 75 percent slopes
190	Pardaloe-Woodin complex, 50 to 75 percent slopes
191	Pardaloe-Woodin-Casabonne complex, 30 to 50 percent slopes
205	Squawrock-Garcia-Witherell complex, 15 to 50 percent slopes
206	Squawrock-Garcia-Witherell complex, 50 to 75 percent slopes
207	Squawrock-Witherell complex, 15 to 50 percent slopes
231	Woodin-Yellowhound complex, 30 to 50 percent slopes
232	Woodin-Yellowhound complex, 50 to 75 percent slopes
235	Yellowhound-Kibesillah complex, 50 to 75 percent slopes
236	Yellowhound-Kibesillah-Ornbaun complex, 9 to 30 percent slopes
237	Yellowhound-Kibesillah-Ornbaun complex, 30 to 50 percent slopes


Willits
Mendocino
Big River
Albion
Salmon Creek
Mendocino County
Ukiah
Pacific Ocean
Boonville
Point Arena
Garcia River Forest
Gualala River Forest
Gualala
Sonoma County
Albion Ridge Road
Middle Ridge Road
Hazel Creek
Donnelly Gulch
Kelly Gulch
Big Salmon Creek
White Gulch
Navarro Ridge Road
Cameron Ridge Road
128
16N17W
16N16W
15N16W
THE CONSERVATION FUND
Salmon Creek
1 inch = 2,800 feet
Property Boundary
Streams
Paved Roads
Other Forest Roads
N
January 14, 2014 - LK


SSURGO Soils
Willits
Mendocino
Big River
Albion
Salmon Creek
Ukiah
Pacific Ocean
Boonville
Point Arena
Garcia River Forest
Gualala River Forest
Gualala
Middle Ridge Road
Navarro Ridge Road
Kelly Gulch
Ferncreek Gulch
White Gulch
THE CONSERVATION FUND
Salmon Creek
1 inch = 2,800 feet
N
Property Boundary
Streams
County Roads
Site Class
II
III
MUSYM | MUTYPE
118 | Carlain loam, 2 to 9 percent slopes
135 | Dehaven-Hotel complex, 50 to 75 percent slopes
136 | Dehaven-Hotel complex, 75 to 99 percent slopes
141 | Ferncreek sandy loam, 2 to 9 percent slopes
172 | Irmulco-Tramway complex, 9 to 30 percent slopes
173 | Irmulco-Tramway complex, 30 to 50 percent slopes
174 | Irmulco-Tramway complex, 50 to 75 percent slopes
188 | Ornbaun-Zeni complex, 30 to 50 percent slopes
189 | Ornbaun-Zeni complex, 50 to 75 percent slopes
196 | Quinliven-Ferncreek complex, 2 to 15 percent slopes
199 | Shinglemill-Gibney complex, 2 to 9 percent slopes
211 | Threechop-Ornbaun complex, 9 to 30 percent slopes
221 | Vandamme loam, 9 to 30 percent slopes
223 | Vandamme-Irmulco complex, 20 to 50 percent slopes


Brush Creek
Mountain View Rd
Olson Gulch
Eureka Hill Road
North Fork Garcia River
Blue Waterhole Creek
Willow Creek
Garcia River
Inman Creek
Signal Creek
Fish Rock Road
Hayfield Creek
Galloway Creek
North Fork Schooner Gulch
THE CONSERVATION FUND
Garcia River Forest
1 inch = 6,200 feet
Property Boundary
Ecological Reserve
Streams
Paved Roads
Other Forest Roads
N
January 16, 2014 - LK
Mendocino
Big River
Albion
Salmon Creek
Mendocino County
Ukiah
Pacific Ocean
Boonville
Point Arena
Garcia River Forest
Gualala River Forest
Gualala
Sonoma County



MUSYM	MUTYPE
107	Bigriver loamy sand, 0 to 5 percent slopes
120	Casabonne-Wohly complex, 30 to 50 percent slopes
135	Dehaven-Hotel complex, 50 to 75 percent slopes
146	Garcia-Snook-Gube complex, 50 to 75 percent slopes
154	Gube-Garcia-Snook complex, 30 to 50 percent slopes
172	Irmulco-Tramway complex, 9 to 30 percent slopes
174	Irmulco-Tramway complex, 50 to 75 percent slopes
187	Ornbaum-Zeni complex, 9 to 30 percent slopes
188	Ornbaum-Zeni complex, 30 to 50 percent slopes
189	Ornbaum-Zeni complex, 50 to 75 percent slopes
190	Pardaloe-Woodin complex, 50 to 75 percent slopes
191	Pardaloe-Woodin-Casabonne complex, 30 to 50 percent slopes
205	Squawrock-Garcia-Witherell complex, 15 to 50 percent slopes
206	Squawrock-Garcia-Witherell complex, 50 to 75 percent slopes
207	Squawrock-Witherell complex, 15 to 50 percent slopes
224	Vandamme-Irmulco-Tramway complex, 50 to 75 percent slopes
231	Woodin-Yellowhound complex, 30 to 50 percent slopes
232	Woodin-Yellowhound complex, 50 to 75 percent slopes
235	Yellowhound-Kibesillah complex, 50 to 75 percent slopes
236	Yellowhound-Kibesillah-Ornbaum complex, 9 to 30 percent slopes
237	Yellowhound-Kibesillah-Ornbaum complex, 30 to 50 percent slopes
244	Yorkville-Yorktree-Squawrock complex, 15 to 30 percent slopes
245	Yorkville-Yorktree-Squawrock complex, 30 to 50 percent slopes