

SECTION IV

Cumulative Impact Assessment

Statutory and Regulatory Framework Discussion

Forest Practice Act and Forest Practice Rules

The Z'berg-Nejedly Forest Practice Act of 1973 (FPA) establishes a comprehensive system for regulating timber harvesting on private lands. (See Pub. Resources Code [PRC] § 4511 et seq.) This regulatory regime is implemented through the Forest Practice Rules (FPRs), developed and adopted by the State Board of Forestry and administered by CalFire. The FPRs impose detailed requirements that control all aspects of timber harvesting. The 2025 FPRs span nearly 400 pages. The FPA requires landowners to submit a THP prepared by a Registered Professional Forester (RPF) before harvesting. CalFire works with a multi-agency “Review Team” to evaluate, revise, and refine the THP. (See PRC §§ 4581-4583.5; 14 Cal. Code Regs. [CCR] §§ 1037- 1037.1) CDFW and the Regional Water Boards—the agencies with primary responsibility for protecting the State’s fish, wildlife and water resources—are Review Team members, as is the California Geological Survey (CGS), which scrutinizes THPs for slope stability (PRC § 4582.6; 14 CCR § 1037.3.). CalFire next circulates the THP for public comment along with rafts of supporting technical information. Its “Official Response” responds to the public comments and sets forth its decision on whether to approve or deny the THP. (See PRC §§ 4582.6-4582.7; 14 CCR §§ 1037.1, 1037.8.)

CalFire cannot approve a THP if “implementation of the plan as proposed would cause a violation of any requirement of an applicable water quality control plan adopted or approved by the State Water Resources Control Board.” (14 CCR § 898.2, subd. (h).) Nor can CalFire approve a THP if its implementation may result in “take” or cause significant harm to a listed species under state or federal law, e.g., the federal Endangered Species Act. The FPRs have an article that imposes requirements to ensure harvesting activities, road or landing construction, and other timber operations have no adverse effects on water quality, aquatic and riparian species, or riparian ecological functions, including from sediment and temperature. (See 14 CCR §§ 936-936.12 [Water Course and Lake Protection].) The designation of a watercourse class is dependent on the presence or potential presence of fish or the capability to support other aquatic life, or to transport sediment to fish-bearing waters. The Board of Forestry has continuously updated the FPRs to make them more protective of the environment. In 2009, it adopted the Anadromous Salmonid Protection (ASP) Rules (see 14 CCR § 936.9), and in 2014 adopted the “Road Rules,” a set of regulations to increase sediment control requirements. (See 14 CCR § 943 et seq.)

Cumulative Impacts Analysis under CEQA and the FPRs

The THP review and approval process is a certified regulatory program for the purposes of CEQA (PRC § 21080.5; 14 CCR. § 15251, subd. (a)), and a THP is deemed to comply with CEQA’s requirements for preparation of an EIR. (*Ebbetts Pass II*, supra, 43 Cal.4th at 943-44.) Although a THP differs from an EIR due to the prescriptive requirements of the FPRs, a THP still must include an evaluation of the project’s contribution to potential cumulative impacts. (See 14 CCR. §§ 898, 932.9; see also *East Bay Mun. Util. Dist. v. Dep’t of Forestry & Fire Prot.* (1996) 43 Cal.App.4th 1113, 1127 (*EBMUD*).) The FPRs require those impacts to “be assessed based upon the methodology described in Board Technical Rule Addendum Number 2 “Cumulative Impacts Assessment”] ... [and] be guided by standards of practicality and reasonableness.” (*Ebbetts Pass II*, supra, 43 Cal.4th at 944 [quoting 14 CCR § 898].) The FPRs limit the assessment “to closely related past, present and Reasonably Foreseeable Probable Future Projects within the same ownership and to matters of public record.” (14 CCR § 898.) CalFire must also “supplement the information provided by the . . . Plan submitter when necessary to ensure that all relevant

information is considered.” (Id.) “[CalFire], as lead agency, shall make the final determination regarding assessment sufficiency and the presence or absence of significant adverse Cumulative Impacts . . . based on a review of all sources of information provided and developed during review of the Plan.” (14 CCR § 932.9, Add. 2.) Technical Rule Addendum No. 2 (TRA 2) provides a comprehensive checklist that RPFs must follow for the cumulative impacts assessment. First, the THP must “establish and briefly describe the assessment area within or surrounding the Plan for each resource subject [to be assessed] and shall briefly explain the rationale for establishing the resource area.” (14 CCR § 932.9, Add. 2; see 14 CCR § 898.) The eight mandatory resource subjects to be evaluated range from Watershed to Biological to Greenhouse Gases to Wildfire Risk and Hazard. (14 CCR § 932.9, subd. (c).) The planning watershed maps distributed by CalFire must be used to evaluate impacts absent explicit approval by the Director. (14 CCR § 895.1 [defining “Planning Watershed”].) The THP must identify and briefly describe “past, present, and Reasonably Foreseeable Probable Future Projects,” and describe “any continuing significant adverse impacts from past land use activities within the assessment area(s) that may add to the impacts of the proposed project.” (14 CCR § 932.9.) Finally, the Appendix to TRA 2 provides extensive guidelines for the RPF’s evaluation of whether the THP will “cause or add to significant adverse Cumulative Impacts.”

STATE OF CALIFORNIA BOARD OF FORESTRY
CUMULATIVE IMPACTS ASSESSMENT

Introduction & Plan Overview

The Section THP is 167 acres, located adjacent to Gualala, CA, in the central portion of the Big Pepperwood Creek and Mouth of Gualala River CalWater Planning Watersheds. This watershed drains to the Pacific Ocean via the Gualala River. Big Pepperwood Creek and Mouth of Gualala River are ASP (Anadromous Salmonid Protection) Watersheds. The Gualala River Watershed is 303(d) listed for Aluminum, Temperature, and Sedimentation/Siltation Impairment. The Gualala River also has a TMDL (Sediment Total Maximum Daily Load) prepared initially in December 2001 and adopted by the North Coast Regional Water Quality Control Board in November 2004. The TMDL is being amended into the North Coast Regional Water Quality Control Board Basin Plan (Basin Plan) as the Clean Water Act requires.

The project footprint was previously harvested under THP#1-11-087 SON under a different ownership.

There are three mapped soil types within the project area, all of which classify as Coarse, and the textures range from sand to fine sandy loams. These soils' parent materials are generally sandstone, mudstone, and marine sediment. The San Andreas Fault is located near the THP.

There are two Northern Spotted Owl ACs within the Biological Assessment Area (BAA) located within 0.7 miles of the THP. One AC is to the east of the center north portion of the THP and the other is to the west of the north end of the THP. Other habitats exist within the BAA for listed species, and the THP includes measures to promote these habitats. There are no special habitat elements other than the adjacency of the Pacific Ocean and the proximity to the Gualala River. The Main Stem of the Gualala River is a vital feature to species within the BAA and is downstream of the project area.

Due to topography, distance, and densely forested conditions, none of the harvest areas are visible from CA Route 1, a designated Scenic Highway. There are no portions of this THP that are easily visible from the Gualala River.

The THP is expected to recoup carbon emissions and carbon lost from the harvest in 5 years. There is a moderate to high amount of fuel loading within and surrounding the project area, and the area has not been entered in any substantial way since THP 1-11-087 SON (other than routine road maintenance). Gualala is located to the west of the Plan Submitter's property. There are no residential properties proximal to the THP. Residential properties near Gualala Road may hear the faint sound of operations, but given the distance between the plan and those properties, the project will not have an adverse impact on the ambient noise levels within the hamlet of Gualala.

The Big Pepperwood Creek #1113.850201 and the Mouth of Gualala River #1113.850202 watersheds collectively make up the Watershed Assessment Area of this project. The conifer species present in the THP are coast redwood and Douglas-fir. The dominant hardwood species in the THP are red alder, and pepperwood. The watershed comprises a mix of small, non-industrial landowners, the community of Gualala, timberland owners, municipal water supplies, and recreational lands. As described below, this watershed sees routine timber harvesting. Gualala Redwood Timber, (plan submitter) owns a large portion of this watershed. Timber Harvest Plans (THP) and Nonindustrial Timber Management Plans (NTMP) have been filed on approximately 2,342 acres of the 11,837-acre watershed assessment area within the past ten years, or approximately 19% of the assessment area. Silviculture's were selected and approved in the THPs were intended to maintain and increase the production of conifer and provide for quality wildlife habitat. It is important to note that NTMPs are long-term planning documents and that timber harvesting may or may not occur. Within the planning watershed, 210 acres have been included within Notice of Timber Operations (NTO) within the last ten years.

When considering past projects (prior to the FPRs), there may be an existing continuing significant adverse impact in the WAA. Watershed Resources from past land use activities in regard to sediment effects. There is evidence of sediment within watercourses in the WAA due to past logging practices.

This analysis, along with the protection measures in the THP, and operational compliance with the THP and applicable Forest Practice Rules, supports the plan preparer's statement that after protection measures, the THP will not have a significant adverse impact on resource subjects.

14CCR 912.9 Cumulative Impacts Assessment Checklist

(1) Do the assessment area(s) of resources that may be affected by the proposed project contain any past, present, or reasonably foreseeable probable future projects?

Yes X No

If the answer is yes, identify the project(s) and affected resource subject(s).

Past, present and future projects are contained within the Watershed Assessment Area and Biological Assessment Area. Past projects include residential/commercial development, conversion of forests for residential/commercial construction, timber harvest, and other agriculture/grazing. Future projects within these larger assessment areas include ongoing timber harvesting and forest fire prevention work.

The past and present activities within the Watershed Assessment Areas have/are primarily timber harvesting, recreation, rural residential use, and past livestock grazing. In the past, both timber harvesting and livestock grazing activities have contributed to soil erosion and sedimentation. With the advent and use of the FPRs, timber harvest impacts have decreased over time. Most effects from timber harvest are apparent within the first few years and then taper off as revegetation occurs. Negative effects from timber harvest can also be ameliorated if some form of partial harvest or cable logging is employed but this is not always the case. The THP area comprises a small portion of the assessment area. The protection measures, as proposed in this THP, and the improvements that have already been made outside of the THP in the watershed shall reduce the impacts of the proposed THP to insignificance.

“Reasonably Foreseeable Probable Future Projects” is defined by the Forest Practice Regulations to mean: “projects with activities that may add to or lessen impact(s) of the proposed THP including but not limited to: 1) if the project is a THP on land which is controlled by the THP submitter, the THP is currently expected to commence within but not limited to, 5 years or, 2) if the project is a THP on land which is not under the control of the THP submitter the THP has been submitted or on-the-ground work including THP preparation has materially commenced, or 3) if the project is not a THP and a permit is required from a public agency, and the project is under environmental review by the public agency, or 4) if the project is one which is under taken by a public agency, the agency has made a public announcement of the intent to carry out the project.” The plan submitter anticipates another THP being submitted and operated on within the next five years. This additional plan area will be approximately 250 acres of Selection silviculture with a combination of tractor and cable yarding. The plan submitter is not aware of any additional THPs off-property that have been submitted or have on-the-ground work which has materially commenced. The plan submitter is not aware of any non-THP related permits within the WAA.

(2) Are there any continuing, significant adverse impacts from past land use activities that may add to the impacts of the proposed project?

Yes X No

If the answer is yes, identify the project(s) and affected resource subject(s).

Pre-harvest adverse cumulative watershed effects on the populations & habitat of anadromous salmonids have been considered. There are some continuing adverse effects from past timber operations, grazing, and agricultural practices. Some of the past damage is still contributing sediment to the stream systems. The significance of the ongoing impacts is difficult to quantify. The WAA has been impacted by historic logging activities before the 1973 Forest Practice Act. Pre-regulation logging activities have included tractor skidding of logs down watercourse channels, landing construction on unstable areas and creek bottoms, past cut/fill road construction practices without proper drainage installed, and tractor logging on slopes >65%. This resulted in sedimentation and accumulation of organic debris in the channels. Basic erosion control measures were not taken or minimally employed to prevent road and trail washouts and bank erosion.

Grazing also has impacted the watershed through soil compaction, road building, and the common burning practices of the past. These activities have affected the Watershed, Soil Productivity, and Biological Resource Subjects. As modern logging techniques are utilized, roads are being moved out of the stream zones and placed on ridges/midslope locations and tractor skidding is being used much less on steep terrain. These practices and the application of the best available science are

aiding in the recovery process of the WAA. Areas discovered during plan preparation that are causing erosion and are the product of past logging-related practices will be addressed in Section II. If areas not addressed in Section II are discovered during operations, these will be corrected where possible, either with amendments to the THP, on the ground actions or the 1600 permit process, depending on the problem and what the Forest Practice Rules require. Much corrective work has been performed throughout the watershed where stands have been re-entered since the 1973 Forest Practice Act. This work includes the installation of erosion control structures, upgrading of roads, correction of stream diversions, stabilization of fill material and slide areas and use of all-aged timber management, when appropriate, which leaves a significant stand post-harvest.

Additional erosion control measures will be implemented during the life of this project, including the installation and maintenance of erosion control structures and facilities on logging roads. These measures will further improve conditions and reduce the impacts from past timber harvesting projects. Some minor surface erosion from the most recently harvested areas is common but limited, as these areas are quick to re-vegetate and stabilize, following logging operations. Also, the protection measures incorporated into this THP will reduce, to insignificance, movement of soil and sediment into salmonid producing waters. These protection measures, along with ongoing improvements to the road system outside of the THP area, will reduce potential impacts from the proposed THP to insignificance, while positively reducing sediment in the watershed.

The Gualala River, which receives drainage from the watershed, is on the 303 (d) list of the Clean Water Act. Gualala River is listed as impaired from aluminum, sedimentation, and temperature. This plan will incorporate protection measures for sediment and temperature reduction. The Gualala River and its tributaries support habitat of Coho and Chinook salmon and steelhead trout, fisheries of concern in northern California. The 303(d) list describes water bodies that do not fully support all beneficial uses and are not meeting water quality objectives. It also describes the pollutants for each water body that impair beneficial uses and water quality. At the time of listing, sedimentation was judged to be associated, in part, with past management-related activities.

(3) Will the proposed project as presented, in combination with past, present, and reasonably foreseeable probable future projects identified in items (1) and (2) above, have a reasonable potential to cause or add to significant cumulative impacts in any of the following resource subjects?

	<u>Yes after mitigation (a)</u>	<u>No after mitigation (b)</u>	<u>No reasonably potential significant effects (c)</u>
A. Watershed			X
B. Soil Productivity	_____	_____	X
C. Biological	_____	_____	X
D. Recreation	_____	_____	X
E. Visual	_____	_____	X
F. Traffic	_____	_____	X
G. Greenhouse Gases (GHG)	_____	_____	X
H. Wildfire Risk & Hazard	_____	_____	X
I. Other	_____	_____	X

a) “Yes, after mitigation” means that potential significant adverse Cumulative Impacts are left after application of the Rules and mitigations or alternatives proposed by the Plan Submitter.

b) “No after mitigation” means that any potential for the proposed timber operation to cause or add to significant adverse impacts by itself or in combination with other projects has been reduced to insignificance or avoided by mitigation measures or alternatives proposed in the Plan and application of the Rules.

c) “No reasonable potential significant adverse impacts” means that the operations proposed under the THP do not have a reasonable potential to join with the impacts of any other project to cause, add to, or constitute significant adverse cumulative impacts.

NOTE: Guidance on evaluating Impacts to resource subjects are provided within the Appendix to Technical Rule Addendum No. 2.

(4) If column (1) is checked in (c) above describe why the expected Impacts cannot be feasibly mitigated or avoided and what mitigation measures or alternatives were considered to reach this determination. If column (2) is checked in (c) above describe what mitigation measures or alternatives have been selected which will substantially reduce or avoid reasonably potential significant adverse Cumulative Impacts.

CUMULATIVE IMPACTS ASSESSMENT

I. ASSESSMENT AREA DESCRIPTIONS

- A. Watershed: The proposed watershed assessment areas for this THP are the Big Pepperwood Creek (1113.850201) CALWATER planning watershed and the Mouth of Gualala River (1113.850202) CALWATER planning watershed. These planning watersheds run into the Pacific Ocean. The boundaries for the assessment area were chosen under the guidelines offered in Part A of the “Cumulative Impact Assessment Guidelines” under Technical Rule Addendum No. 2 so as to account for all effects from activities that could conceivably interact with effects from this THP to cause significant cumulative adverse impacts on the watershed assessment area. Only those activities within this assessment area could potentially combine with the activities proposed in this plan to affect watershed resources.
- B. Soil Productivity: The soil productivity assessment area is the THP area as suggested in the “Cumulative Impact Assessment Guidelines” under Technical Rule Addendum No. 2. The THP area is the logical assessment area as ground disturbance will be limited to the plan area and factors outside the area will not affect soil productivity.
- C. Biological Resources: The Biological Assessment Area is the same as the WAA but includes that area within 0.7 miles of the THP boundary, as this area is large enough to provide a representative sample of the different habitat types found in the vicinity of the proposed plan area. The proposed Biological Assessment Area is the same as that which

is defined in the Forest Practice Rules for assessment of potential impacts to the Northern Spotted Owl. The RPF believes that any potential adverse impacts to wildlife will be diminished beyond the Biological Assessment Area.

- D. Recreational Resources: The Recreation Assessment Area will be the THP area plus 300 feet as suggested in the “Cumulative Impacts Assessment Guidelines” under Technical Rule Addendum No. 2. This area has been chosen because the property is gated, and recreational access is limited to the owners and their guests.
- E. Visual Resources: The Visual Assessment Area is the logging area that is readily visible to significant numbers of people who are no further than three miles from the timber operations. This area has been chosen as per the “Cumulative Impacts Assessment Guidelines” under Technical Rule Addendum No. 2.
- F. Traffic Impacts: Timber will be hauled from this THP to sawmills in Sonoma and Mendocino Counties. Other destinations may be an option at future dates.
- G. Greenhouse Gases (GHG): The assessment area for Greenhouse Gases is the proposed THP area. The assessment boundary encompasses the area with the greatest potential carbon use and alterations to carbon sequestering vegetation.
- H. Wildfire Risk & Hazard: The Wildfire Risk and Hazard Assessment Area is the proposed THP area. The THP area is where harvesting activities will have the greatest influence on wildfire risk.

Rationale:

Modification to the vertical and horizontal distribution of forest fuels and the use of internal combustion tools or vehicles that can affect wildfire risk or hazard associated with the proposed timber operations is limited to the plan area. The assessment area includes the entire plan boundary plus 300 feet outside of the plan boundary. This allows for assessment of possible ignition sources and forest fuel loading not associated with the proposed project but could combine to produce a cumulative increase in wildfire risk and hazard.

- I. Other (Noise): The noise assessment area includes the area within 0.5 miles of the project boundary.

Rationale:

This is the greater of known distance for noise disturbance from timber operations for some listed wildlife species (FPRs, 14CCR 919.3(e)). For people, this distance should be equally acceptable.

A. Watershed Resources: Assessment

General WAA Description

Operations from this THP have the most potential to affect water quality within the *Big Pepperwood Creek and Mouth of Gualala River planning watersheds*, as the entirety of the THP acreage lies in these watersheds. The planning watershed includes a variety of topographic aspects, a variety of slope inclinations from steep to flat. There is a variety of soil types from very stable to

moderately unstable and are primarily sandstone derived soils. Watercourses within the THP range from Class I to Class III watercourses. There are no Class IV watercourses within the THP. Trees within the THP area range from 1-100 years and consist of a variety of different age classes. Canopy cover within the watershed assessment area varies throughout but generally consists of heavy canopy cover ranging from 80-100% in areas previously managed under uneven aged silviculture. The WAA includes a long stretch of the South Fork Gualala Rivers floodplains where there is a mosaic of heavy stocking of large redwoods creating 90-100% canopy closure, even in harvested areas, hardwood forests and grasslands. Even aged silviculture within the WAA resulted in relatively small openings with canopy covers ranging from 20-70% throughout the WAA. These openings are all at different stages of ingrowth, therefore older clearcut areas have a significant amount of young redwood creating low level canopy closure. Depending on the age of the stand and site class, evenaged stands may have a higher canopy closure than unevenaged stands. Conifer species include (in order of % composition) redwood and Douglas fir. Hardwood species include pepperwood, tanoak, and big leaf maple. A breakdown of the percentage of the watershed harvested by silviculture is also included in the THP history tables below.

Precipitation within the watersheds averages around 40 inches per year, which comes mainly in the form of rain. This area is exposed to coastal fog during the summer months. Fog provides plant available moisture to the redwood forests and reduces evaporation by providing cover from solar radiation. Due to the close proximity to the Pacific Ocean, summer high temperatures are much lower than temperatures just two miles farther east of the THP.

The last harvest entry into this THP area was under THP# 1-11-087 SON. The silviculture was a partial harvest, which is obvious given the standing inventory in place. Dominant trees have shown a significant increase in diameter growth. The RPF estimates that many of the largest individual trees have grown over one thousand board feet since this previous harvest.

Currently, Gualala Redwood Timber, LLC has six approved and active THPs (1-20-00144 SON, 1-21-00076 SON, 1-22-00042 SON, 1-23-00073 MEN, 1-23-00099 SON and 1-24-00103 MEN) within the WAA. Logging operations were completed on all of these THPs.

The following cumulative effects analysis references the following documents: The Gualala River Watershed Council (GRWC) Monitoring Plan Report 2000-2005 (GRWCMPR) and from the North Coast Watershed Assessment Program (NCWAP March 2003). The GRWCMPR is the most comprehensive analysis available and summarizes the data that has been collected as part of the Gualala River Watershed Monitoring Program Plan and includes a Quality Assurance Project Plan (QAPP) vetted by the California Department of Fish and Wildlife and the North Coast Regional Water Quality Control Board. It is part of the ongoing development of a Watershed Management and Enhancement Plan (WMEP) for the Gualala River Watershed. This monitoring plan was funded by grants from the State Water Resource Control Board (State WRCB) 319(h) program and the California Department of Fish and Game (CDFG) SB271 program.

The GRWCMPR and NCWAP reports were published in 2006 and 2003 respectively and contain the most comprehensive and scientifically valid information to date regarding existing conditions and how those conditions relate to past land use practices. NCWAP was developed through cooperative efforts with landowners, government agencies and public cooperators.

The Gualala River Watershed Technical Support Document (GRWTSD) prepared by the Water Quality Control Board in 2001, as supporting documentation for the TMDL analysis by the EPA, was also reviewed for this cumulative impacts analysis. The primary objective of the GRWTSD is to identify and quantify sources of sediment in a way that allows a relative comparison of those sources and to provide information for non-point source erosion control measure prioritization and implementation.

Additional references are THP reports prepared for GRT, and its predecessor, by fisheries experts, in particular a report by fisheries biologist Dennis Halligan of Natural Resources Management Corporation (Halligan 2000). Mr. Halligan's report contained valuable analysis of the available watershed information and some of his conclusions are included in this analysis. The archives at Department of Fish and Wildlife have previously been examined for information regarding the Gualala River and most of that information was summarized in the NCWAP report.

Watershed work and analysis is continually being conducted by the Gualala River Watershed Council (GRWC). The GRWC stream monitoring program revisits specific stream reaches on a periodic basis to evaluate trends in water temperature, stream channel characteristics such as depth, width, and thalweg, riparian shade cover, and presence and absence of anadromous salmonids. GRWC crews have been annually monitoring stream reaches since the two reports cited above were published in 2003. Gualala Redwood Timber, LLC. is continuing these monitoring programs on its property in the Gualala River Watershed.

The most comprehensive study to date, The North Coast Watershed Assessment Program (NCWAP), has been extensively reviewed and cited as a pertinent source of watershed conditions in this harvest plan's assessment area. As mentioned previously, additional information has been taken from reports written for previous harvest plans such as the report by consulting Fisheries Biologist Dennis Halligan of Natural Resources Management Corporation (Halligan 2000). Mr. Halligan's report contained valuable analysis of the available information and some of his conclusions are included in the following pages. The archives at the California Department of Fish and Wildlife have previously been examined for information regarding the Gualala River system and most of that information has also been included in the NCWAP report. Of unique value, was the white paper titled Flood Prone Area Considerations in the Coast Redwood Zone dated November 2005.

The Gualala River Watershed Technical Support Document (GRWTSD) prepared by the Water Quality Control Board as supporting documentation for the TMDL analysis by the EPA was also reviewed. The primary objective of the GRWTSD for sediment is to identify and quantify sources of sediment in a way that allows a relative comparison of those sources and to provide information for non-point source assessment, project planning, and implementation.

The North Coast Watershed Assessment Program (NCWAP) provides a description of the Mainstem-South Fork Gualala River Subbasin.

"The Gualala Mainstem/South Fork Subbasin (Gualala Hydrologic Subarea, Calwater 2.2a 113.85) contains 134 miles of "blue line" stream in its 63.7-square-mile watershed. The subbasin is composed of two Calwater 2.2a Super Planning Watersheds (SPWSs): Marshall Creek (113.8501, 45.2 square miles) and Lower South Fork Gualala River (113.8502, 18.5 square miles). The river system originates in the far southern end of the Gualala River Watershed and flows north along the San Andreas Fault to meet the North Fork Gualala. From that point to the ocean, the stream is considered the Gualala River mainstem (Figure 5.6-1). The Gualala River

estuary is within that part of the subbasin; however, it was parsed out as its own section (Section 5.1).

Nearly the entire subbasin is privately owned, with 15 acres of federal land and 38 acres of state land. Predominant land uses are timber production, grazing, and small vineyards.

A stream flow gage was installed in 2001 near the confluence with the Wheatfield Fork Gualala South Fork Gualala River above Wheatfield Fork near Annapolis. It is maintained by the California Department of Water Resources (DWR) and has been in operation since installation.”

The subbasin has been subject to three eras of intensive land use: (1) old growth redwood harvesting in the long narrow lower South Fork valley was initially harvested during the turn of the century, (2) tractor harvesting between 1942 to 1968, and (3) cable/tractor harvesting throughout the lower to central reaches in excess of 50 percent of the Big Pepperwood Creek and Mouth of Gualala River PWS between 1990 to present.

The NCWAP report is a significant amount of data collected and analyzed by qualified licensed professionals. NCWAP was published in March 2003 and contains the most comprehensive and scientifically valid information to date in regard to the existing conditions and how it relates to past land use practices. NCWAP was developed through cooperative efforts with Gualala Redwoods Inc., government agencies and public cooperators. The NCWAP report and executive summary were studied as part of this analysis. GRI and cooperators collected data that relates to the watersheds affected by this plan.

The following important points have been taken from the executive summary of the NCWAP report.

- 1) The Gualala River Watershed has improved from 1984 to 1999/2000, based on aerial photo interpretation of accumulations of sediment that were interpreted as indicative of channel disturbance. Specifically, since 1984 total erosion from upslope areas has not resulted in a net increase of sedimentation within the majority of the tributaries to a degree discernable in 1999/2000 aerial photos.
- 2) Pool habitat, escape and ambush shelter/cover, and water depth are unsuitable for salmonids in some mainstem and tributary stream reaches in the Gualala River Watershed. Large woody debris function in the channel is low throughout the watershed. Increasing the instream habitat complexity is the top recommendation category for all of the sub-basins.
- 3) Water temperatures are suitable in the smaller tributaries for which we had data. In contrast mainstem temperatures were in the unsuitable range in the majority of the sub-basins.
- 4) Gravel and substrate suitable for salmonids are limited in some streams and abundant in others.
- 5) Harvest of coastal redwood and Douglas-fir actively occurs today, but with substantially improved practices. While areas of the watershed experienced more improvement than others during this period, an overall trend towards improvement in the transport reaches was observed.

Also, according to NCWAP-

Based on the information available for the Gualala River Watershed, salmonid populations are currently being limited by:

- 1- General watershed-wide lack of instream habitat complexity;
- 2- Instream sediment conditions in some areas;
- 3- High summer water temperatures in the mainstems; and
- 4- Reduced watershed-wide coho salmon and steelhead trout populations over those observed in the 1960s.

What habitat improvement activities would most likely lead to more desirable conditions in a timely and cost-effective manner?

A restoration plan that targets the general areas identified below.

- 1- Reduce sediment delivery and deposition.
- 2- Improve riparian canopy density and diversity
- 3- Continue road assessments, storm proofing, improvements, and decommissioning.
- 4- Evaluate and address non-road sediment sources.
- 5- Add more large organic debris and shelter structures. (Pool depth and shelter consistently were limiting)
- 6- Protect high quality habitat from degradation.
- 7- Reduce livestock and feral pig entry.
- 8- Evaluate fish rescue activities.
- 9- Continuing in-channel characteristics and stream flow monitoring.
- 10- Expand aerial photo interpretation of channel characteristics.
- 11- Expand temperature monitoring into eastern portions of watershed.

Historically, the Big Pepperwood Creek and Mouth of Gualala River watersheds were logged for old growth at the turn of the last century, and it was not until after the depression that the middle to upper watershed areas were entered. These areas which are mostly upstream of the watershed which is the focus of this analysis were heavily impacted in the period between 1952 and 1968 according to aerial photo analysis by NCWAP. Road construction was intense and heavily impacted the watercourses since roads were built close to watercourses and often destabilized the adjacent steep slopes.

Because of the geology of the area the landslide potential is high and this intense period of harvesting and road building over a short period of time created numerous failures that reached the watercourses, particularly in the middle and upper watershed drainages. Canopy closure on all watersheds was significantly reduced, affecting stream temperatures and it has taken several decades for streamside canopy to recover.

After a period of relative inactivity in the 70s and 80s lighter entries occurred in the 90s removing residuals that were left from the original stands. In the Big Pepperwood Creek and Mouth of Gualala River watersheds, the history of earlier logging has resulted in stands that are approximately 90 to 110 years old while in the middle and upper reaches of the Gualala River Basin the stands are now around 60 years old. Canopy closure has slowly improved, sediment has slowly flushed through the system and old roads have slowly revegetated, been improved, or been abandoned. In the mid 2000's NCWQCB asked that GRT's predecessor GRI to limit activities in

these watersheds to allow for further improvement in conditions and as a result of this informal agreement very little activity has taken place in this watershed in the last decade or more.

Along the Gualala River there are extensive alluvial terrace deposits that are covered with second growth redwood forest. These alluvial flats function as a buffer between the steeper upslope areas, from which sediment is migrating, and the major watercourses. Sediment that is carried from transport reaches steep Class I, II and III watercourses at the headwaters of the watershed units drop out of suspension as they cross the lower gradient storage reaches that occur adjacent to the river. Also, Class III watercourses that feed directly into the alluvial flats disappear into the sandy soil without contributing their sediment load directly to higher order watercourses. Numerous low spots within the flats along these watercourses also function as sediment catch basins when the watercourses periodically overflow their banks. The side slopes are vegetated with redwood, Douglas-fir, tan oak, madrone, and several other hardwood species in small amounts.

The South Fork of the Gualala follows the San Andreas Fault in a 100-200-foot-wide aggraded alluvial channel with less than 1% gradient. The summer low flow wetted channel is approximately 25 feet wide. The substrate is composed exclusively of small gravel and sand. The stream banks are 10-30 feet high and have a 50% slope prior to transitioning onto the terrace. The riparian zone is composed of densely spaced 2nd growth redwoods in the 12-to-40-inch dbh size classes but larger redwood up to 70 inch diameter are present. Due to channel width, the effective shade canopy is low even though the adjacent forest can be as high as 180 feet. Lack of bank erosion and evidence from historic aerial photography indicates little or no active channel migration. The narrow-wetted channel does meander within the wider channel zone but appears to be amazingly consistent in its location over the last forty years.

The North Fork of the Gualala follows the San Andreas Fault and is relatively narrow (25-50' aggraded alluvial channel with less than 3% gradient. The summer low flow wetted channel is approximately 10 feet wide. The substrate is composed exclusively of small gravel and sand. The stream banks are 5-20 feet high and have a 50% slope prior to transitioning onto the terrace. The riparian zone is composed of densely spaced 2nd growth redwoods in the 12-to-40-inch dbh size classes. Due to channel width, the effective shade canopy is relatively high. There is presence of bank erosion from this highly sinuous watercourse. Historical aerial photography indicates little or no active channel migration. The narrow-wetted channel does meander within the wider channel zone but appears to be amazingly consistent in its location over the last forty years.

The floodplains within the Big Pepperwood Creek and Mouth of Gualala River watersheds are sediment deposition areas, not source areas. GRT has documented an increase in floodplain elevation between 1953 and 1986 of approximately 3.5 feet in some parts of the flood prone areas adjacent to the Gualala River.

The watershed resources that are affected by potential adverse impacts of this project are the beneficial uses of water in the Gualala River which are designated in the Water Quality Control Plan for the North Coast Region (Section 2, Table 2-1) as: municipal supply and domestic supply, agricultural supply, industrial service supply, industrial process supply, groundwater recharge, freshwater replenishment, navigation, hydropower generation, water contact recreation, non-water contact recreation, commercial and sport fishing, warm freshwater habitat, cold freshwater habitat, wildlife habitat, rare, threatened, or endangered species, migration of aquatic organisms, spawning, estuarine habitat, aquaculture, and subsistence fishing. The following table indicates estimated cubic feet per second (cfs) diversions during the year from the entire Gualala River Watershed as determined by the Gualala River Watershed Technical Support Document (GRWTSD) prepared by the Water Quality Control Board (2001).

Estimated Water Uses in the Gualala River Watershed

Water Use Estimated Maximum

User	Withdrawal Rate (cfs)
SWRCB appropriative rights	8
Vineyards—irrigation and frost	27-100
Rural Residential	2.5
North Gualala Water Company	2
Sea Ranch	2.8
Potential total diversion amount	42.3 – 115.3

1. Watershed Effects

a. Sediment Effects:

Sediment-induced cumulative watershed effects occur when earthen materials, transported by surface or mass wasting erosion, enter a watercourse system at separate locations and are then combined at a downstream location to produce a change in water quality or channel condition. The WAA lies within the greater Gualala River Watershed which is listed as 303(d) for Aluminum, Temperature and Sedimentation/Siltation Impairment. Within the Big Pepperwood Creek and Mouth of Gualala River Planning Watersheds, primary historical and present activities include the development of the town of Gualala, road and watercourse crossing construction, timber harvesting, milling and lumber production, agricultural production, water and sewage treatment, livestock grazing, wildland burning, residential building and subdivisions, and recreation. Amongst these activities, the primary drivers of increased sedimentation to downstream resources include road building, deferred road maintenance, road failures, natural erosion processes, flooding of the Gualala River and agricultural operations upslope and directly adjacent to watercourses. Increased sediment is primarily responsible for pool filling and gravel embeddedness resulting in a decrease in available habitat for spawning and rearing salmonids. Increased sediment also can contribute to increased temperature due to pool filling.

Within both the WAA and the project area, logging conducted in the 1850s to the 1960s placed an enormous amount of sediment and large woody debris (LWD) within the watercourses. LWD was buried in the deposited sediment. The morphology of the channels were also altered through widening and flattening. The Gualala River Watershed experienced intensive harvest activity beginning with oxen logging to the turn of the 20th Century. Use of steam donkeys and railroad logging followed this era and use of watercourse channels continued to be used as logging roads, skid trails, oxen trails, and railroad access. The watercourses are now showing some evidence of down cutting through the sediment and buried LWD is emerging. Where the watercourses have

cut through the sediment, steepened banks exist. The sediment in the over steepened banks is being slowly released into the streams during high flow events. Tractor logging and logging truck use began in the 1940s in the Gualala area.

The California Coastal Commission established the Coastal Commission Zone in 1972 and established Special Treatment Areas. None of this plan is within the Coastal Commission Special Treatment Areas.

Effects of past activities can be seen today in areas within the WAA, where sediment was once delivered to the watercourse in mass wasting, skid trails, and watercourse crossings.

The landowner is involved in an ongoing project to evaluate and rehabilitate their entire road system to offset any sediment impacts that result from their timber harvesting activities. GRI/GRT has improved 55% of their road system at their own cost of \$4,000,000 not including grant money. It is estimated that this has prevented at least 300,000 cubic yards of sediment from being delivered into watercourses through work completed on company lands in the Gualala River Watershed from the period 2003 to 2023. The average cost of road upgrading has been \$17,900 per mile. GRT has a goal of assessing their remaining road system over the next ten years and upgrading all roads to a storm-proofed condition over the next twenty years as money is available. In addition, roads are inspected annually and most road erosion sites that develop during the winter that are found and are accessible are repaired immediately so that small problems do not develop into big problems. Under miscellaneous addendums in Section V is a listing of "Completed Road Work" projects for each watershed. In these "Completed Road Work" addendums "Yards Stabilized" were only provided if a qualified person addressed the site, and many of the stabilization sites were repaired but actual quantitative sediment savings has not or is yet to be documented.

Sediment Effects Baseline Conditions

The WAA and THP area contain the following baseline conditions regarding sediment effects. Effects of past activities can be seen today within the WAA, where sediment was once delivered to the watercourse in mass wasting, skid trails, and watercourse crossings, however these effects are seen on a minimal scale within and downstream of the project area:

Roads – The existing road network within the project area contains primarily upslope seasonal roads with rolling dips, culverted crossings, and rocked crossings. These roads were likely built during historic logging operations. Roads within the plan area receive high amounts of water in the winter and spring months due to a higher water table. Despite this, the roads within the project area and WAA generally have sufficient drainage facility and there are no major issues related to road drainage. Where road work was deemed necessary a description of the issue and proposed treatments is included at the end of Sec. II of the THP. There is a high density of roads adjacent to the project area, however many of them are on gentle or flat slopes and have minimal maintenance issues.

Yarding – The entire THP area was previously logged using ground-based equipment, Therefore, there is an existing network of skid trails, the majority of which are stable and in good condition. There are historic skid trails located within WLPZs of Class I and II watercourses and in some cases across watercourse channels, the RPF is proposing to reuse segments of these skid trails. The WLPZ skid trails proposed for reuse have been inspected by the RPF and have been observed to be in good condition, Sec II, Item 27 describes the proposed soil stabilization measures should these trails be utilized. This proposed skid trails and crossing are located on flat terrain area and scheduled for treatment following use, all to avoid sediment delivery into associated watercourses.

Waterbarring of existing skid trails is fairly consistent with modern day FPRs as much of the area has been entered since the year 1991. The existing network of skid trails are all within Moderate Erosion Hazard Rating areas. The initial harvest of the WAA and subsequent entries prior to the FPRs resulted in many skid trails constructed in line with the drainages of watercourses. Although these trails have not been used in any recent past projects due to the enforcement of the FPRs, the effects within the watershed are still present as watercourses continue to find their way back to their original and natural course. This resulted in filling of channels and pools, aggradation, and requires downcutting, and bank cutting to flush the perched sediment.

Sediment Effects- Past Activities

The assessment area (WAA) has a long history of human habitation. The main activities that may have contributed to past adverse impacts of the Watershed Assessment Area, specifically to sediment effects, are the development of the town of Gualala, road and watercourse crossing construction, timber harvesting, milling and lumber production, agricultural production, livestock grazing, wildland burning, residential building. Logging practices occurring prior to the Forest Practice Act likely impacted the entire Gualala River watershed, including the THP area; effects of these activities are present within the project area. Past logging practices consisted primarily of oxen logging, steam donkey logging, and finally tractor logging. All practices contributed sediment into stream channels. Activities in the last 10 years have been limited to road maintenance within the project area. Additional recent past activities include power line and highway maintenance.

Wildland Burning: Early landowners appear to have burned the slopes periodically following the initial logging to enhance livestock carrying capacity. The wildland burning, which occurred from before the turn of the century until the early 1950s, had a definite negative impact on the beneficial uses of water across the assessment area. Annual burning was conducted to increase the amount of grazing habitat and improve the quality of the grazing habitat. Burning during this period was also used in conjunction with clear cutting in the watershed assessment area. This burning reduced protective ground cover exposing large areas of soil to increased erosion potential. Conifer shade canopy along the watercourses of the assessment area must have been reduced as a result of repeated burning, thus leading to higher summer water temperatures. Reduced canopy levels across the timbered portions of the assessment area would have resulted in reduced water use by vegetation and a potential for increased peak flows. The removal of canopy cover on a large scale followed by wildland burning and therefore the removal of organic material and root strength increases the amount of runoff, mass wasting and rain drop impact which led to excessive sedimentation.

The practice of broadcast control burning may still be practiced within the watershed to a certain degree to control fuel loads and vegetative cover and for site preparation activities. Fires are usually set in early winter when burning conditions are suitable for low intensity-controlled burns. Wildland burning, however, is not conducted on the same scale as it was in the past and is not used to increase grazing habitat.

- Agriculture/Grazing: The watershed assessment area has a long history of agricultural use. Farming and livestock grazing were major uses in the past and continue today. Homesteads existed where permanent water, natural open areas and level ground allowed for subsistence farming. Predation by coyotes and other predators has made this uneconomic land use. Past grazing by livestock resulted in the destruction of streamside vegetation and minor gully erosion along trails. These impacts will likely be limited as the amount of grazing has been diminished.
- Town, Residential, and Industrial Development: The human population levels of the area have steadily increased over time. The development of the town of Gualala began in the 1860s as a mill town. During this time and decades after, the town supported the workers and families of the logging and mill industries. In the more recent past, the town supports residential citizens, landowners, travelers, and tourism. With the development of The Sea Ranch in the 1960s and the construction of California State Route 1, the WAA has seen a steady increase in visitors and residential building and development. Currently there are many residences located throughout the watershed mainly located on semi-rural land (neighborhoods nestled into undeveloped areas) near the ocean and clustered around the town of Gualala. The eastern part of the WAA is mountainous and forested, with significantly less development than the west side, is primarily under the control of the plan submitter and non-industrial landowners. Located adjacent to the THP is the Gualala Lumber Co. Mill site. Whenever there is human activity, there is potential for adverse effects on the environment. Human population growth affects all resources, either directly or indirectly, and increased pressure upon rural settings is a manifestation of those impacts. Accelerated erosion can occur from access roads and home sites through the diversion of natural watercourse patterns. Chemical and biological pollutants can enter waterways from septic systems, gardens, and roads. The increasing human population reduces the inventory of productive soils and disrupts wildlife. It reduces wildland recreational opportunities and disrupts the visual resources. The county/state controls almost all land use activities with regulations designed to prevent significant adverse impacts.
- Road Building: Road building is associated with all the other past land uses discussed here. The sedimentation of watercourses from far past projects (before the FPRs) is perhaps the greatest past and continuing impact within the watershed and a major contributing factor to that would be the construction and use of forest and ranch roads. Several sources including the Handbook for Forest and Ranch Roads (Weaver, Weppner and Hagans, 2015) and the Klamath Resource Information System (KRIS) indicate that road failures can contribute both fine and coarse sediment to streams, and accumulated road failures in large storm events can have catastrophic effects, such as filling in pools and reducing habitat complexity. Studies cited within KRIS show that roads can contribute 50 to 80% of the sediment that enters streams and the amount of sediment delivered from forests with roads can be more than 300 times greater than from undisturbed forest land. Roads on ranch lands and those leading to rural and suburban parcels also contribute to sediment problems in a watershed. Surface erosion from roads can produce chronic sources of fine sediment, which can diminish salmon and steelhead spawning success. Roads constructed next to streams are chronic contributors of fine sediment, particularly if they are used in winter months. Winter logging on seasonal road exacerbates this problem because the truck wheels pump fines from within the roadbed to the surface. Fine sediment from roads that enter streams fills interstitial spaces in gravel streambeds, reducing survival of salmon and steelhead eggs and aquatic insects.

Road construction in the past was not subjected to the same regulatory scrutiny and resources such as the Handbook for Forest and Ranch Roads were not available to private landowners. State and county roads next to watercourses are there because of historic uses associated with livestock watering needs and gentle gradients. Roads for timber harvest were constructed within and next to streams and were commonly used during wet winter periods. There are historic logging roads within the WAA that are located within the floodplain of the Gualala River, within the ownership of the Plan submitter. These roads have been in good condition for decades and are actively maintained by the landowner. Mid-slope road construction from early logging altered drainage patterns of the watershed assessment area and proper watercourse crossings were not installed. This likely caused sediment impacts and were addressed as necessary, but proper upgrades were not installed until more recent timber harvest plans (last 30 years). Much of the property has been addressed in the recent past and has been monitored and maintained for multiple decades without major failure or sediment delivery. Recognition of road and erosion problems in the Gualala River watershed has led to many road improvement and erosion control projects in recent years. There are, however, some small landowners that continue to use road systems during wet periods and who conduct little or no upgrades to their road systems.

- Timber Harvesting: Before the implementation of the Forest Practice Act of 1973, historic logging activities, in general, did not take into consideration hydrology, erosion, mass wasting, or the watercourse protection issues that forest harvesting focuses on today. Although there is evidence of this within watercourse channels and WLPZ's through filled in channels, widened valleys and skid trails, these effects are older and weathered since many of these facilities have not been used in multiple past projects. The facilities that have been recently reused in multiple entries are upslope, mostly on gentle flat ground with little construction, and have intact waterbars at appropriate spacing. The last harvest entry on the THP area was in 2011. This project used ground-based methods for the removal of timber. Initial skid trail patterns that feed landings and roads were not always designed with watercourses or the watershed in mind, rather they used the topography of the landscape to their advantage, no matter the impact. This proposed THP will only use skid trails that were pre-flagged by the RPF and are in locations with little to no impact on watercourses.

In the historic past, roads and skid trails were constructed either directly in or adjacent to watercourses resulting in sedimentation of the watercourses and reduction of shade canopy. Large increases in large woody debris and increased sediment inputs resulted in the storage of large amounts of sediment. As the woody debris begins to decay, stored sediment is moving through the watershed. Furthermore, lack of adequate erosion control on skid trails, roads and watercourse crossings resulted in the deposition of sediment and organic debris into the watercourse channels. Overall impacts from past timber management, however, appear to have been beneficial. The land remains forested with various levels of regeneration dependent upon location. Incidental adverse impacts to watershed resources are more likely associated with past skidding patterns, road maintenance or primary log transport using watercourses rather than harvesting per se. After the FPRs, all past projects in the WAA did not use the skid trails that are directly located inside of major watercourse drainages, therefore these streams are still recovering from the initial and pre-FPR harvests and yarding methods.

Sediment Effects-Quantitative Analysis of Past Projects – 10 Year

A query of Calfire-GIS THP and NTMP/NTO data has indicated there has been regular approval of Timber Harvests (THPs and NTMPs) within the assessment area during the past 10 years. See WAA and BAA harvest history maps at the end of this section for an indication of silvicultural category, location within the watershed, and THP and NTMP number. Approximately 20% of the watershed assessment area has had timber harvest activity within the last 10 years.

Big Pepperwood Creek Watershed Assessment Area (WAA)

THP Number	Legal Description	Acres in WAA	Silvicultures	Plan Status
1-15-042-SON	Portions of Sections 25, 26, 27 & 36 T11N R15W. Portions of Sections 30 & 31 T11N R14W	176	Selection, No Harvest	Approved
1-17-104-SON	Portions of Section 30 & 31 T11N R14W	199	Clearcut, Shelterwood Removal, Selection	Approved
1-19-00050-MEN	Portions of Section 27 T11N R15W	10	Selection	Approved
1-19-00197-MEN	Portions of Sections 18 & 19 T11N R14W	2	Variable Retention, Transition	Approved
1-20-00003-SON	Portions of Section 29 T11N R14W	2	Clearcut	Approved
1-22-00042-SON	Portions of Section 31 T11N R14W	40	Group Selection	Approved
1-22-00043-SON	Portions of Section 31 T11N R14W	7	Selection	Approved
1-23-00073-MEN	Portions of Sections 17, 18, 19 & 20 T11N R14W	301	Variable Retention, Selection	Approved
1-23-00099-SON	Portions of Sections 25, 26, 35 & 36 T11N R15W	165	Selection	Approved
1-24-00103-MEN	Portions of Sections 22, 23, 26 & 27 T11N R15W	163	Selection, Special Treatment Area Prescription, No Harvest	Approved

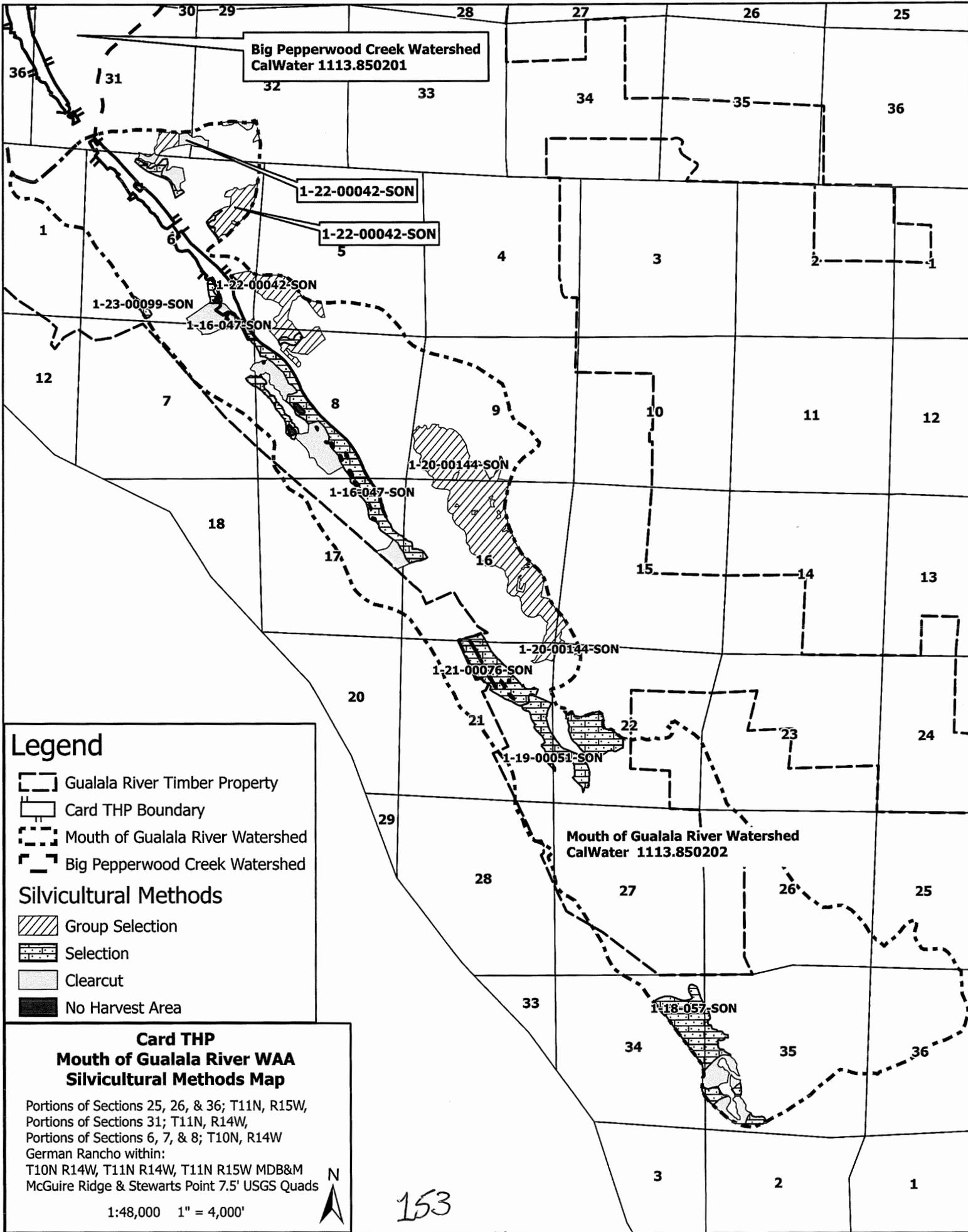
NTMP Number	Legal Description	Acres in WAA	Silvicultures	Plan Status
1-08NTMP-009-MEN	Portions of Sections 22 & 27 T11N R15W	80	Group Selection	Approved

Mouth of Gualala River Watershed Assessment Area (WAA)

THP Number	Legal Description	Acres in WAA	Silvicultures	Plan Status
1-15-033-SON	Portions of Sections 8, 16, 17 & 21 T10N R14W	121	Clearcut, Selection, No Harvest	Approved
1-15-042-SON	Portions of Sections 8, 16, 17, 21, 22, 27 and German Land Grant T10N R14W	108	Selection, No Harvest	Approved
1-16-047-SON	German Land Grant	199	Selection, Clearcut, No Harvest	Approved
1-17-049-SON	German Land Grant	1	Selection	Approved
1-18-057-SON	German Land Grant	108	Clearcut, Selection	Approved
1-18-082-SON	German Land Grant	1	Group Selection	Approved
1-19-00051-SON	Portions of Section 22 and German Land Grant T10N R14W	81	Selection	Approved
1-20-00144-SON	Portions of Sections 9, 16, 21 & 22 T10N R14W	245	Group Selection	Approved
1-21-00076-SON	German Land Grant	53	Selection	Approved
1-22-00042-SON	Portions of Sections 5, 6, 8, 31 & 32 T10N R14W	150	Clearcut, Selection, Group Selection	Approved

NTMP Number	Legal Description	Acres in WAA	Silvicultures	Plan Status
1-01NTMP-008-SON	German Land Grant	2	Group Selection	Approved
1-01NTMP-048-SON	Portions of Section 23 & 26 T10N R14W	48	Group Selection	Approved
1-05NTMP-013-SON	Portions of Section 5, 8 & 9 T10N R14W	80	Group Selection	Approved

*These acreages represent approximate plan acreages within the Watershed Assessment Area (WAA), and not total THP acreages. This information is supplied by CalFire through their online database. The WAA map displaying the ten-year harvest history can be found at the end of Section IV of this THP.



Big Pepperwood Creek Watershed
CalWater 1113.850201

1-22-00042-SON

1-22-00042-SON

1-22-00042-SON

1-23-00099-SON

1-16-047-SON

1-20-00144-SON

1-16-047-SON

1-20-00144-SON

1-21-00076-SON

1-19-00051-SON

Mouth of Gualala River Watershed
CalWater 1113.850202

1-18-057-SON

Legend

- Gualala River Timber Property
- Card THP Boundary
- Mouth of Gualala River Watershed
- Big Pepperwood Creek Watershed

Silvicultural Methods

- Group Selection
- Selection
- Clearcut
- No Harvest Area

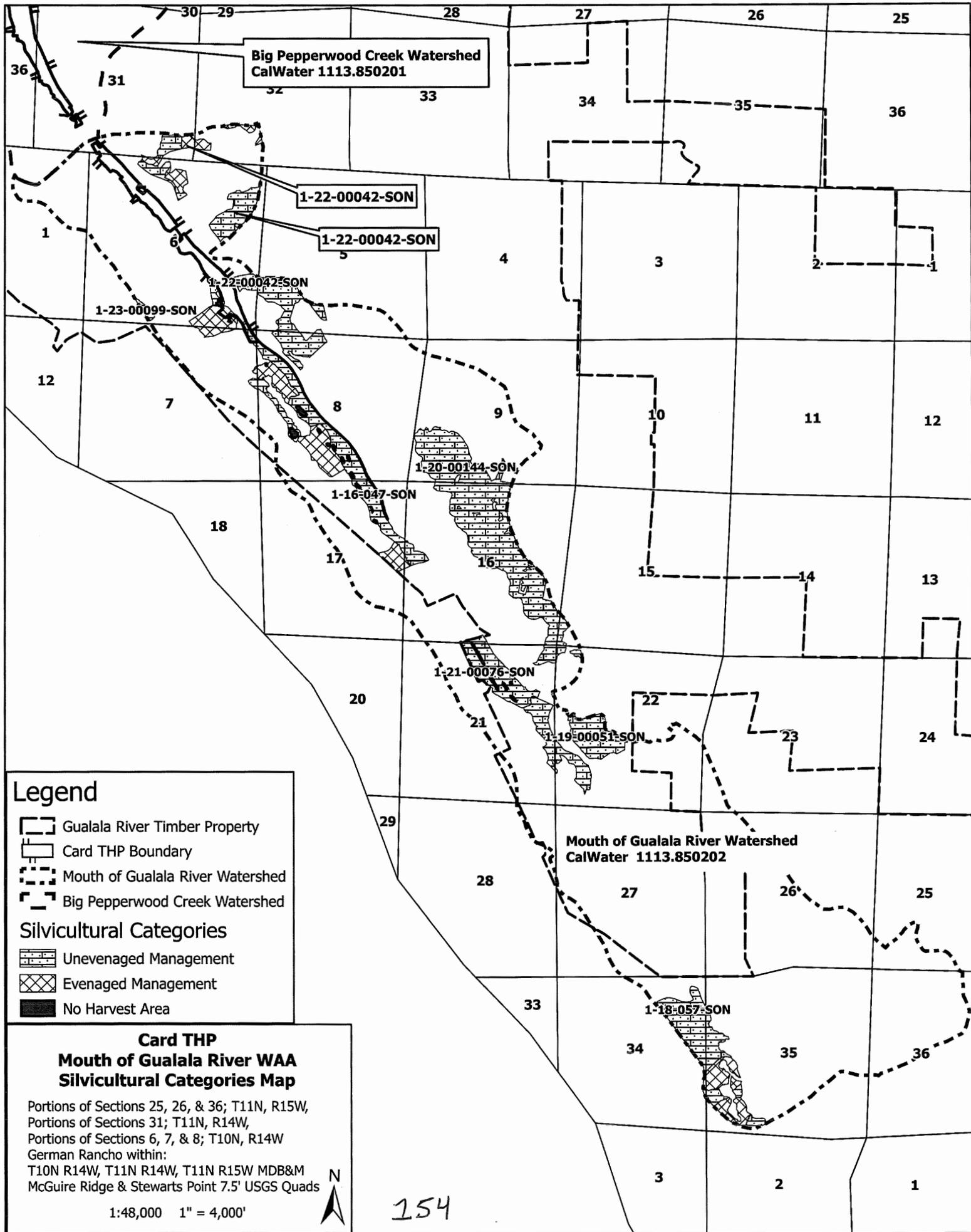
**Card THP
Mouth of Gualala River WAA
Silvicultural Methods Map**

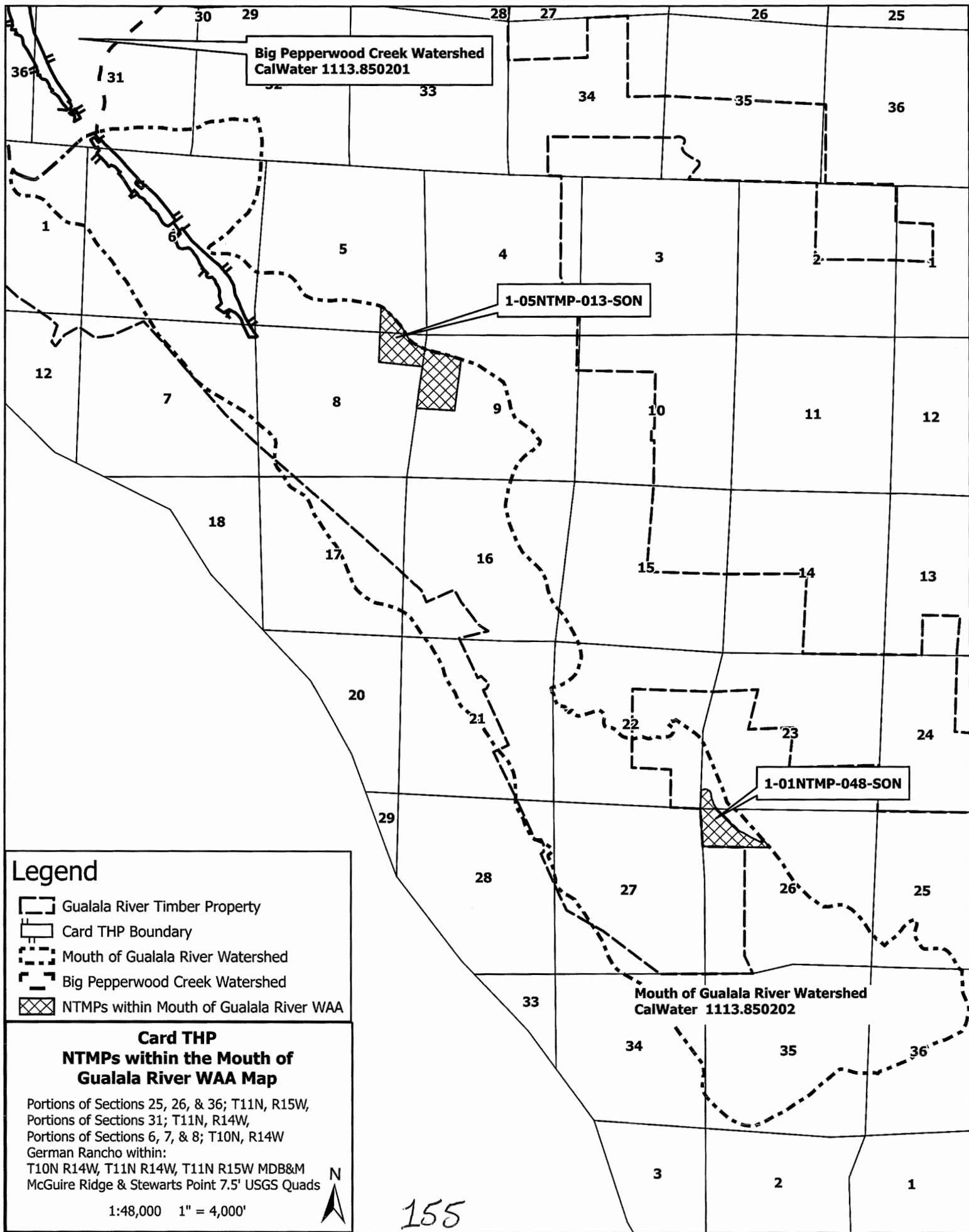
Portions of Sections 25, 26, & 36; T11N, R15W,
Portions of Sections 31; T11N, R14W,
Portions of Sections 6, 7, & 8; T10N, R14W
German Rancho within:
T10N R14W, T11N R14W, T11N R15W MDB&M
McGuire Ridge & Stewarts Point 7.5' USGS Quads

1:48,000 1" = 4,000'



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Big Pepperwood Creek Watershed
CalWater 1113.850201

1-05NTMP-013-SON

1-01NTMP-048-SON

Mouth of Gualala River Watershed
CalWater 1113.850202

Legend

- Gualala River Timber Property
- Card THP Boundary
- Mouth of Gualala River Watershed
- Big Pepperwood Creek Watershed
- NTMPs within Mouth of Gualala River WAA

**Card THP
NTMPs within the Mouth of
Gualala River WAA Map**

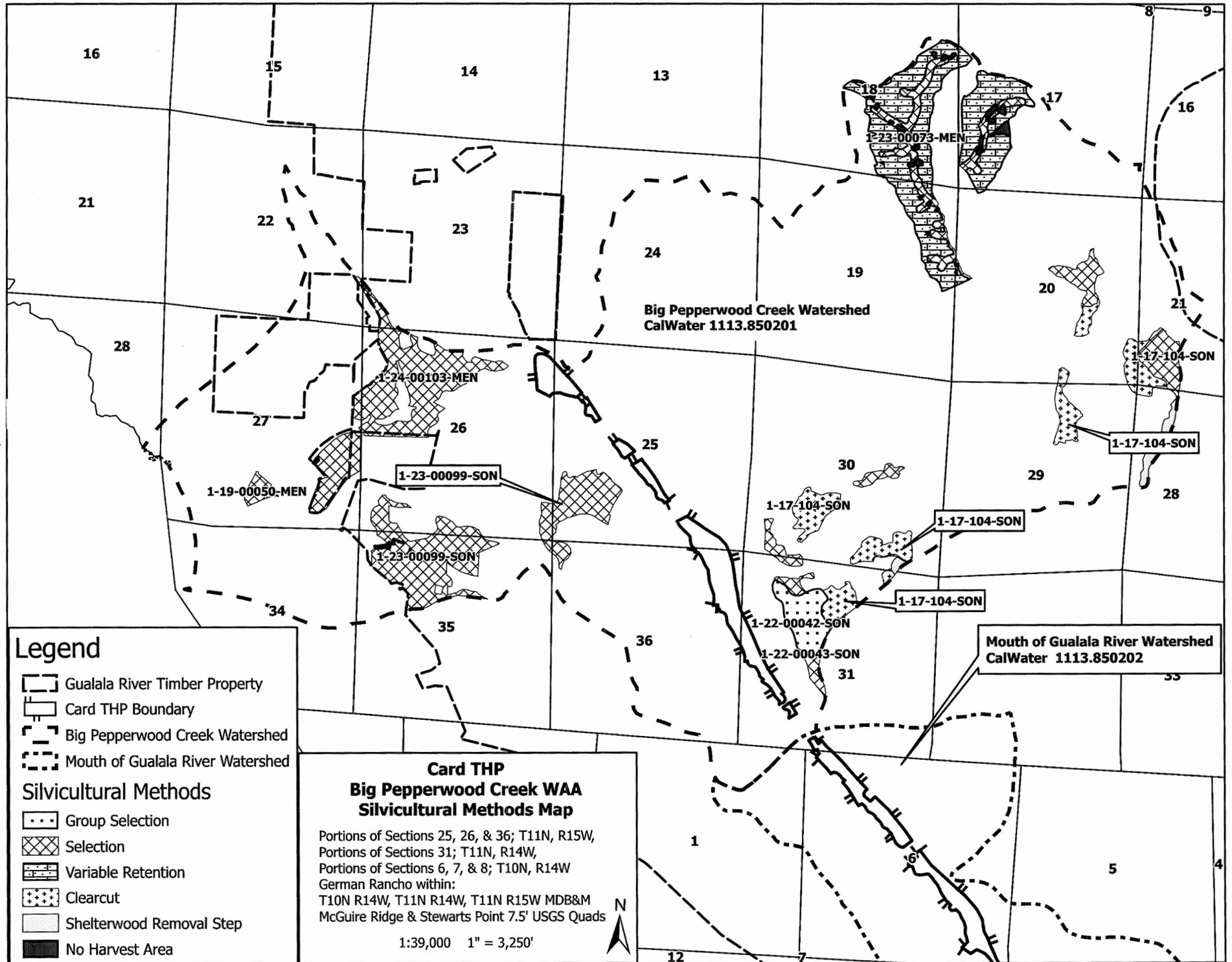
Portions of Sections 25, 26, & 36; T11N, R15W,
Portions of Sections 31; T11N, R14W,
Portions of Sections 6, 7, & 8; T10N, R14W
German Rancho within:
T10N R14W, T11N R14W, T11N R15W MDB&M
McGuire Ridge & Stewarts Point 7.5' USGS Quads

1:48,000 1" = 4,000'



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Legend

- Gualala River Timber Property
- Card THP Boundary
- Big Pepperwood Creek Watershed
- Mouth of Gualala River Watershed

Silvicultural Methods

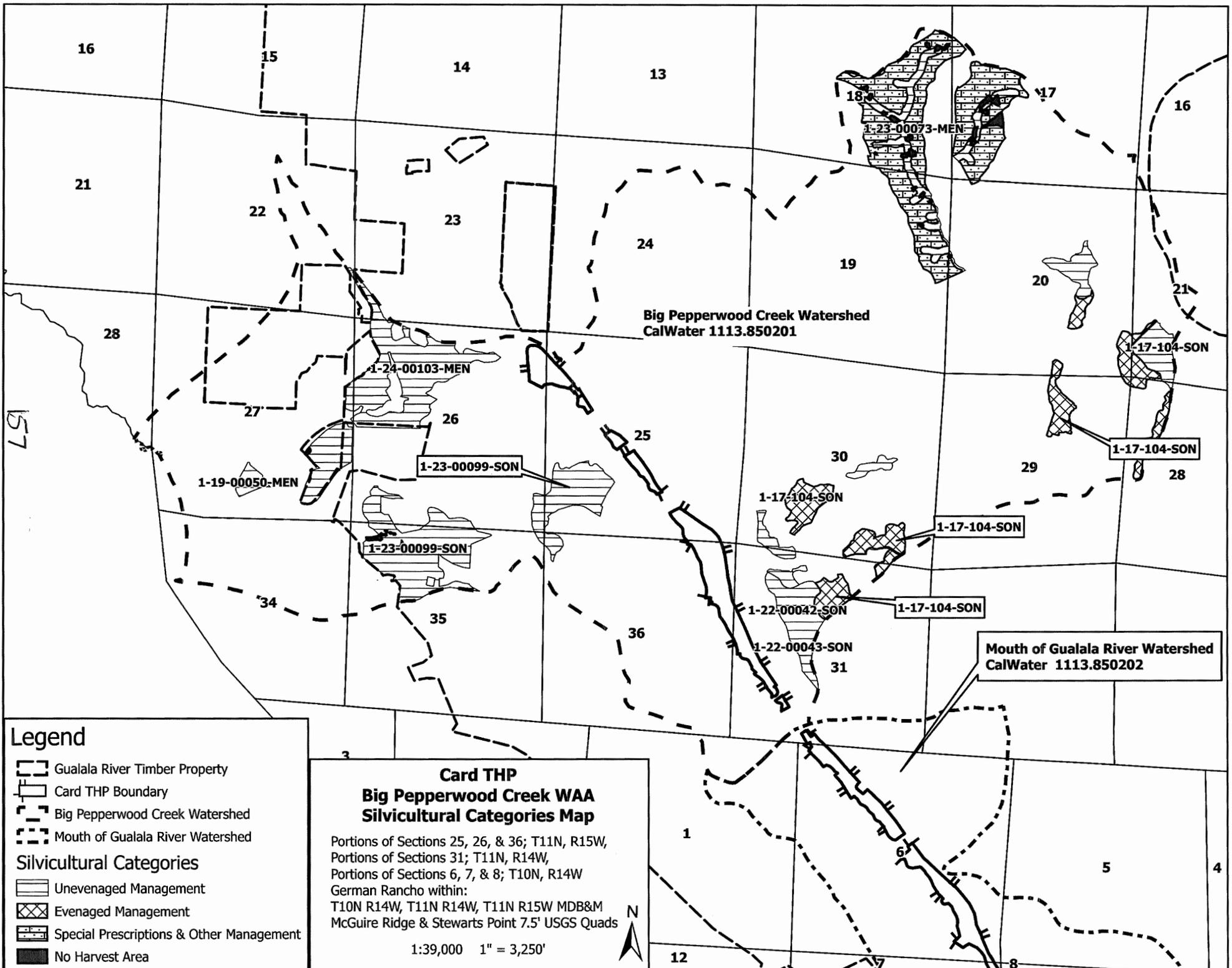
- Group Selection
- Selection
- Variable Retention
- Clearcut
- Shelterwood Removal Step
- No Harvest Area

Card THP
Big Pepperwood Creek WAA
Silvicultural Methods Map

Portions of Sections 25, 26, & 36; T11N, R15W,
 Portions of Sections 31; T11N, R14W,
 Portions of Sections 6, 7, & 8; T10N, R14W
 German Rancho within:
 T10N R14W, T11N R14W, T11N R15W MDB&M
 McGuire Ridge & Stewarts Point 7.5' USGS Quads

1:39,000 1" = 3,250'





Legend

- Gualala River Timber Property
- Card THP Boundary
- Big Pepperwood Creek Watershed
- Mouth of Gualala River Watershed

Silvicultural Categories

- Unevenaged Management
- Evenaged Management
- Special Prescriptions & Other Management
- No Harvest Area

Card THP
Big Pepperwood Creek WAA
Silvicultural Categories Map

Portions of Sections 25, 26, & 36; T11N, R15W,
 Portions of Sections 31; T11N, R14W,
 Portions of Sections 6, 7, & 8; T10N, R14W
 German Rancho within:
 T10N R14W, T11N R14W, T11N R15W MDB&M
 McGuire Ridge & Stewarts Point 7.5' USGS Quads

1:39,000 1" = 3,250'



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1-19-00050-MEN

1-23-00099-SON

1-23-00099-SON

1-17-104-SON

1-17-104-SON

1-22-00042-SON

1-17-104-SON

1-22-00043-SON

Mouth of Gualala River Watershed
CalWater 1113.850202

Big Pepperwood Creek Watershed
CalWater 1113.850201

1-23-00073-MEN

1-24-00103-MEN

1-17-104-SON

1-17-104-SON

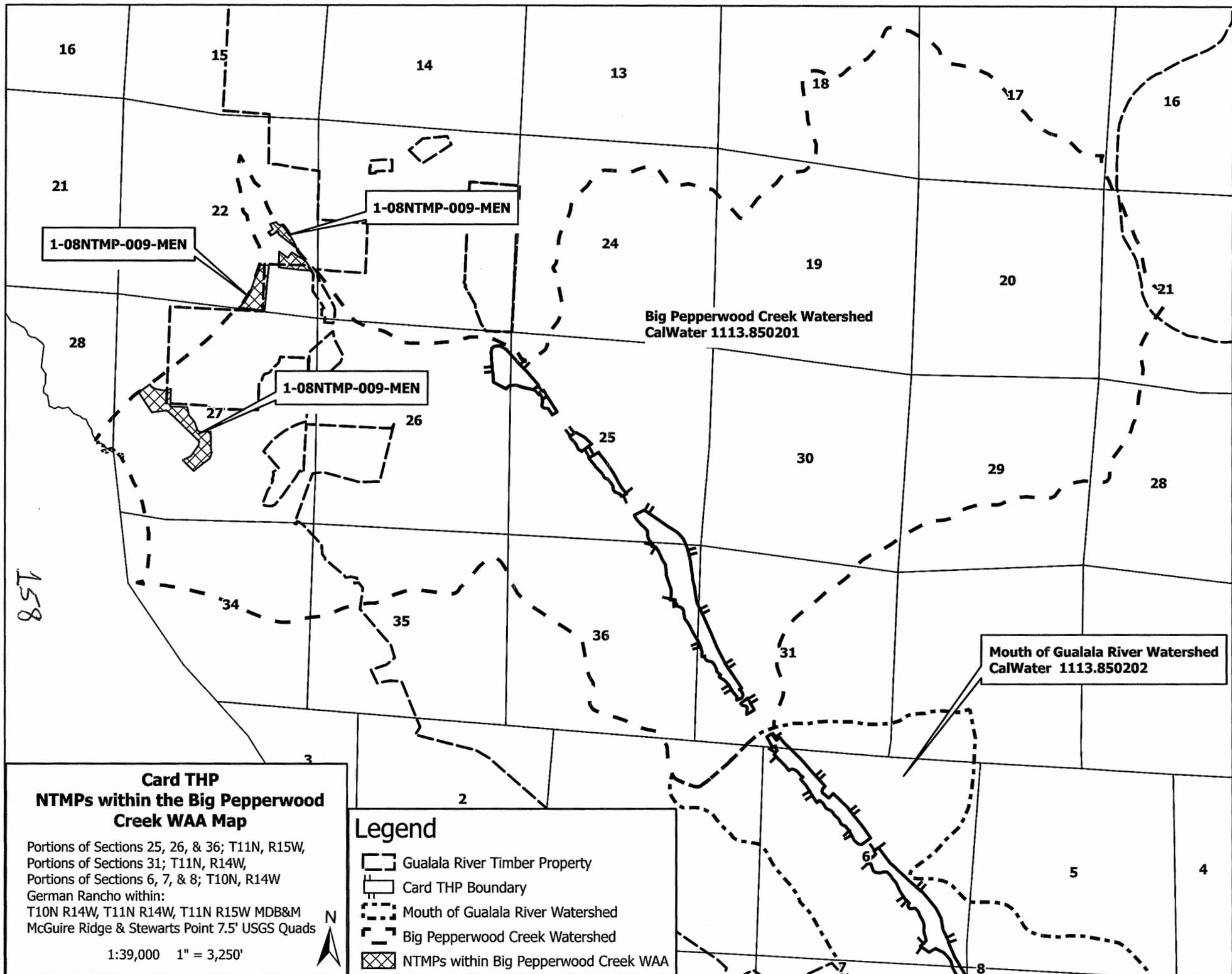
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1-08NTMP-009-MEN

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1-08NTMP-009-MEN

Big Pepperwood Creek Watershed
CalWater 1113.850201

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1-08NTMP-009-MEN

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Mouth of Gualala River Watershed
CalWater 1113.850202

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**Card THP
NTMPs within the Big Pepperwood
Creek WAA Map**

Portions of Sections 25, 26, & 36; T11N, R15W,
Portions of Sections 31; T11N, R14W,
Portions of Sections 6, 7, & 8; T10N, R14W
German Rancho within:
T10N R14W, T11N R14W, T11N R15W MDB&M
McGuire Ridge & Stewarts Point 7.5' USGS Quads

1:39,000 1" = 3,250'



Legend

-  Gualala River Timber Property
-  Card THP Boundary
-  Mouth of Gualala River Watershed
-  Big Pepperwood Creek Watershed
-  NTMPs within Big Pepperwood Creek WAA

A total of 1,145 acres of the 6,532 acres within the Big Pepperwood Creek WAA (approximately 17%) have had harvesting documents (including NTMPs) approved within the last 10 years. A total of 1,197 acres of the 5,305 acres within the Mouth of Gualala River WAA (approximately 22%) have had harvesting documents (including NTMPs) approved within the last 10 years. Silviculture's were selected and approved in the THPs were intended to maintain and increase the production of conifer and provide for quality wildlife habitat. Many of the silviculture prescriptions used in the last 10 years were uneven-age management. Small evenaged units are proposed when it is the best option for long term sustain yield of timber resources. Also incorporated were "Special Prescriptions" to increase conifer stocking and growth.

Future activities:

Due to the Big Pepperwood Creed and the Mouth of Gualala River Watersheds being controlled by numerous landowners performing various land management activities, predicting all future activities that could result in cumulative effects to the watershed is difficult to determine. As outlined in Present Activities above, it is likely that similar activities, including framing and timber harvesting, will occur into the future. Harvesting, for practical reasons, is often concentrated in one watershed for a period of time and reduced in another watershed. This is the concern that is addressed in a cumulative effects analysis. However, the percentage of the watershed acres harvested is a poor indicator of long-term effects by itself because if all silviculture were even-aged then a sixty-year harvest rotation would harvest approximately 16.7% of a watershed every ten years. However, if silviculture's were all uneven aged, perhaps 50 to 100% of the acres would experience selective harvesting every ten years. Since there is a mixture of silviculture's the true amount of harvesting becomes more complicated to decipher. This also does not consider the fact that these are not fully regulated stands but have historically been harvested in bursts of activity. As a result, many of these stands become harvestable in similar times. Periods with higher rates of harvesting normally result in decades with higher harvest rates followed by decades with little to no harvesting. The rules about cumulative effects attempt to spread the effects of harvesting out over time. Under current rules for forest practice, many of the timber stands within the WAA are legally harvestable using even-age silvicultures. At the current time the landowner has begun the process of looking at an area for harvest that is roughly within T10N, R14W, Sections 22, 26, 27, and 35. The area will likely be uneven-age silviculture.

Sediment Effects-Reasonably Foreseeable Probable Future Projects

Timber production is the principal land use within the Assessment Area, and this is not expected to change in the near future. Gualala Redwood's portion of the assessment area will continue to be managed for sustained timber production and the enrichment of all forest resource attributes. Within the watershed, timber operations have begun on 1-22-00042 SON, 1-23-00073 MEN, 1-23-00099 SON and 1-24-00103 MEN. This THP, like all others, contains protection measures to protect the Beneficial Uses of Water. It is important to note that NTMPs are long-term planning documents, and that timber harvesting may or may not occur. Within the planning watershed, 210 acres have been included within Notice of Timber Operations (NTOs) within the last ten years. Those NTO acres are included within the summary of Unevenaged acres listed above. Areas of NTMPs without NTOs can be considered future projects as well.

The Gualala Redwood property is managed under the California Forest Practice Rules Option C. Additional plans are currently being prepared under Option C, located throughout the property, those THPs will be submitted in the future and it should be assumed that additional plans will be filed over the next 10 years within the assessment area.

Until THP field work and layout begins, Gualala Redwood is not able to predict with any degree of certainty that an actual THP for a specific area will be written, submitted and approved. Future harvesting projects are often contemplated or appear to be feasible based on assumed ground conditions, stand age and composition, and other information, including information from the landowners Geographic Information System (GIS). Until actual field work begins, the location of the THP on the ground, its area layout (including its size and shape), its foreseeable impacts or associated protection measures are unknown. At this time, the RPF knows of 250 acres that may be put under a future plan within the watershed. This area can be found within the 10 Year Harvest History within the WAA map at the end of this section. This project is presently in the review process. While most of this acreage will be in the form of THPs, other projects will likely include road construction, reconstruction and maintenance. Appurtenant roadwork, such as road upgrades, installing rolling dips and out sloping, will be done concurrent with THP work. Also, given the history of land use in the assessment area, it is safe to assume that expansion of rural residential housing, agricultural uses, and timber harvesting will continue to occur in other parts of the assessment area that are not under Gualala Redwood Timber's ownership. The timing and nature of any additional future projects is difficult to predict, due to constantly changing economic conditions.

Other non-harvest forest management activities can be expected to occur on GRT's ownership as future projects will or may include:

Road Rehabilitation: Watershed restoration work and road storm proofing is an ongoing activity. In the last 20 years nearly 60% of the ownership's road system has been improved to reduce potential sediment delivery to the streams within the Gualala River Watershed. This has been accomplished through stream crossing replacements and improvements, removal of legacy earth filled crossings and undersized culverts, storm proofing roads by reconstruction to an outsloped running surface and hydrologically disconnecting the road surface from nearby watercourses. In all, approximately 295,000 cubic yards of sediment have been prevented from being delivered to the tributaries and the main watercourses of the Gualala River. This potential sediment has been retained on the hillslopes through stabilization work. GRT will continue to address treatment of the remaining 40% of its road system through grant funding or as on-site improvements/upgrades through the company's timber harvest management program.

Fish Habitat Improvement: GRT plans to continue its grant funded work with the Gualala River Watershed Council (GRWC), the California Department of Fish and Wildlife, and NOAA Fisheries to improve the on-property fish habitat with ongoing instream large woody debris placement. To date it is estimated that more than 111 log truck loads of large wood have been placed in the fish bearing streams on GRT property within the Gualala River Watershed. This work was primarily accomplished through State grant funding and company cost share, and to a limited extent as off-site fish habitat improvements related to the gravel extraction and mining permit. In 2018 eleven (11) large trees (nearly 14 MBF) were placed in the North Fork of the Gualala River by use of the Option 'v' process in the ASP Rules that allows for site-specific restoration work within the watercourse channel. GRT expects it will continue this work into the future in association with GRWC, California Department of Fish and Wildlife, the North Coast Regional Water Quality Control Board, and NOAA Fisheries.

All this past and expected future restoration and stabilization work as addressed above has been evaluated through monitoring efforts by the GRWC and found to be contributing significant improvements to the Gualala River Watershed. The regulatory agencies support continuing this work into the future as the work is resulting in measurable fisheries and water quality improvements to the Gualala River Watershed as a whole.

Timber Harvest Scheduling: Harvesting, for practical reasons due to historical past harvest entries, access availability, equipment and manpower mobilization and staging, is often concentrated in one watershed for a period of time and reduced in another watershed. This varying harvest intensity must be addressed in a cumulative effects analysis. In the assessment of potential cumulative effects, which may result from harvesting, the percentage of the watershed acres harvested over a ten year period is a poor indicator by itself. If all silviculture used were even-aged, then one would expect on a sixty-year rotation to only harvest 16.7% of a watershed area in a ten-year period. This is due to adjacent harvest unit constraints imposed by the Forest Practice Rules and to the existing timber stand condition at the time. However, if the landowner were to fully engage in uneven-aged silviculture over the entire watershed one could expect to selectively harvest 50 to 100% of the acres over a ten to fifteen-year period. Since there is a mixture of silvicultural prescriptions within a watershed the areas harvested in a ten to fifteen-year period become more complicated to decipher. This also does not consider the fact that these are not fully regulated stands but have been harvested in bursts of activity in the past which has resulted in the majority of these stands becoming harvestable at approximately the same time in some cases. This pattern results in decades with higher harvest rates over an area followed by decades in which little to no harvesting occurs, so potential impacts can be periodic in nature.

At the present rate of harvest and because of harvest unit adjacency rules, it is likely that many of the stands on the landowner's property will not be harvested until they are decades older than the rules require for minimum stand age using even-aged management. Much of the ownership will continue to be managed using unevenaged selection silviculture, and older stands of mature timber will continue to exist because of restrictions and considerations including watercourse protection rules, geological hazard set-asides, northern spotted owl habitat protection, as well as other plant and animal habitat retention areas being left across the ownership.

Other activities in the WAA, outside of GRT ownership, will likely continue including development, agriculture, grazing, recreation, tourism, trespass, and illegal crop cultivation. These all can contribute to sedimentation, but with regulations, are not expected to be at a significant level in the future.

Sediment Effects- Proposed THP

Silviculture (14 CCR 913): THP Item #14 describes the silvicultural methods proposed in this THP as Single-Tree Selection and Group Selection. These silvicultures will retain and maintain a high degree of overstory and understory cover along WLPZ corridors, upland areas adjacent to tributaries, and on steep slopes and landslide features. Expected high levels of post-harvest vegetative cover throughout the plan area will help to reduce the potential for deleterious amounts of sediment entering into watercourses in the form of excessive surface runoff and rain drop impact.

Road Improvements (14 CCR 923; 14 CCR 916.9): Sec II describes road treatments that will be implemented to reduce the potential for generation of sediment near watercourses. Required road rules have been applied to this plan and include specific requirements for Anadromous Species Protection. Crossing upgrades include sizing new or replacing culverts to meet a 100-year flood event, which controls and limits the amount of potential sediment that could discharge if the crossing fails. Maintenance activities protect the existing infrastructure, stabilize bare mineral soil and allow for proper functioning of drainage facilities. Temporary crossings include removal and returning to a natural condition after operations, plus treatment of exposed bare mineral soil, which substantially reduces the potential sediment at the crossing. There is no new road construction proposed. This THP proposes the following activities aimed at road improvement:

- Existing watercourse crossing upgrades: 3 proposed in this THP.
- Road drainage facility improvements: 4 proposed in this THP.
- Hydrologic disconnection of logging roads: No roads observed to be hydrologically connected
- Existing Temporary watercourse crossings: Multiple proposed in this THP.

Yarding Methods (14 CCR 914.2 & 914.6): THP Item #16 describes the yarding methods to be employed during harvest operations. The THP proposes ground-based operations. This includes the use of tractors, skidders and heel boom loaders to move logs. Skid trails in these areas have been evaluated and flagged for use by the RPF and were determined to be intact, stable, in good condition, and require little to no grading for reuse. The LTO is instructed to waterbar these trails to the appropriate standard. The majority of the THP has gentle slopes with existing skid trails that require little construction. Due to the wide floodplain associated with the South Fork Gualala River, the THP proposes to use segments of WLPZ trails. There are six WLPZ tractor landings proposed for use within this plan. The only reason these are WLPZ facilities is because of the wide flood plain. Earth berms, significant amount of filtering vegetation and back tilted topography exist between these landings and the Class I watercourses and the chance of sediment entering a Class I watercourse because of the usage of these landings is very remote.

- Unstable Features: a few unstable areas have been identified adjacent to the plan boundaries and impact avoidance measures have been provided in Section II of the THP.
- Soil Stabilization Measures (14 CCR 923.5 & 916.7): THP Item #18 includes soil stabilization measures for logging roads, tractor roads, and WLPZs/ELZs/EEZs, with specific requirements for Anadromous Species Protection special road use and maintenance provisions will be applied to wet weather conditions during the non-winter period; self-maintaining drainage features, such as rolling dips and out-sloping, will be used in appropriate places. Covering bare mineral soil disturbed through operations prior to winter storms prevents fine sediment from washing off-site and reaching a higher order stream.
- Winter Period Operating Plan (14 CCR 914.7): No Winter Operations
 - No ground-based equipment operations during saturated soil conditions.
 - No log hauling during saturated soil conditions.
 - No watercourse crossing installation or proposed road construction during the Winter Period.
 - No site preparation activities during the Winter Period.
 - No Temporary road usage

Sediment Effects Conclusion

The existing conditions within the WAA regarding sediment effects may have been impacted from past projects prior to the FPRs, and there may be a continuing impact. Future projects are not expected to have an impact on sediment effects in the WAA. The THP area is generally in good condition regarding sediment effects. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on sediment effects reveals that there are no significant cumulative impacts, and that current conditions will be improved through the project implementation.

b. Water Temperature Effects

The Gualala River has been 303d listed as impaired for Temperature (Feb. 4, 2003). NCWAP states, "Overall watershed-wide riparian shade canopy has improved since the 1960s, but still falls short of the 1942 levels of canopy density and coverage." The 1942 levels showed 95% canopy coverage. It is also noted that overstory canopy cover in the lower reaches of the watershed are the highest (this happens to be the area of GRT ownership). It should be noted that while summer water temperatures along the main river (which is transporting water from many other upstream ownerships) is higher than desirable, the temperature of the tributaries in the Doty Creek and Robinson Creek planning watershed which run into the North Fork Gualala River are good to excellent. These tributaries are more representative of GRT conditions and are less diluted by other upstream ownerships. Another way of looking at it is that GRT owns roughly 30,000 acres out of the 191,116 acres comprising the Gualala River Watershed. Less than 20% potential management caused adverse effects on the Gualala River system is therefore caused by GRT activities. GRT owns most of the Little North Fork and North Fork Gualala River watersheds and associated tributaries; these tributaries show significantly better temperature numbers than the mainstem South Fork Gualala River. Most of the creeks that originate off property have higher temperatures where they enter GRT's land than they do when they hit the main stems, which shows that GRT practices are probably not a cause of high temperatures, but stream temperatures are decreasing or at least not warming as they pass through GRT property. Water temperature can be the single most critical feature of habitat for salmonids and other aquatic organisms and is relatively easy to monitor. California chinook salmon, coho salmon, steelhead trout and coastal cutthroat trout are all Pacific salmon species (genus *Oncorhynchus*), and all require cold water. Water temperature tolerance varies somewhat between species and also between life stages. Warm temperatures can reduce fecundity, decrease egg survival, retard growth of fry and smolts, reduce rearing densities, increase susceptibility to disease, decrease the ability of young salmon and trout to compete with other species for food and to avoid predation. Sedimentation of streams may also contribute to elevated water temperatures. Sediment can fill pools and cause the width-to-depth ratio of a stream to increase, which can facilitate heat exchange.

Within the WAA and the project area, two main watercourse conditions affect water temperature: canopy cover and pool depth. Canopy cover within the WAA is high due to the fact that approximately 20% of the assessment area has either undergone timber harvesting operations within the last ten years, or has a filed or approved project. This is a function of adherence to WLPZ protections. Pool depth has gradually decreased over the last 200 years, due to anthropomorphic activities increasing sedimentation to streams. However, adoption of the FPRs has resulted in restoration of these pools through the increased recruitment of Large Woody Debris (LWD) in watercourses and a gradual decrease in sedimentation resulting from timber operations.

Water Temperature Baseline Conditions

The THP area contains the following baseline conditions regarding water temperature:

- **Canopy Cover** – There is one Class I watercourse (South Fork Gualala River and a small section of the Mainstem on the northern part of the assessment area) adjacent to the Plan area. The THP area contains multiple Class II, Class III watercourses, and multiple wet areas. Shade canopy along Class II and III watercourses across the Plan area varies from as high as 100% to as low as 55%. Canopy cover is comprised mainly of mature redwood, Douglas-fir, Pepperwood and Red Alder in the overstory with an abundance of ferns and huckleberry in some portions of the understory. While historic logging activities may have removed canopy cover adjacent to watercourses, current conditions reveal adequate regeneration, high stocking, and recovered shade canopy. There are instances of existing roads located within the WLPZ. WLPZ roads inherently decrease canopy cover adjacent to higher order watercourses, as road construction and maintenance requires the removal and or pruning of overstory trees, however these roads are minimal within the plan area.

Water Temperature- Past Activities

The main activities that may have contributed to past adverse impacts of the Watershed Assessment Area, specifically to water temperature, are similar to and connected to the sediment effects section above. They include development of the town of Gualala, road and watercourse crossing construction, timber harvesting, milling and lumber production, agricultural production, livestock grazing, wildland burning, and residential building.

- Wildland Burning: The removal of canopy cover on a large scale followed by wildland burning and therefore the removal of organic material and root strength increases the amount of runoff, mass wasting and rain drop interception, which led to excessive sedimentation, turbidity, and increased water temperatures. The lack of streamside canopy due to burning, as well as input of organic matter and loss of LWD also contributed to an increase in temperatures. LWD projects from the recent past on FRT lands have been abundant and help to create pools within the Gualala River and tributaries, and therefore decrease water temperature.
- Agriculture/Grazing: Past grazing activity often converted forestlands to grassland which decreased the amount of canopy in the WAA at times. Additionally, roads and access for grazing and agricultural activities in the WAA through grasslands with flashy watercourses and poor drainage cause mass wasting events and sediment delivery.
- Rural and industrial subdivisions: Whenever there is human activity, there is potential for adverse effects on the environment. Human population growth affects all resources, either directly or indirectly, and increased pressure upon rural settings is a manifestation of those impacts. Accelerated erosion can occur from access roads and home sites. Today, the county/state controls almost all land use activities with regulations designed to prevent significant adverse impacts. Past building and conversion in riparian areas at the lower elevations of the WAA also reduces canopy and therefore could have impacted water temperatures of the Gualala River.

- Road Building: Road building is associated with all the other past land uses discussed here. The sedimentation of watercourses and therefore an increase in water temperature is perhaps the greatest past and continuing impact within the watersheds and a major contributing factor to that would be the construction and use of forest and ranch roads. The building of private and public roads through riparian areas and alongside Class I watercourses within the WAA, reduces canopy cover and therefore increasing temperatures, and the pushing of fill material into creeks during their construction most likely contributed to an increase in water temperatures during these historic practices and prior to the implementation of the FPRs and other building standards.
- Timber Harvesting: Before the implementation of the Forest Practice Act of 1973, historic logging activities occurred within the plan area and much of the surrounding timberland. These activities did not take into consideration erosion, mass wasting or the watercourse protection issues that forest harvesting focuses on today. The last harvest entry on the THP area was associated with a THP approved in 2011. Prior to the FPRs roads and skid trails were constructed either directly in or adjacent to watercourses resulting in sedimentation of the watercourses and reduction of shade canopy. Large increases in large woody debris and increased sediment inputs resulted in the storage of large amounts of sediment. As the woody debris begins to decay, stored sediment is moving through the watershed. Furthermore, lack of adequate erosion control on skid trails, roads and watercourse crossings resulted in the deposition of large amounts of sediment and organic debris into the watercourse channels. Overall impacts from past timber management, however, appear to have been beneficial. The lands remain forested with various levels of regeneration dependent upon location. The timber operations conducted in the recent past, within the last 10 years did not result in any significant adverse impacts, including an increase in water temperature.

Water Temperature-Reasonably Foreseeable Probable Future Projects

As described above, the main activities that have been conducted within the Watershed Assessment Area affecting water temperature are development, road building, timber harvesting, and to a lesser extent wildland burning, agriculture, and recreation. It is anticipated that these activities will continue, as discussed above.

Road building is not expected to result in adverse impacts to the assessment area in the future as a majority of the assessment area has roads and any new roads constructed will utilize proper planning, design and construction techniques. Road maintenance and repair will increase in the future as awareness of the impacts of roads are evaluated and landowners work to improve their roads, using the Handbook for Forest and Ranch Roads.

Wildland burning is expected to be conducted in the future, to a certain degree, to control fuel loads and vegetative cover and for site preparation activities. The amount of burning conducted is expected to be minimal and should not result in any adverse impacts to sediment, canopy or water temperature, and in fact should maintain the amount of overall canopy.

Livestock grazing and other agricultural uses are expected to continue at limited levels which is not expected to have significant impact.

Large, forested land holdings have been and will likely continue to be harvested and maintained as timberland, but some of this land could be sold and subdivided. Rural residential development will continue to have impacts upon the management of large tracts of industrial and small private timberland within the WAA.

Water Temperature- Proposed THP

- Silviculture (14 CCR 913): THP Item #14 describes the silvicultural methods proposed in this THP as Single Tree Selection and Group Selection. LWD shall be retained within riparian corridors. The unevenaged silvicultures proposed will retain and maintain a high degree of overstory and understory cover throughout the Plan area and along WLPZ corridors, upland areas adjacent to tributaries, and on steep slopes and landslide features. Across the entire plan, it is expected that high levels of post-harvest vegetative cover will help to shade riparian and aquatic ecosystems which regulates and maintains water temperature.
- All other previously mentioned proposed activities that could impact sedimentation: Sedimentation of streams contributes to elevated water temperatures. Sediment can fill pools and cause the width-to-depth ratio of a stream to increase, which can facilitate heat exchange. See above for a description of sediment effects with regards to potential impacts on water temperature.
- Within the Class I WLPZ Pre harvest Canopy Closure is estimated to range from 80% to 100%. Following operations, the Core Zone will not be impacted. The Inner Zone A and B will maintain the 13 largest trees per acre and maintain 80% and 50% canopy.
- Within the Class II WLPZs, Pre harvest Canopy Closure is estimated to range from 80% to 100%. Following operations, the Core Zone of the Class II WLPZ will remain unchanged. Outside of the Core Zone Class II WLPZ Canopy Closure is estimated to range from 70% to 80% after operations.

Water Temperature Conclusion

The existing conditions within the WAA regarding water temperature effects indicate that there may have been an impact in the past, but since the adoption of many regulations and the recent projects in the area following the modern-day FPRs, the effects have become less than significant in many aspects. Canopies have regrown in the Gualala River watershed from historic activities in both the 19th and 20th centuries, and continue to close in. Future projects following the regulations are not expected to have an adverse impact to sediment effects. The proposed THP alone does not have an adverse impact on water temperature through the selected silvicultures and yarding practices in accordance with the FPRs. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on water temperature effects reveals that there are no significant cumulative impacts, and that current conditions will be maintained or improved through the project implementation.

c. **Organic Debris Effects**

Organic debris in a watercourse can have either positive or negative effects depending on the size and stability of the material. Large woody debris is an important component of a healthy functioning watershed, while an excessive amount of small fine organic debris will have a negative impact including increased acidity and decreased dissolved oxygen. A sudden large input of unstable organic debris, including logs, can have a detrimental effect on the watershed. Debris torrents, stream diversions, and barriers to fish migration can cause major impacts to the health and resilience of watershed ecosystems. LWD provides in stream habitat for salmonid species as well as storage and metering of sediment within the stream itself. A lack of LWD in Class I watercourses has been identified as a limit on salmonid habitat function.

Within the WAA, GRT is involved in the facilitation of ongoing stream reach, stream cross sectional, and LWD placement monitoring. This is being conducted annually by the Gualala River Watershed Council (GRWC) on GRT's property and within the Gualala River Watershed to offset any potential impacts that may result from their timber harvesting activities.

Large trees that fall into coastal streams play a dominant role in forming pools, metering sediment, trapping spawning gravels and creating a more complex stream environment. Redwoods are particularly valuable because a large tree may not decay for several hundred years (Kelly et al., 1995). Fir and spruce trees last for several decades while alder and hardwood species rot within a few years of being recruited into the stream (Cedarholm et al., 1997). In general, the larger the size of the woody debris the greater its stability in the stream channel. Heavier pieces require higher flows for mobilization and longer pieces are more likely to be caught by the stream bank and its vegetation. Reeves et al. (1993) found "that wood is a primary element influencing habitat diversity and complexity in streams. Consequences of decreased amounts of wood include loss of cover and structural complexity, decreased availability and abundance of habitat units, and reduced varieties of current velocities and other hydraulic features."

Organic Debris- Baseline Conditions

The THP area contains the following baseline conditions regarding organic debris:

- **Small Organic Debris** – The Class I, II and III watercourses within the THP area have a high degree of canopy cover and therefore introduce a natural amount of small organic debris into the watercourses. The RPF has observed a healthy degree of leaf litter in the Class I, Class II and III watercourses present in, or proximal to, the Plan area. Elk Prairie is a grassy meadow. This area currently lacks forest cover but is sufficiently occupied with annual grasses with are adequately functioning as a filter strip and surface cover for the North Fork Gualala. Currently, there is no evidence of the introduction of small organic debris into watercourses that likely occurred during historic logging activities within the Plan area, and there are no observed adverse effects regarding organic debris from the 2011 harvest that most recently took place in the approximate plan area.
- **Large Woody Debris** – The Class I and II watercourses within, or proximal to, the Plan area contain a moderate amount of LWD that appears stable. Existing LWD is not causing any diversions. Existing LWD is mostly in the form of tree boles, redwood buckskins, root wads, and large branches that are contributing to bank stabilization and pool development. It is thought that these environments could use more of these structures to reach peak health, but pre old growth logging conditions are not well documented. The high degree of stocking within the riparian buffers and the retention of large trees within the WLPZ will contribute to the recruitment of LWD into these streams now and in the future.

Organic Debris- Past Activities

The main activities that may have contributed to past adverse impacts of the Watershed Assessment Area, specifically to organic debris, are wildland burning, agriculture/grazing, development, road building, and timber harvesting, like the discussion for sediment effects above.

- Wildland Burning: Past burning activities could have reduced the amount of small debris in watercourses, however it also contributed to a lack of LWD available for watercourses. Burning that has caused bank mass wasting may have also delivered sudden inputs of sediment and organic debris into watercourses.
- Agriculture/Grazing: Past grazing and agriculture limited forestlands and therefore LWD production, and mass wasting events caused by these activities and their roads may have suddenly input organic debris into watercourses.
- Development: Building and converting from timber to non-timber uses reduced the amount of LWD available, and also diverted watercourses to ditches and underground systems, eliminating their natural drainage pattern. The grading, paving, and construction associated with the abandoned mill site likely altered drainage patterns with portions of the site.
- Road Building: Road building and mass wasting events of the past, prior to modern day regulations, undoubtedly input sudden amounts of organic debris into watercourses through placement of side cast materials into watercourses.
- Timber Harvesting: Historic past timber harvesting (prior to the adoption of the CA Forest Practice Rules) in general, did not consider erosion or mass wasting when developing skid trail and road construction to assist in harvesting practices. Often times sediment and debris were pushed directly into watercourses. Recent past projects did not use many of these legacy facilities, except to perform remediation work to reduce sediment discharge and followed the FPR regulations and suggestions from State agencies made during the THP review process. It is the RPFs opinion that there has been a positive impact on the watersheds from past activities that occurred since the advent of the Forest Practice Rules and particularly in the last three decades.

Organic Debris-Reasonably Foreseeable Probable Future Projects

As described above, the main activities that have been conducted within the Watershed Assessment Area are road building, timber harvesting, town and residential development, and to a lesser extent wildland burning, agriculture, and recreation. It is anticipated that these activities will continue into the future.

Road building is not expected to result in adverse impacts to the assessment area in the future as a majority of the assessment area is currently adequately occupied with roads and any new roads constructed will utilize proper planning, design and construction techniques. Road maintenance and repair will increase in the future as awareness of the impacts of roads are evaluated and landowners work to improve their roads.

Wildland burning is expected to be conducted in the future, to a certain degree, to control fuel loads and vegetative cover and for site preparation activities. The amount of burning conducted is expected to be minimal and should not result in any adverse impacts.

Livestock grazing and other agricultural uses are expected to continue at limited levels.

Large, forested land holdings have been and will likely continue to be harvested unless sold and subdivided. Rural residential development will continue to have impacts upon the management of large tracts of industrial and small private timberland, and development can reduce the amount of LWD available for watersheds.

Organic Debris- Proposed THP

- Silviculture (14 CCR 913): THP Item #14 describes the silvicultural methods proposed in this THP as Single Tree Selection, and Group Selection. LWD shall be retained within riparian corridors. The unevenaged silvicultures proposed will retain and maintain a high degree of overstory and understory cover throughout the Plan area and along WLPZ corridors, upland areas adjacent to tributaries, and on steep slopes and landslide features. Expected high levels of post-harvest vegetative cover throughout the plan area will help maintain and regulate the deposition of organic debris into aquatic ecosystems.
- Yarding Methods and Watercourse Protections (14 CCR 916.3 (b); 916.4(c)(3); 923.9(p); 916.3(d)): Accidental depositions of soil or other debris in lakes or below the watercourse or lake transition line in waters classed I, II, and IV shall be removed immediately after the deposition or as approved by the Director. This FPR ensures that an excess amount of organic debris does not enter watercourses. Soil deposited during timber operations in a Class III watercourse other than at a temporary crossing shall be removed and debris deposited during timber operations shall be removed or stabilized before the conclusion of timber operations, or before October 15. All temporary crossings of watercourses on the plan area will be removed and any organic debris deposited in these watercourses will be removed or stabilized to prevent an increase in the organic debris content of these watercourses. Vegetation other than commercial species bordering and covering meadows and wet areas shall be retained and protected during timber operations.

Organic Debris Conclusion

The existing conditions within the WAA regarding organic debris effects indicate that there may have been an impact in the past, but since the adoption of protective regulations, the effects have become less than significant. Currently, there is a natural input (not excessive) of small organic debris in watercourses. The reintroduction of LWD is slowly increasing in the larger watercourses. Future projects are not expected to have an adverse impact on organic debris effects. The proposed THP is not expected to have adverse impacts on organic debris effects due to the measures followed in the THP and FPRs regarding LWD, snags, and wildlife recruitment in the WLPZ, shade canopy retention in the WLPZ, and other WLPZ restrictions. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on organic debris effects reveals that there are no significant cumulative impacts, and that current conditions will be maintained or improved through the project implementation.

d. Chemical Contamination Effects

The WAA could have been impacted by chemical contamination from past historic projects with regards to the following activities: grazing and ranching, vineyards, orchards, cannabis cultivation, recreation, roadside herbicide treatments, slash pile burning, broadcast burning, heavy equipment maintenance, highway runoff, and rural/residential/industrial runoff, and industrial runoff. Chemical contamination of downstream resources can have negative impacts on aquatic organisms, as well as the beneficial uses of water. Watercourses within the plan drain into the South Fork Gualala River. The Gualala River drains into the Pacific Ocean approximately one mile downstream of the North Fork/Mainstem confluence.

Chemical Contamination- Baseline Conditions

The THP area contains the following baseline conditions regarding chemical contamination:

- **Management activities using heavy equipment** - within the project area, there are no known significant adverse effects of chemical contamination from activities using heavy equipment in the past. In the WAA overall, there have been a number of timber harvest plans in the recent past within the plan submitter's ownership in which no chemical contamination events have occurred, and there are no known existing impacts from past activities.

Chemical Contamination- Past Activities

The main activities that may have contributed to past adverse impacts of the Watershed Assessment Area, specifically to chemical contamination effects, are wildland burning, agriculture/grazing, rural subdivisions, road building, town building, power line maintenance and timber harvesting. Additional activities include trespassing and illegal crop cultivation. These effects are not seen today in the baseline conditions but should be considered.

- Wildland Burning: Burning throughout the watershed occurred within or near watercourses and riparian areas in historic burning, which likely input chemicals, generated through burning, into the watershed ecosystem. Equipment for these activities may have also been worked on in these areas possibly releasing oil or hydraulic fluids.
- Agriculture/Grazing: This past activity may have contributed to this effect through heavy equipment servicing near watercourses, the use of pesticides and the use of fertilizers.
- Development and Tourism: People living within the WAA in the past and present have likely disposed of or stored chemicals that may have impacted watercourses. The Gualala Lumber Company Sawmill likely had runoff into watercourses in the area, however the RPF is unaware of any attempts to quantify these impacts, and the mill has been closed for approximately 50 years. The large amount of people who visit the area or use Gualala River Road may also have dumped trash or chemicals into the river or on the side of the highway.
- Road Building and utilization: Road building uses heavy equipment, therefore there was likely chemical contamination of watercourses within the WAA prior to the FPRs. Projects after the FPRs and the most recent harvests in the WAA do not service equipment inside of the WLPZ and there are no known issues related to this from the past.
- Timber Harvesting: Similar to road building, heavy equipment used, in the past, within what are now WLPZs likely contributed to chemical contamination.

Chemical Contamination-Reasonably Foreseeable Probable Future Projects

As described above, the main activities that have been conducted within the Watershed Assessment Area are road building, timber harvesting, development, and to a lesser extent wildland burning, agriculture, recreation, power line maintenance, trespass, and illegal cannabis cultivation. It is anticipated that these activities will continue into the future.

Use of heavy equipment within the WLPZ and riparian areas is restricted and limited within the State, and it is unlikely that any future activities will contribute to significant chemical contamination effects within the watershed.

The assessment area consists of both large private landowners, and small rural parcels. Typically, large private landowners manage timberlands or other agriculture. Some larger landowners may not conduct any activities on their property and therefore do not have impacts to chemical contamination. These activities on the larger ownerships are expected to continue. The future activities will be conducted with the knowledge gained from past practices and will result in fewer adverse impacts and improved forest health and diversity. In regard to timber harvesting and forestry practices, herbicides may be used for unwanted brush and tree species that inhibit the growth and success of fire-resilient conifer tree species. This is a management tool that many landowners use to control vegetation in the most economical way and is expected to continue for small and large timberland owners in the WAA. Other agricultural management may also use herbicide and pesticides for their crops, and this activity is also expected to continue.

Wildland burning is expected to be conducted in the future, to a certain degree, to control fuel loads and vegetative cover and for site preparation activities. The amount of burning conducted is expected to be minimal and should not result in any adverse impacts, especially since the FPRs restrict fueling and heavy equipment in the WLPZ.

Livestock grazing and other agricultural uses are expected to continue at limited levels, and chemicals associated with these activities may contribute a small and insignificant amount to contamination in the future.

Large, forested land holdings have been and will likely continue to be harvested but could be sold and sub-divided in the future. Residential development in rural environments will continue to have impacts upon the management of large tracts of industrial and small private timberland. The presence of people always increases the risk of chemical contamination. Activities and presence of the public in the WAA (tourists, recreators, and short time residents) are likely not associated with a project, especially one under state and public review, and has a higher chance of directly contributing chemicals to the WAA without any consideration for environment or the cumulative effect.

Trespass and illegal marijuana crop cultivation will undoubtedly continue into the future without substantial changes to the current laws. This can lead to chemical contamination, but at a level that is not significant. There are few instances of trespass or illegal crop cultivation within the project area, and it is likely to be reduced in the future. There are no current adverse impacts from these instances, and therefore no probable future impacts.

Chemical Contamination- Proposed THP

- Pile Burning and Equipment Maintenance (14 CCR 916): Potential sources of chemical contamination include the accidental release of equipment fuels and oils and introduction of excess nutrients released during the burning of slash piles. Maintenance and fueling of equipment shall be done in locations away from watercourses. Slash piles will be created at landing sites. These will be located along roads. The distance of slash piles from watercourses and the establishment of WLPZ filter strips will significantly minimize the movement of excess nutrients into watercourses. Slash piles created because of this THP will follow the requirements of the FPRs including the placement of piles away from watercourses. Furthermore, equipment shall be re-fueled and worked on away

from any watercourse and outside WLPZ buffers.

- **Dust Palliatives (14 CCR 916):** This THP may use dust palliatives such as magnesium chloride or other natural material to assist with dust abatement during the implementation of this Timber Harvest Plan. Dust palliatives are substances applied to roads or ground surfaces to reduce airborne dust and help reduce its environmental impact by tightening and compacting the particles of the road prism surface. The landowner and the applicator should take necessary precautions to keep dust palliative material out of watercourses and roadway ditches leading directly to watercourses or bodies of water to reduce the amount of salt, lignin, or other dust abatement material that is input into the system. If dust palliatives are used in conjunction with this THP, the dust palliative shall be applied following all local, state, and federal regulations.

Chemical Contamination Effects Conclusion

Past activities involving chemical contamination of watercourses may have had an impact on the watershed in the far past, but there is not a significant effect of those activities or from recent past projects today within the WAA. With regulations, there is not an expected significant impact during future projects. The THP does propose activities involving chemicals (only possible road dust abatement) and they are designed to reduce and avoid chemical contamination in compliance with regulations. The project area has watercourses that drain into the South Fork Gualala River. Class I and II watercourses have established WLPZ where non-herbicide applications will occur and tractor operations will be limited to those prescribed within Section II, Item 27. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on chemical contamination effects reveals that there are no significant cumulative impacts.

d. Peak Flow Effects

Timber harvesting activities (e.g., construction of roads, compaction of surface and canopy removal) have the potential to alter the hydrology of a watershed, affecting the timing, volume and maximum rate of runoff. Timber harvesting and associated road building can affect hydrology by compacting soils, creating areas of imperviousness, triggering road surface runoff, intercepting subsurface flows, increasing late fall groundwater levels, extending the channel network and decreasing interception and evapotranspiration (EPA 2005a, Lewis et al. 2011, Reid and Lewis 2007). Increased peak flows can cause flooding and erosion, as well as siltation that may degrade aquatic habitat. While multiple watershed-scaled studies have reported increases in peak flows due to forest harvesting (e.g., Ziemer 1981, Wright et al. 1990, Rice et al. 1979, Rothacher 1973, Harr 1981, Jones and Grant 1996, Thomas and Megahan 1998, Beschta et al. 2000, Lewis et al. 2001, Guillemette et al. 2005), a more recent United State Department of Agriculture Forest Service synthesis of available data in the Pacific Northwest suggest that peak flow increases may be less apparent in rain-dominated regions (such as the THP area), and may only be discernible in small watersheds when >29% of the watershed had been harvested by clearcut and for flows with a return period of 6 years or less (Grant et al. 2008). Changes in peak flow conditions can also occur due to timber harvest. Increased peak flows can occur following harvest but typically would not occur at levels that would cause flooding and erosion which adversely affect beneficial uses.”

The silvicultural prescriptions proposed within this plan will leave a moderate to high amount of overstory canopy and vegetative cover providing for evapotranspiration and interception of precipitation. The THP will retain high levels of overstory and understory cover, with rapid recovery of the forest canopy, with canopy returning to preharvest conditions, is expected to occur within 5-20 years. GRT has a long-term plan to develop uneven-aged forest structure where single tree selection will be favored. This management objective will ensure that forest canopy is maintained or enhanced across the landscape.

Within the WAA, approximately 20% of the assessment area has experienced timber operations or has an approved/filed documents within the last ten years, which is a minimal impact on vegetation removal overall and the duration of peak flows. Of this, only a small percentage is in evenaged management. More substantial impacts within the WAA have likely resulted from development and timberland conversions.

Peak Flow Effects-Baseline Conditions

The THP area contains the following baseline conditions regarding peak flows:

- **Harvest Intensity** – There has been a moderate level of harvest intensity over the last 30 years within the THP area, however most of the operations consist of uneven-age selective harvests. Conifer stocking and canopy cover are high throughout the THP area, which intercepts rainfall and has a net decrease on peak flows. Currently there are no conditions within the THP which are negatively impacting peak flows. Less than 20% of the WAA has been harvested or has an approved harvest document in the last 10 years.

Peak Flow Effects- Past Projects

The assessment area (WAA) has a long history of human habitation. The main activities that could have contributed to past adverse impacts of the Watershed Assessment Area in regard to peak flow are those that remove timberland or vegetation on a large scale like historic era wildland burning (post-harvest), agriculture/grazing, and timber harvesting. Additional activities include LWD removal, paving and development.

- Wildland Burning: A large scale reduction in canopy and vegetation from past burning activities leads to excessive runoff and a lack of interception and delay of water reaching watercourses. This could have had an impact on peak flow in combination with storm events in the past.
- Agriculture/Grazing: Similar to burning, a lack of forested areas converted to grassland may have increase runoff and delivery of water to watercourses which in combination with storm events could have had impacts to peak flow in the past.
- Timber Harvesting: With intensive and expansive timber harvest, there may have been a lack of canopy on a large scale at various times that could have contributed to increased runoff and in combination with storm events, could have increase peak flow or the duration of peak flow in the past.
- Development: The pouring of concrete and asphalt throughout the WAA during the development of Gualala (including the Gualala Lumber Co. Sawmill) undoubtedly decreased canopy, decreased grassland and vegetation and increased the amount of runoff as the amount of impermeable ground increased. Undeveloped land and roadways that maintain a natural substrate have the ability to

absorb and slow water and runoff in ways that concrete and asphalt cannot. Development increases runoff through the capping and covering of the natural landscape with smooth, basically impermeable substrates. This allows water to concentrate and quickly flow as it drains across these surfaces towards drainage structures. Detention of water in developed areas can slow down the rate of runoff but not the total volume of runoff. These areas include parking lots, roads, buildings and homes.

- Peak Flow Effects Reasonably Foreseeable Probable Future Projects

As described above, the main activities that have been conducted within the Watershed Assessment Area are timber harvesting, development, wildland burning, agriculture and ranching. It is anticipated that these activities will continue into the future. Harvesting and development are the main factors in the future that could affect peak flow, in combination with storm events, however with the FPRs, there is not expected to be a significant adverse impact on peak flow from harvesting because large scale clear-cutting followed by burning or conversion to grassland is not a permitted activity today.

- Peak Flow Effects- Proposed THP

Silviculture (14 CCR 913): Adherence to FPRs and provisions in the THP are designed to maximize tree retention near streams and subsequently the filtering capability of the forest near watercourses, while minimizing sediment deposition. The silvicultural methods outside of the WLPZ require stocking levels to be adequate immediately after operations (for Single Tree Selection and Group Selection units) Vegetation retention across the landscape, utilizing the silvicultures proposed in this THP, reduces the possibility of extended peak flows as noted in the Jackson State study. Due to the level of selective harvesting in this watershed and the proposed THP there is not expected to be any measurable effect on peak flows associated with this harvest type.

- Yarding Methods (14 CCR 916; 923): This plan proposes having a negligible effect on peak flows because operations will adhere to the FPRs and will follow the following Best Management Practices:

- Tractor operations are limited to flagged skid trails when feasible or required. When skid trails have been blocked by the RPF, the LTO shall abide by these and avoid further encroachment on the trail.

- Exposure of significant areas of soil or reduction of large amounts of vegetation will not occur on large areas outside of the WLPZ.

- Slash remaining from operations and or standing vegetation will remain on-site to lessen raindrop impact within the project area.

- Large areas of exposed ground will not occur due to low amounts of repetitive skid trail use and limited to no prescribed burning. Waterbarring after operations will improve drainage by refreshing the drainage facilities.

- The application of soil stabilization measures for watercourse crossings of roads, tractor crossings, WLPZ skid trails and landings, and temporary roads prior to the winter period.

Peak Flow Effects Conclusion

The past activities in the WAA including historic era timber harvesting and burning, grazing and agriculture, and development of natural land may have had an impact in combination with and during storm events regarding higher peak flow rates or longer duration of peak flow. Because no future activities are expected in the WAA that would convert forestland on a large-scale, and the proposed THP also does not have large scale reduction in canopy or broadcast burning proposed, there is not expected to be a significant impact from the proposed project or other timber harvest related projects. An evaluation of interactions of

proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on peak flow effects reveals that there are no significant cumulative impacts.

2. Watercourse Condition

a. Gravel Embeddedness

Excess fine sediment can cause gravels in the water body to become embedded (i.e., the fine sediment surrounds and packs-in against the gravels), which effectively cement them into the channel bottom. Embeddedness can prevent the spawning salmon from building their beds. The intrusion of fine sediment into gravel reduces permeability, which results in reduced rates of oxygen delivery to incubating embryos and removal of metabolic waste from the egg pocket. The volume of fine sediment in spawning substrates is thus an indirect measure of gravel conditions that affect survival to emergence, whereas permeability directly measures conditions affecting embryonic survival.

Halligan states that embeddedness is a problem on the Gualala River. The GRWTSD states that the Regional Board Staff was able to observe 6 miles of stream during their random sample field work and they observed a thin to non-existent armor layer underlain and embedded with fine sediment. The absence of an armor layer is indicative of an oversupply of sediment (Dietrich et al. 1989). The available statistics show a wide variability across the range and are sometimes worse and sometimes better than similar sized old growth watersheds. Although the D50 data set falls below the 38mm level as determined by Knopp 1993 for healthy watercourses the Gualala is a depositional reach that falls at 1% or less. Data collected from the Knopp study is mostly taken from watercourses with a 2% or greater grade. You would expect to find more fine sediment falling out of suspension as the watercourse gradient decreases.

Gravel Embeddedness- Baseline Conditions

The THP area contains the following baseline conditions regarding gravel embeddedness:

- **Fine Sediment** – The Gualala Estuary and Lower River Assessment and Enhancement Plan (ECORP Consulting Inc., 2005) found that embeddedness for the Gualala Estuary is generally sub-optimal with the mean embeddedness ranging from 5.0% to 23% (Target values are that greater than 50% of the stream length is less than 50% embedded).

Gravel Embeddedness- Past Activities

The assessment area (WAA) has a long history of human habitation. The main activities that could have contributed to past adverse impacts of the Watershed Assessment Area in regard to gravel embeddedness and excessive fine sediment are the same as those discussed above in the sediment effects section. It includes wildland burning, agriculture/grazing, development, road building, and timber harvesting. Sedimentation of watercourses led to the embedding of gravels and therefore a reduction in the quality of habitat for spawning anadromous salmonids. Effects of past activities can be seen today within the WAA, where sediment was once delivered to the watercourse in mass wasting, skid trails, and watercourse crossings.

Gravel Embeddedness Reasonably Foreseeable Probable Future Projects

It is anticipated that the past activities in the WAA will continue to occur, but under modern day regulations. As discussed above in the sediment effects section above, the FPRs and other county and state regulations for roads and timber harvesting ensure that there is not a significant impact in the future.

Gravel Embeddedness- Proposed THP

Excessive sediment delivery to streams can increase the rates of gravel embeddedness.

The following THP activities shall not adversely affect and shall maintain the existing watercourse condition described in the baseline conditions above:

- Silviculture – Single-Tree Selection and Group Selection, silvicultural methods will regulate erosion upslope of and adjacent to watercourses, maintain streamside vegetation, and prevent sedimentation and pool filling.
- Road Improvements – Watercourse crossing upgrades and drainage facility maintenance decreases sedimentation and large-scale bank mass wasting events. This THP will be replacing multiple culverts that have rusted-out bottoms and are at risk of undermining and erosion of the slope beneath the culvert.
- Yarding Methods (14 CCR 923; 916) – use of existing skid trails that are stable and in good condition and appropriate waterbarring of these skid trails reduces the risk of erosion and sediment delivery to downstream watercourses.
- Soil Stabilization Measures – soil stabilization reduces rates of erosion and sediment delivery to downstream watercourses.
- Winter Period Operating Plan – prevents the use of heavy equipment on saturated soils which prevents erosion and sediment delivery to downstream watercourses. This also limits the use of trails within the WLPZ during the winter period, regardless of saturation levels.
- In-Lieu Practices – Use of WLPZ facilities is only permitted with appropriate protection measures that are equivalent to or above the standard FPRs. This prevents erosion and sediment delivery to downstream watercourses.

Gravel Embeddedness- Conclusion

There may be an effect from historic past activities on the WAA in terms of sediment effects as discussed above, which can increase gravel embeddedness, however, there have been many projects after the adoption of the FPRs. These more recent projects have not added to the negative effects of these past projects. Future projects are not expected to have an adverse impact to gravel embeddedness. The proposed THP is not expected to have adverse impacts to gravel embeddedness. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on gravel embeddedness reveals that there are no significant cumulative impacts.

b. Pools Filled

Salmonids need a variety of habitat types such as pools, riffles and flatwater to accommodate different life stage functions during their lifecycle. Pool habitats are required by most salmonids at one or more life stages. Provided that water quality is adequate, primary pools provide critical summer habitat for steelhead and coho salmon.

Pools Filled- Baseline Conditions

The THP area contains the following baseline conditions regarding pool filling:

- **Sedimentation** – The Class I watercourses proximal to the Plan area have channels with a developed pool structure. These higher order watercourses have flatter gradients and therefore lack the ability to develop deep pools where there is a lack of LWD.

Pools Filled- Past Activities

The assessment area (WAA) has a long history of human habitation. The main activities that could have contributed to past adverse impacts of the Watershed Assessment Area in regard to pools filled and excessive fine sediment are the same as those discussed above in the sediment effects section. It includes historic era wildland burning, agriculture/grazing, development, road building, and timber harvesting. Sedimentation of watercourses led to pools being filled and therefore a lack of protective and productive pool habitats. Effects of past activities can be seen today within the WAA, where sediment was once delivered to the watercourse in mass wasting, skid trails, and watercourse crossings, but is overall not significant in these watersheds.

Pools Filled Reasonably Foreseeable Probable Future Projects

As described above, the main activities that have been conducted within the Watershed Assessment Area are road building, timber harvesting, development, wildland burning, and agriculture. It is anticipated that these activities will continue. Trespass and illegal cannabis cultivation does occur within the WAA and is expected to continue. There may be some sedimentation that can be attributed to these activities, but the effects are not significant in the WAA. As discussed in the sediment effects section above, the FPRs and other county and state regulations for roads and timber harvesting ensure that there is not a significant impact in the future.

Pools Filled- Proposed THP

Excessive sediment delivery to streams can increase the rates of pool filling.

The following THP activities shall not adversely affect and shall maintain the existing watercourse condition described in the baseline conditions above:

- Silviculture – Single-Tree Selection and Group Selection regeneration methods regulate erosion upslope of watercourses, maintain streamside vegetation, and prevent sedimentation and pool filling.
- Road Improvements – Watercourse crossing upgrades and drainage facility maintenance decreases sedimentation and large-scale bank mass wasting events.
- Yarding Methods– use of existing skid trails that are stable and in good condition and appropriate waterbarring of these skid trails reduces the risk of erosion and sediment delivery to downstream watercourses.
- Soil Stabilization Measures – soil stabilization like mulching and slash packing reduces rates of erosion and sediment delivery to downstream watercourses.
- Winter Period Operating Plan – prevents the use of heavy equipment on saturated soils which prevents erosion and sediment delivery to downstream watercourses.
- In-Lieu Practices – Use of WLPZ facilities is only permitted with appropriate protection measures that are equivalent to or above the standard FPRs. This prevents erosion and sediment delivery to downstream watercourses.

Pools Filled- Conclusion

There may be an effect from historic past activities on the WAA in terms of sediment effects as discussed above, which would increase the amount of pools filled, but it is not at a significant level. Future projects are not expected to have an adverse impact to pools filled as there is not an expected adverse impact to sedimentation from future projects with current regulations. The proposed THP has measures in accordance with the FPRs that will prevent sedimentation. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on pools filled reveals that there are no significant cumulative impacts.

c. Aggrading

Stream aggradation describes the raise in channel bottom elevation of a watercourse channel due to the deposition of sediment. As a result of this elevated sedimentation, or as an example of it, stream aggradation is evident throughout the watershed. A minimal to moderate level of aggradation has occurred within the streams adjacent to and within the project area. These streams generally have gentle gradients and are therefore more susceptible to aggradation. The streams adjacent to the plan that have higher gradients show less aggradation, as these streams are more capable of flushing the sediment downstream. Spawning gravels are impacted by the delivery of fine and coarse sediment to the stream.

Aggrading- Baseline Conditions

The THP area contains the following baseline conditions regarding stream aggradation:

- **Gentle Stream Gradients** – The Class I watercourses proximal to the THP area, have a relatively gentle channel gradient. The gentle gradient inhibits rapid flushing of sediment downstream and has led to some stream aggradation, but not at a significant level.

Aggrading - Past Activities

The assessment area (WAA) has a long history of human habitation. The main activities that could have contributed to past adverse impacts of the Watershed Assessment Area in regard to aggrading and excessive fine sediment are the same as those discussed above in the sediment effects section. It includes wildland burning, agriculture/grazing, development, road building, and timber harvesting. Sedimentation of watercourses led to a rise in the elevation of the channel bottoms at times, and historic era skidding of logs down large watercourse channels may have changed the morphology of the channels and their gradients. Effects of past activities can be seen today within the WAA, where sediment was once delivered to the watercourse in mass wasting, skid trails, and watercourse crossings, but aggradation is not known to be continuing today or has effects at a significant level today.

Aggrading Reasonably Foreseeable Probable Future Projects

As described above, the main activities that have been conducted within the Watershed Assessment Area are road building, timber harvesting, development, and to a lesser extent wildland burning, agriculture, trespass, and illegal cannabis cultivation. It is anticipated that these activities will continue. As discussed above in the sediment effects section above, the FPRs and other county and state regulations for roads and timber harvesting ensure that there is not a significant impact in the future.

Aggrading- Proposed THP

Excessive sediment delivery to streams can increase the rates of aggradation, especially in lower gradient watercourses. The following THP activities shall not adversely affect and shall maintain the existing watercourse condition described in the baseline conditions above:

- **Silviculture** – Single-Tree Selection and Group Selection regeneration methods regulate erosion upslope of watercourses, maintain an evenly distributed canopy, maintain streamside vegetation, and therefore prevent sedimentation and pool filling.
- **Road Improvements** – Watercourse crossing upgrades and drainage facility maintenance decreases sedimentation and large-scale bank mass wasting events that may lead to aggradation.
- **Yarding Methods** (14 CCR 923; 916) – use of existing skid trails that are stable and in good

condition and appropriate waterbarring of these skid trails reduces the risk of erosion and sediment delivery to downstream watercourses. The majority of skid trails in the THP are on slopes with gentle gradients.

- Soil Stabilization Measures – soil stabilization reduces rates of erosion and sediment delivery to downstream watercourses on timber harvest activities that expose bare mineral soil near watercourses.

NCWAP report indicates that aggradation may not be occurring in the Gualala River watershed. The conclusion of the NCWAP report (Executive summary ES-18) is that " Instream sediment depositions indicative of disturbance occur along 56 of 300 miles of blue line streams, representing a 52 percent reduction from 1984 observations" Similar degrees of streambed aggradation were observed in aerial photos from 1942 and 1999/2000. Several years of thalweg profiles taken by GRT and cooperators now tentatively supports a conclusion that stream aggradation is not now occurring. Evidence from monitoring reaches measured by the Gualala River Watershed Council indicates thalwegs are increasing in average pool depth as sediments from old logging practices before the 1973 Forest Practices Act continue to wash downstream. Variation Index (VI) measures the complexity of the channel bed; reduction of complexity occurs with excessive sediment introduction; increased complexity indicates a recovery from such a condition. A variation index above 20 is a good indication of recovery. The variation index along Monitoring Site 217 range from approx. 12(2003) to 24(2015). A 2005 report at Mill Bend comparing visual cross section profiles did not determine whether aggregation or degradation was occurring at the time (ECORP Consulting Inc., 2005).

- Winter Period Operating Plan – prevents the use of heavy equipment on saturated soils which prevents erosion and sediment delivery to downstream watercourses. This also limits the use of temporary roads and trails within the WLPZ during the winter period, regardless of saturation levels.
- In-Lieu Practices – Use of WLPZ facilities is only permitted with appropriate protection measures that are equivalent to or above the standard FPRs. This prevents erosion and sediment delivery to downstream watercourses.

Aggrading- Conclusion

There may be an effect from historic past activities on the WAA in terms of sediment effects as discussed above, which could have increased aggradation. The baseline conditions within the project area or WAA do not include any watercourses that have been severely aggraded, and only moderate aggrading likely occurred in the historic past. Future projects are not expected to have an adverse impact to the aggrading of watercourses or sedimentation. The proposed THP is in accordance with the FPRs and an evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on aggradation reveals that after protection measures, there are no significant cumulative impacts.

- d. Bank Cutting and Downcutting: Bank cutting is indicated by areas of fresh, un-vegetated soil or alluvium exposed along the stream banks, usually above the low-flow channel and often with a vertical or undercut face. Severe bank cutting is often associated with channels that are down cutting, which can lead to over-steepened banks. As described above, high levels of sedimentation within the watershed has led to or is evidenced by stream aggradation. Also described above, is the fact that more recently, sedimentation levels have been decreasing and the watercourses are now flushing the sediment downstream and are down cutting through the stored sediment.

Bank Cutting and Downcutting Baseline Conditions

The THP area contains the following baseline conditions regarding bank cutting and downcutting:

- **Stream Aggradation** – As stated above, the THP area contains gentle gradient Class II watercourses that have experienced minimal degrees of stream aggradation. The historic filling of these channel bottoms has led to a slight rise in elevation in the watercourse channel and therefore has resulted in minimal amounts of bank cutting and downcutting.

Bank Cutting and Downcutting - Past Activities

The assessment area (WAA) has a long history of human habitation. The main activities that could have contributed to past adverse impacts of the Watershed Assessment Area in regard to bank cutting and downcutting and excessive fine sediment are the same as those discussed above in the sediment effects section. It includes wildland burning, agriculture/grazing, development, road building, and timber harvesting. Sedimentation of watercourses led to a rise in the elevation of the channel bottoms at times, which causes watercourse channels to cut down through fine sediment. Effects of past activities can be seen today within the WAA, where sediment was once delivered to the watercourse in mass wasting, skid trails, and watercourse crossings, but severe or significant downcutting or bank cutting is not known to be at a significant level.

Bank Cutting and Downcutting - Reasonably Foreseeable Probable Future Projects

As described above, the main activities that have been conducted within the Watershed Assessment Area are road building, timber harvesting, development, and to a lesser extent wildland burning, agriculture, trespass, and illegal cannabis cultivation. It is anticipated that these activities will continue. As discussed above in the sediment effects section above, the FPRs and other county and state regulations for roads and timber harvesting ensure that there is not a significant impact in the future.

Bank Cutting and Downcutting - Proposed THP

Excessive sediment delivery to streams can increase the rates of aggradation, especially in lower gradient watercourses, which can, in turn, increase the rates of watercourse downcutting through sediment to reach a natural watercourse grade. Excessive runoff or increased peak flows can increase the rate of downcutting.

The following THP activities shall not adversely affect and shall maintain the existing watercourse condition described in the baseline conditions above:

- Silviculture – Single-Tree Selection and Group Selection regeneration methods regulate erosion upslope of watercourses, maintain streamside vegetation, and prevent sedimentation and pool filling, while also regulating the amount of runoff reaching streams at rapid rates.
- Road Improvements – Where necessary the THP proposes to upgrade older culverts. Watercourse crossing upgrades and drainage facility maintenance decreases sedimentation and large-scale bank mass wasting events by sizing the crossing to be able to withstand a 100-year flood event and effectively draining road prisms to eliminate the possibility of road failure. Undersized culverts can also increase the velocity of streams as they pass through and cause major downcutting events at the outlet of the crossing. Culvert replacements involve setting the new culvert to watercourse grade. Older culverts may have been set above the grade with a shot-gunned outlet, which can create a pool at the outlet, fillslope erosion, and undermining of the fillslope. When the new culvert is installed, further excavation of fill material may be required to actually set the pipe at the channel bottom at watercourse grade. Once at grade, water can move freely under the road without being funneled or having to make a sudden drop in elevation.
- Yarding Methods (14 CCR 923; 916; protection measures) – use of existing skid trails (including in-lieu trails) that are stable and in good condition and appropriate waterbarring of these skid trails reduces the risk of erosion and sediment delivery to downstream watercourses. A majority of the skid trails expected to be utilized already exist. The reuse of existing facilities reduces the amount of new ground disturbance.
- Soil Stabilization Measures – soil stabilization reduces rates of erosion and sediment delivery to downstream watercourses.
- Winter Period Operating Plan – prevents the use of heavy equipment on saturated soils which prevents erosion and sediment delivery to downstream watercourses.
- In-Lieu Practices – Use of WLPZ facilities is only permitted with appropriate protection measures that are equivalent to or above the standard FPRs. This prevents erosion and sediment delivery to downstream watercourses.

Bank Cutting and Downcutting – Conclusion

There may be an effect from historic past activities on the WAA in terms of sediment effects as discussed above, which could increase the rates of downcutting and bank cutting. Within the project area, only minimal amounts of cutting were evident. Further future sedimentation is not expected to be significant throughout the WAA through future projects. The proposed THP is not expected to impact or increase bank-cutting or downcutting and is in accordance with the FPRs. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on bank cutting and down cutting reveals that with appropriate protection measures, there are no significant cumulative impacts.

e. Bank Mass Wasting:

According to the findings of geologist, the Gualala River system and surrounding topography evolved in response to rapid geologic changes along the west coast of North America over the past 30 million years, and especially in the last five million years. The landmass west of the South Fork of the Gualala is an uplifted portion of the Pacific Plate, a result in the change of plate boundary with the North American Plate to the east. The new transform fault system, known as the San Andreas Fault, is a right-lateral strike-slip fault that brought the Pacific plate up from the southwest over the last 30 million years. The main fault is located in the South Fork and North Fork Gualala River. The drainage networks evolved along with the changing landscape. The drainage network of the Gualala River is fault controlled and records the major tectonic and flood events that took place. The landscape continues to change, most notably by flood caused mass wasting. Mass wasting and erosion affect fluvial geomorphic conditions, which in turn affect aquatic habitat conditions. The causes of mass wasting are varied. A large percentage of mass wasting is a result of natural geologic processes. Grazing cattle and sheep on unstable grasslands and timber harvesting or road building on unstable soils can also result in mass wasting. Roads produced the highest sediment delivery to watercourse channels when compared to other erosion processes (MSG 1999). The majority of the road related mass failures were associated with fill slope problems, indicating that proper road construction techniques are critical for protecting instream resources.

The banks of the South Fork Gualala River appear generally stable. Aerial photos for the past fifty years have been studied and the location of the main watercourses appear to have remained stable except for meandering back and forth between the main banks. Class II watercourses show evidence of bank mass wasting where they cross pressure ridges that were formed by movement of the San Andreas fault.

Bank Mass Wasting- Baseline Conditions

The THP area contains the following baseline conditions regarding bank mass wasting:

- **Roads** – The existing road network within the project area contains a seasonal road. Many of the roads in the watershed were likely built during historic logging operations. The original road construction likely followed old railroad grades or historic trails. There are segments of these roads that are lacking adequate drainage features.
- **Yarding** – The THP area was previously logged using ground-based equipment. Therefore, there is an existing network of skid trails, the majority of which are stable and in good condition. The initial waterbarring of these skid trails, following construction, was not consistent with modern day FPRs. This resulted in areas of unrestricted runoff towards watercourses and small scale bank mass wasting

events. The THP area is mostly flat ground, so this was not a significant problem within the THP area. The majority of the trails in the WAA have been reused since their original construction and water bars have been installed. Therefore, natural drainage patterns have been restored and there is no longer a known to be significant problem with this in the WAA. Historic era logging activities did not consider Erosion Hazard Ratings and therefore waterbarring standards may not have been appropriate to prevent slope instability and erosion. The last harvests in the THP area, however, did appropriately apply waterbars and there are no significant erosion sites due to poor skid trail drainage.

- **Unstable Features** – Many of these unstable features are located upslope of watercourses and are a result of either natural erosional processes or historical logging or road building within and adjacent to watercourses. Historically, these features have likely contributed to active sedimentation and bank mass wasting.

Bank Mass Wasting - Past Activities

The assessment area (WAA) has a long history of human habitation. The main activities that could have contributed to past adverse impacts of the Watershed Assessment Area in regard to bank mass wasting, landsliding and excessive amounts of sediment and organic debris in watercourses are the same as those discussed above. It includes wildland burning, agriculture/grazing, development, road building, and timber harvesting. Effects of past activities can be seen today within the WAA, where landsliding and erosion once delivered sediment and organic debris to a watercourse, but severe or significant mass wasting is not known to be at a significant level. Within the WAA, most of the landsliding that is documented is east of the South Fork Gualala River within the Franciscan Complex. These events may have occurred because of past management practices in the WAA, as well as natural geologic processes, and contribute to the overall sediment effects of the WAA. This condition alone does not have a significant impact on the WAA.

Bank Mass Wasting - Reasonably Foreseeable Probable Future Projects

As described above, the main activities that have been conducted within the Watershed Assessment Area are road building, timber harvesting, wildland burning, agriculture, development, and illegal cannabis cultivation. It is anticipated that these activities will continue. As discussed above in the sediment effects section above, the FPRs and other counties and state regulations for roads and timber harvesting ensure that there is not a significant impact in the future for bank mass wasting.

Bank Mass Wasting - Proposed THP

Landsliding within watercourses, and all mass wasting events within the WAA, may continue to occur because of natural erosional processes, and may continue to occur as a result of past management.

The following THP activities shall not adversely affect and shall maintain the existing watercourse/watershed condition described in the baseline conditions above:

- **Silviculture** – Single-Tree Selection and Group Selection regeneration methods regulate erosion upslope of watercourses, maintain streamside vegetation, and prevent sedimentation and pool filling. All silvicultures maintain a high level of vegetation and root strength, especially near watercourses.
- **Unstable areas**- The THP shall avoid bank mass wasting events to the extent feasible.
- **Road Improvements** – Watercourse crossing upgrades and drainage facility maintenance decreases sedimentation and large-scale bank mass wasting events. This THP includes culvert replacements for metal culverts near the end of their lifetime.

- Yarding Methods (14 CCR 923; 916) – use of existing skid trails that are stable and in good condition and appropriate waterbarring of these skid trails reduces the risk of erosion and sediment delivery to downstream watercourses.
- Soil Stabilization Measures – soil stabilization reduces rates of erosion and sediment delivery to downstream watercourses.
- Winter Period Operating Plan – prevents the use of heavy equipment on saturated soils which prevents erosion and sediment delivery to downstream watercourses.
- In-Lieu Practices – Use of WLPZ facilities is only permitted with appropriate protection measures that are equivalent to or above the standard FPRs. This prevents erosion, landsliding and sediment delivery to downstream watercourses.

Bank Mass Wasting – Conclusion

There may be an effect from past activities on the WAA in terms of sediment effects as discussed above, in which bank mass wasting likely played a role, but the effects of those activities are not significant today. Further sedimentation from bank mass wasting is not expected to be significant throughout the WAA in the future, and within the project area, an additional protection measures are proposed to aid in the reduction of potential sedimentation. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on bank mass wasting reveals that there are no significant cumulative impacts.

f. Scouring

No areas of scouring or downcutting were identified during THP layout. Channel avulsion has occurred in the past along the South Fork Gualala River, as evidenced by abandoned channels in areas adjacent to the current stream channel. Given rain events and tidal influence of the estuary, these channels are dynamic with year to year fluctuations being observed through a review of satellite imagery. Some portions of Class II watercourses show minor evidence of downcutting. This would be expected due to sediment deposits along the banks of the South Fork Gualala River in this area which includes Class II watercourses.

Scouring- Baseline Conditions

The THP area contains the following baseline conditions regarding scouring:

- **Large Flow Events** - Since the RPF has begun working on this Plan, storm events within the THP area have been more severe as compared to recent history. The El Nino events of 2022/2023 resulted in atmospheric river events which undoubtedly influenced scouring. However, with the heavy alluvium load within the Gualala River, the effect of scour exposing and striping the channel bottoms to bedrock is not evident. Very few channels in the THP area exhibit a raw, eroded appearance and the level of scouring should be considered low.

Scouring - Past Activities

The assessment area (WAA) has a long history of human habitation. The main activities that could have contributed to past adverse impacts of the Watershed Assessment Area regarding peak flow are those that remove timberland or vegetation on a large scale like historic era wildland burning (post-harvest), agriculture/grazing, and timber harvesting. Additional activities include LWD removal.

- Wildland Burning: A large scale reduction in canopy and vegetation from past burning activities leads to excessive runoff and a lack of interception and delay of water reaching watercourses. This could have had an impact on peak flow and scour in combination with storm events in the past.
- Agriculture/Grazing: Similar to burning, a lack of forested areas converted to grasslands may have increased runoff and delivery of water to watercourses which in combination with storm events could have had impacts to peak flow and scour in the past.
- Timber Harvesting: With intensive and expansive timber harvest in the past, there may have been a lack of canopy on a large scale at various times followed by wildland burning that could have contributed to increased runoff and in combination with storm events, could have increase peak flow, the duration of peak flow, and scour in the past.

Scouring - Reasonably Foreseeable Probable Future Projects

As described above, the main activities that have been conducted within the Watershed Assessment Area are timber harvesting, wildland burning, agriculture, ranching and land development to other than timber use. It is anticipated that these activities will continue into the future. Harvesting is the main factor in the future that could affect scouring due to peak flow or large flow events, however with the FPRs, there is not expected to be a significant adverse impact on peak flow in combination with storm events because large scale clear-cutting followed by burning or conversion to grassland is not a permitted activity today.

Scouring - Proposed THP

- Silviculture (14 CCR 913): Adherence to FPRs and provisions in the THP are designed to maximize tree retention near streams and subsequently the filtering capability of the forest near watercourses, while minimizing sediment deposition. Vegetation retention across the landscape, utilizing the silvicultures proposed in this THP (Single Tree Selection and Group Selection) shall reduce the possibility of extended peak flows as noted in the Jackson State study (please see discussion of JDSF study in previous section on peak flows). Due to the level of selective harvesting in this proposed THP, there is not expected to be any measurable effect on peak flows and scouring of watercourse channels associated with this harvest.
- Yarding Methods (14 CCR 916; 923): This plan proposes to reduce the effects of peak flows and scouring because of operations with a combination of FPRs, Best Management Practices and the following proposed management practices:
 - Tractor operations are limited to existing skid trails when feasible.
 - Exposure of significant areas of soil or reduction of large amounts of vegetation will not occur in large areas.
 - Generally, slash remaining from operations and standing vegetation will remain on-site to lessen raindrop impact.
 - Large areas of exposed ground will not occur due to low amounts of repetitive skid trail use and no prescribed burning.
 - Limited use of WLPZ roads with mulching requirements as stated in Section II, Item 18.

Scouring - Conclusion

Because past activities were potentially on a larger scale that led to the reduction of forested land or canopy in the WAA, there may have been an impact during storm events regarding higher peak flow rates, longer duration of peak flow, or scouring. No future activities are expected in the WAA that would convert forestland, on a large-scale, to uses other than growing trees. The proposed THP does not propose large scale reduction in canopy or intensive broadcast burning. Therefore, there is not expected to be a significant impact. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on peak flow effects and scouring potential reveals that there are no significant cumulative impacts.

g. Organic Debris

Organic debris in a watercourse can have either positive or negative effects depending on the size and stability of the material. Large woody debris is an important component of a healthy functioning watershed, while an excessive amount of small fine organic debris may have a negative impact including increased acidity and decreased dissolved oxygen. A sudden large input of unstable organic debris, including logs, can have a detrimental effect on the watershed. Debris torrents, stream diversions, and barriers to fish migration can cause major impacts to the health and resilience of watershed ecosystems. LWD provides in stream habitat for salmonid species as well as storage and metering of sediment within the stream itself. A lack of LWD in Class I watercourses in the WAA has been identified as a limit on salmonid habitat function.

Large trees that fall into coastal streams play a dominant role in forming pools, metering sediment, trapping spawning gravels and creating a more complex stream environment. Redwoods are particularly valuable because a large tree may not decay for several hundred years (Kelly et al., 1995). Fir and spruce trees last for several decades while alder and hardwood species rot within a few years of being recruited into the stream (Cedarholm et al., 1997). In general, the larger the size of the woody debris the greater its stability in the stream channel. Heavier pieces require higher flows for mobilization and longer pieces are more likely to be caught by the stream bank and its vegetation. Reeves et al. (1993) found "that wood is a primary element influencing habitat diversity and complexity in streams. Consequences of decreased amounts of wood include loss of cover and structural complexity, decreased availability and abundance of habitat units, and reduced varieties of current velocities and other hydraulic features."

Organic Debris Baseline Conditions

The THP area contains the following baseline conditions regarding organic debris:

- **Small Organic Debris** – The Class I, II and III watercourses within the THP area have a moderate to high degree of canopy cover and therefore introduces a natural amount of small organic debris into the watercourses. The RPF has observed a large amount of leaf litter and needle cast in the Class II & III watercourses present in the Plan area. Currently, there is no evidence of the introduction of small organic debris into watercourses that likely occurred during historic logging activities within the Plan area.
- **Large Woody Debris** – The Class I (South Fork Gualala River) and the watercourses adjacent to the Plan area contain a moderate amount of LWD. Existing LWD is not causing any diversions. Existing LWD is mostly in the form of tree boles, root wads, and large branches that are contributing to bank stabilization and pool development. The high degree of stocking within the riparian buffers will contribute to the recruitment of LWD into these streams in the future. GRT is involved in the facilitation of ongoing stream reach, stream cross sectional, and LWD placement monitoring being

conducted annually by the Gualala River Watershed Council (GRWC) on GRT's property in the WAA and within the Gualala River Watershed in order to offset any potential impacts that may result from their timber harvesting activities.

Organic Debris - Past Activities

The main activities that could have contributed to past adverse impacts of the Watershed Assessment Area, specifically to organic debris, are wildland burning, agriculture/grazing, development, road building, and timber harvesting, similar to the discussion for organic debris effects above.

- Wildland Burning: Past burning activities could have reduced the amount of small debris in watercourses, however it also contributed to a lack of LWD available for watercourses. Burning that has caused bank mass wasting may have also delivered sudden inputs of sediment and organic debris into watercourses.
- Agriculture/Grazing: Past grazing and agriculture limited forestlands and therefore LWD, and mass wasting events caused by these activities and their roads may have suddenly input organic debris into watercourses.
- Development: Building and converting redwood forests within the WAA reduced the amount of LWD available. Portions of Gualala residential/industrial development and roads are located within forested stands, which have been permanently converted from land capable of growing and producing LWD.
- Road Building: Road building and mass wasting events of the past, prior to modern day regulations, undoubtedly input sudden amounts of organic debris into watercourses. Steeper portions of the WAA show evidence of this. Most of the WAA and the project area have much gentler slopes and therefore road building on these areas resulted in lower gradient roads with less failures.
- Timber Harvesting: Historic harvesting, prior to the FPR, did not consider erosion or mass wasting, and skid trail and road construction to assist in harvesting practices pushed sediment and debris into watercourses, or even converted watercourses to skid trails. Some areas of the WAA have evidence of historic era in stream landings and roads that have either been abandoned or are mostly eroded away. These likely involved a large input of organic debris and the removal of LWD at the time.

Organic Debris-Reasonably Foreseeable Probable Future Projects

As described above, the main activities that have been conducted within the Watershed Assessment Area are road building, timber harvesting, development, wildland burning, and agriculture. It is anticipated that these activities will continue into the future.

Road building is not expected to result in adverse impacts to the assessment area in the future as a majority of the assessment area is currently occupied with a sufficient road infrastructure and any new road constructed will utilize proper planning, design and construction techniques. Road maintenance and repair will increase in the future as awareness of the impacts of roads are evaluated and landowners work to improve their roads. This THP does not propose any new road construction.

The assessment area consists of both large private landowners, and small rural parcels. Typically, large private landowners manage large tracts of timberland within the WAA. A small portion of the WAA is also within the unincorporated community of Gualala where development and conversion have occurred. These activities on the larger ownerships are expected to continue. These future activities will be conducted with the knowledge gained from past practices and will result in fewer adverse impacts and improved forest health and diversity.

Wildland burning and pile burning are expected to be conducted in the future, to a certain degree by some landowners, to control fuel loads and vegetative cover and for site preparation activities. The amount of burning conducted is expected to be minimal and should not result in any adverse impacts.

Livestock grazing and other agricultural uses are expected to continue at limited levels.

Organic Debris- Proposed THP

- Silviculture (14 CCR 913): THP Item #14 describes the silvicultural methods proposed in this THP as Selection and Group Selection. These prescriptions will retain and maintain a moderate to high degree of overstory and understory cover throughout the Plan area and along WLPZ corridors, upland areas adjacent to tributaries, and on steep slopes and landslide features. Expected high levels of post-harvest vegetative cover throughout the plan area will help maintain and regulate the deposition of organic debris into aquatic ecosystems.
- Yarding Methods and Watercourse Protections (14 CCR 916.3 (b); 916.4(c)(3); 923.9(p); 916.3(d)): Accidental depositions of soil or other debris in lakes or below the watercourse or lake transition line in waters Classed I, II, and IV shall be removed immediately after the deposition or as approved by the Director. This FPR ensures that an excess amount of organic debris does not enter watercourses. Soil deposited during timber operations in a Class III watercourse other than at a temporary crossing shall be removed and debris deposited during timber operations shall be removed or stabilized before the conclusion of timber operations, or before October 15. All temporary road crossings of watercourses on the plan area will be removed and any organic debris deposited in these watercourses will be removed or stabilized so as to prevent an increase in the organic debris content of these watercourses. This activity will also take place prior to the winter period, therefore the first storms of the season will flow freely without sediment or debris. Waterbars are placed upslope of all road and tractor crossings to hydrologically disconnect the roads and trails from the watercourses. Vegetation other than commercial species bordering and covering meadows and wet areas shall be retained and protected during timber operations.

Organic Debris Conclusion

The existing conditions within the WAA regarding organic debris effects indicate that there may have been an impact in the historic past, but since the adoption of protective regulations and the overall ground cover and topography of the WAA, the effects have become less than significant overall. There is a natural input (not excessive) of small organic debris in watercourses, and the reintroduction of LWD is slowly increasing. The proposed THP has measures in accordance with the FPRs regarding WLPZ protection and organic debris recruitment. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on organic debris effects reveals that there are no significant cumulative impacts, and that current conditions will be maintained or improved through the project implementation.

h. Streamside Vegetation

Stream-side vegetation and near-stream vegetation provide shade or cover to the stream, which may have an impact on water temperature, and provides root systems that stabilize stream banks and floodplains and filter sediment from flood flows. Root systems of terrestrial vegetation provide a natural stabilizing factor of streamside banks in addition to providing terrestrial insect drop (i.e. fish food) and nutrients in the form of leaf litter and organic material. Leaf litter, organic material and their associated nutrients are known to be utilized as a food source by benthic macro-invertebrates, which in turn are a major food source of fish. Terrestrial vegetative bank protection is very substantial in the form of large conifers, hardwoods, sedges, grasses, ferns, and various berries in this watershed.

Streamside Vegetation- Baseline Conditions

The THP area contains the following baseline conditions regarding streamside vegetation:

- **Canopy Cover** – There is one Class I watercourse within or adjacent to the Plan area with canopy closure ranging from 80-100%. The THP area contains several Class II-Standards and several Class III watercourses along with wet areas. Streamside vegetation and shade canopy along Class II and III watercourses across the Plan area varies from as high as 100% to as low as 60%. There are no areas that are severely lacking in canopy or vegetation within the project area. Canopy cover is comprised mainly of redwood, Douglas-fir, Pepperwood and red alder in the overstory with an abundance of ferns and grasses in portions of the understory where there is sufficient light for plant growth. While historic logging activities may have removed canopy cover adjacent to watercourses, current conditions reveal adequate regeneration, high stocking, and recovered shade canopy. There are WLPZ roads within the WAA and project area. WLPZ roads inherently decrease canopy cover adjacent to higher order watercourses, but these roads are generally single lane roads with turnouts and are narrow. Road maintenance does require the removal and or pruning of overstory trees for log truck traffic. This is not excessive and is necessary for safe operations.

Streamside Vegetation - Past Activities

The main activities that could have contributed to past adverse impacts of the Watershed Assessment Area, specifically to streamside vegetation, are wildland burning, agriculture/grazing, development, road building, and timber harvesting, similar to the discussion for sediment effects above.

- **Wildland Burning:** Past burning activities could have reduced or removed canopy and streamside vegetation. Burning of streamside vegetation including forbs and lower canopy species could have greatly impacted slope stability and water temperatures.
- **Agriculture/Grazing:** Past grazing and agriculture limited forestlands and possibly streamside vegetation, and over-grazing near riparian areas may have greatly impacted slope stability, water quality, and water temperatures.
- **Development:** Building and converting within riparian areas reduced the amount of streamside vegetation available.
- **Road Building:** Road building and mass wasting events of the past, prior to modern day regulations, undoubtedly removed streamside vegetation.

- Timber Harvesting: Past historic timber harvesting, in general, did not consider riparian zones or WLPZs, and harvesting and removing of streamside vegetation was common.

Streamside Vegetation - Proposed THP

Excessive removal of streamside vegetation can cause slope instability, increases in water temperature, and increases in sedimentation.

The following THP activities shall not adversely affect and shall maintain the existing watercourse condition described in the baseline conditions above:

- **Silviculture** – Selection and Group Selection within the proposed THP with a 30 foot wide no harvest Core zone adjacent to the Class I watercourse, regulate erosion upslope of watercourses, maintain streamside vegetation, and prevent excessive erosion leading to sedimentation and pool filling.
- **Road Improvements** – Watercourse crossing upgrades and drainage facility maintenance decreases the number of failures near watercourses, therefore saving streamside vegetation.
- **Yarding Methods** (14 CCR 923; 916) – use of existing skid trails that are stable and in good condition and appropriate waterbarring and removal of temporary crossings of these skid trails reduces the risk of erosion and sediment delivery to downstream watercourses, and also the loss of streamside vegetation due to erosion.
- **Soil Stabilization Measures** – soil stabilization of bare mineral soil that was exposed during watercourse crossing activities, pulling of temporary crossings, and road crossing upgrades reduces rates of erosion and sediment delivery to downstream watercourses, and aids in the effect of streamside vegetation and cover. It can help to establish vegetation and renew the streamside vegetation in the years to come.
- **In lieu practices**- The utilization of skid trails in the WLPZ is primarily limited to existing stable skid trails that will not impact stream side vegetation. The utilization of existing watercourse crossing tractor crossings occurs in areas that were previously disturbed. Given the protection measures and vegetation type it is expected that the decrease in streamside vegetation will be short lived and less than significant.

Streamside Vegetation – Conclusion

In past projects, prior to the FPRs, the WAA did experience large-scale, intensive timber harvesting which likely removed the vast majority of the streamside vegetation in areas during individual logging seasons. More recent past projects followed the FPRs and did not have removal of vegetation near streams. Currently, the baseline condition of the WAA is that there are an abundance and healthy amount of streamside vegetation. Future projects within the WAA are expected to promote and protect streamside vegetation through regulations. The THP, as proposed, is designed to protect streamside vegetation. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on streamside vegetation reveals that there are no significant cumulative impacts.

i. Recent Floods:

There have been recent high flow events in the past winters that would be considered slightly unusual in the WAA, however, flooding of the Gualala River is a common event every winter. The project is proximal to the South Fork Gulala River and project area includes floodplain area associated with both streams. The likelihood of flood events within the project area itself is moderate and is subject to rain and/or tidal events. In WAA, flooding is a common occurrence.

Recent Floods- Baseline Conditions

The Gualala River regularly floods its banks. A rise in elevation of the alluvial flood plain adjacent to the river (a sediment trap) has been documented. It has been estimated that the alluvial flats have risen up to 3.5 feet in the last thirty years due to sediment depositions. These flats therefore function as sediment traps during flooding. Recent events that have been somewhat higher have not changed much of the watercourse condition in the WAA as the floodplain of the Gualala is always changing and has a heavy load of sediment and gravel.

Recent Floods Conclusion

There have been higher flows associated with recent storms in the past few years; however, these have not significantly changed the watercourse conditions within the WAA. There are flood prone areas within the THP. Operations, within these areas, will be limited to the provisions stated within Item 18, 26 and 27 of Section II. Operations will not exacerbate flood events. Flood events are subject to rainfall events and tidal fluctuations. The project will not have a material impact on Peak Flow events or disrupt the current drainage patterns within the watershed.

Additional Watershed Considerations: Fog Drip Discussion

Timber stands close to the coast receive significant amounts of moisture from fog drip. Dawson (1996) determined that 8-34% of water used by coastal redwood trees and 6-100% of water used by understory vegetation originated as fog drip. The closer to the coast the more pronounced the effect since more days have significant fog. The removal of canopy by harvesting would necessarily reduce the amount of fog interception and therefore reduce fog drip (at least temporally until the canopy closes). The effect on ground water and stream flow is less clear since although fog drip is reduced by removal of canopy through logging, evapotranspiration is also reduced by the removal of the tree. Loss of evapotranspiration from forest harvest may be a more significant variable to changes in watershed hydrology than fog drip (Keppeler 1998). Timber harvest has been found to increase streamflow by diminishing transpiration and canopy interception, which offsets any reduction in fog drip. This was concluded by Keppeler in 2007 in her post-harvest analysis of a 65% selective harvest by volume and a 50% clearcut by area in the Caspar Creek watershed.

Fog Drip Baseline Conditions

The plan area is located approximately 2 miles from the Pacific Ocean. The assessment area for fog drip includes the planning watersheds associated with the THP (Big Pepperwood Creek and Mouth of Gualala River). The project area frequently experiences fog during the morning hours of the summer and fall months. Redwoods growing in this belt contribute to fog drip within the WAA. The forested area within the WAA has a high volume of large (>24") redwood trees. The forested area of the project has a high volume of large redwood trees.

Fog Drip Past Projects

Historic past projects in which vast areas and amounts of large diameter redwood were removed at once undoubtedly impacted fog capture, absorption, and delivery to the ground. The amount of fog absorption and drip produced prior to the initial harvest was probably remarkably high. Between intensive harvests, fog drip probably increased as trees and crowns regenerated. Selective harvests within the WAA in subsequent past projects and more recent projects would have maintained or improved fog drip by opening stands while allowing residual dominant and codominant trees to increase their crown growth and therefore fog capturing capacity.

Fog Future Projects

Future projects within the WAA and project area would maintain or improve fog drip from all regeneration methods in the FPRs. The use of unevenaged methods (which would be used on the plan submitter's ownership in the future) would especially maintain or improve fog drip. There may be a slight temporary reduction post-harvest, and then a return to the baseline or even an increase over time.

Fog Drip Proposed THP

Fog is common in the plan area and fog drip may be slightly reduced initially because of this operation. Given the proposed silvicultural prescriptions and relatively small footprint, it is anticipated that the THP will not have an impact on fog drip since there will still be a high amount and distribution of large-crowned redwood trees capable of fog capture. Petreshen (2021) found that topography and tree species composition are a larger predictor of fog presence than the density of the forest and that harvest did not impact fog inundation. This plan proposes to largely maintain current species composition trends and will not alter the topography of the project area. Where larger trees exist in the WLPZ, harvests are limited and require large tree retention. An abundance of large conifers shall be retained post-harvest that will continue to input fog precipitation into the watershed.

Fog Drip Conclusion

Fog drip is common in the WAA and project area, and both contain a large diameter tree component, especially in redwoods. Past projects of greater scale and harvest intensity, such as the initial harvest, probably reduced fog drip input in a dramatic way within the WAA. Later and more recent entries were far and few between (34 years ago), and less intensive and therefore did not have a significant impact. Additionally, this area was harvested prior to the FPRs and has recovered to the point where the area has been experiencing healthy fog drip input, relative to the climate conditions. Future projects and the proposed THP will have a slight temporary reduction post-harvest, but over time will return to baseline or increase in the amount of fog drip produced. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on fog drip reveals that there are no significant cumulative impacts.

Watershed Resource Overall Conclusion

In conclusion, there is not a significant cumulative adverse impact to Watershed Resources with the implementation of this THP. There may still be an impact to the watershed condition of sediment effects within the WAA from historic past projects; this can impact water temperature, aggradation, pool filling, down cutting and bank cutting. The impact of sedimentation is from past harvesting methods, development, road construction, and operations within unstable areas from past projects that occurred prior to the implementation of the Forest Practice Rules. The baseline condition is that there is still evidence of sediment delivery in watercourses within the project area from these past practices prior to the FPRs and the Handbook for Forest and Ranch Roads within the WAA, but not at a level that is significant. There are no significant effects expected from future projects, and with the FPRs in place as well as the topographic setting of the project area, there are no significant impacts expected from the proposed THP. All other watershed conditions not related to sediment effects do not have a significant impact from the past, reasonably foreseeable probable future projects or the proposed THP. Altogether, the RPF has assessed that there are no significant cumulative impacts to the watershed resources. All the watershed effects and watercourse conditions are expected to be maintained or positively impacted through the implementation of the project.

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Personal Communications

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B. Soil Productivity Resources: Assessment

1. Organic Matter Loss

Significant losses of organic matter can result in long-term loss of soil productivity. Loss of organic matter will expose topsoil to erosion, which along with duff, litter layer and woody debris provides the source of nutrients for future forest growth. Organic matter loss can occur by displacement of surface organic materials during skidding, mechanical site preparation, and other land disturbing activities and from erosion, burning, or oxidation of exposed fine organic material. Soil productivity is affected by the loss of nutrients stored in organic matter, surface exposure that results in higher temperatures and increased evaporation during the dry season, and reductions in soil porosity from loss of soil organic matter.

Minimizing the amount of disturbed soil is the most effective method of limiting organic matter loss. Retention of trees on unstable areas and in riparian zones leaves large areas of the assessment area with canopy cover. This protects organic matter loss through interception of rainfall and over time adds to the organic matter layer. In coastal lands, where this THP is proposed, organic layer loss is a short-term condition, as rapid plant growth following harvest leads to quick replenishment of the organic layer when displaced. This is particularly notable following controlled burning, where rapid vegetation growth is spurred by sunlight exposure and availability of fire-released nutrients previously stored in debris.

The THP area contains the following baseline conditions regarding organic matter loss:

- **Existing Infrastructure**– The THP currently contains an existing network of roads and skid trails in which organic matter was displaced and possibly removed during past project activities. Evidence of past burning is apparent in some areas; however, the intensity and extent of the burning is unknown. Burning results in organic matter loss.
- **Unstable Features** – The RPF has identified a few unstable features adjacent to the THP area that have been excluded from the THP. Most of these are located upslope of watercourses and are a result of either natural erosional processes or historical logging within and adjacent to watercourses. These features established themselves within historic times. Historically, these features have likely contributed to organic matter loss through bank mass wasting.

Organic Matter Loss Past Projects

The main activities that may have contributed to past adverse impacts of the Soil Productivity Assessment Area (THP area), specifically to organic matter loss, are wildland burning, development, agriculture/grazing, road building, and timber harvesting.

- **Wildland Burning:** Past burning activities could have reduced the amount of vegetation and slash after harvest on a large scale, reducing the amount of organic matter available for soil production, however, there have been minimal large-scale entries into this particular project area in the recent past.
- **Agriculture/Grazing:** Past grazing and agriculture effects are not evident within the project area, however, there likely was a time when ranching and grazing occurred in the portions of the THP (limited), which may have reduced organic matter through overgrazing.
- **Road Building:** Road building within the project area removed topsoil and displaced organic matter in areas with this activity occurred.

- Timber Harvesting: Past timber harvesting in general did not consider the value of organic matter in the production of soil, a vital component of a healthy forest. The initial timber harvests in the project area were the projects that resulted in the most organic matter loss. Contemporary harvests do not appear to have resulted in much if any organic matter loss.
- Road Construction: the development of the roads within the project area resulted in the loss of organic matter. Some roads have been maintained for continued use and have been rocked, other secondary roads, have not been maintained and have various levels of reoccupation of vegetation.

Organic Matter Loss-Reasonably Foreseeable Probable Future Projects

Future projects within the project area will follow the FPRs, and have the same impact as the current project, which is that there is not a significant adverse impact. The roads proposed in this THP should be sufficient for management, but if more roads are to be built in future projects, the loss of organic matter would be offset by the access the road allows to manage and support the rest of the forested area to continue to produce organic matter. The project area will likely be managed again in the same manner in roughly 10-20 years. Slash generated from the harvest will be reduced to lower the risk of wildfire, but enough will remain on site in so to not have an adversely affect soil productivity.

Organic Matter Loss- Proposed THP

- Silviculture: THP Item #14 describes the silvicultural methods proposed in this THP as Single Tree Selection and Group Selection. These silvicultures will retain and maintain a high degree of overstory and understory cover throughout the Plan area and along WLPZ corridors, upland areas adjacent to tributaries, and on steep slopes and landslide features. Expected high levels of post-harvest vegetative cover throughout the plan area will help maintain and regulate the deposition of organic matter.
- Yarding Methods: The use of existing skid trails will reduce the amount of organic matter loss in the project area since those were already converted in the past. Slash will be used to cover exposed soil on banks of watercourse crossings after removal and WLPZ trails. Some slash generated in the woods from operations will remain at levels appropriate for protection from forest fires, and some slash will be brought to and generated at the landings.
- Road Construction: No new roads are proposed for construction. The existing road infrastructure is sufficient to facilitate the proposed operations.
- In-lieu Practices: The plan proposes to utilize segments of existing WLPZ skid trails, these trails will be slash packed and will likely see an increase in organic matter following operations.

Organic Matter Loss Conclusion

The existing conditions within the Soil Productivity Assessment Area regarding organic matter indicate that there may have been an impact in the past, but since the last harvest the effects have become less than significant in many aspects. There has been a natural input of organic matter after the last harvest to the present day. The proposed THP activities do not have a significant impact on organic matter loss. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on organic matter loss is that there are no significant cumulative impacts, and that current conditions will be maintained or improved through the project implementation.

2. Surface Soil Loss

Topsoil is the major storehouse of nutrients that provide current and future site fertility. Displacement or loss of topsoil can have an immediate and long-term negative effect on an area to grow trees and plants, which may not be readily measurable. Soil loss occurs from mechanical displacement (scalping) during road construction, harvesting, or site preparation and by surface erosion or mass wasting on harvest units. Removing the surface soil has a disproportionate effect on soil productivity because the upper layers of soil are the storehouse of organic matter and nutrients that have accumulated from decomposing plant materials and atmospheric sources. Loss of soil by surface erosion from harvesting units is generally small for timber operations conducted under current Forest Practice Rules, and mass wasting (above background rates) from timber operations is prevented by identifying and placing limits on operations in unstable areas.

Surface soil loss may occur because of road and landing construction, skid trail construction, displacement into piles or windrows or mass wasting, and burning. Road and landing construction is not proposed within the THP area, therefore, not likely to cause a significant reduction in soil productivity. Skid trail construction will not be necessary for this plan and will not cause significant impacts to soil productivity. Displacement of surface soils during slash piling or windrowing affects only a portion of the topsoil and is done on a very small percentage of the plan area. This activity will, therefore, have minimal impact on soil productivity.

The THP area contains the following baseline conditions regarding surface soil loss:

- **Existing Infrastructure**– The THP currently contains an existing network of roads and skid trails in which surface soil was displaced during past project activities. Evidence of past burning is apparent in some areas; however, the intensity and extent of the burning is unknown. Burning can impact the stability and health of surface soil.
- **Unstable Features** – The RPF has identified a few unstable features that are excluded from the THP area. Most of these are located upslope of watercourses and are a result of either natural erosional processes or historical logging within and adjacent to watercourses. Some of these features appear to have failed in historic times. Historically, these features have likely contributed to surface soil loss through bank mass wasting.

Surface Soil Loss Past Projects

The main activities that may have contributed to past adverse impacts of the Soil Productivity Assessment Area (THP area), specifically to surface soil loss, are road building and timber harvesting.

- **Road Building:** Road building within the project area removed topsoil and displaced organic matter on a limited amount of area.
- **Timber Harvesting:** Past timber harvesting in general did not consider the surface soil in the production of soil, a vital component of a healthy forest. The last timber harvest in the project area was the project that resulted in the most organic matter and surface soil loss, however because there are few permanent roads the loss was not significant.

Surface Soil Loss-Reasonably Foreseeable Probable Future Projects

Future projects within the project area will follow the FPRs, and have the same impact as the current project, which is that there is not a significant adverse impact. The roads proposed in this THP should be sufficient for management, but if more roads are to be built in future projects, the loss of

surface soil would be offset by the access the road allows us to manage and support the rest of the forested area to continue to produce surface soil. The project area will likely be managed again in the same manner in roughly 10-20 years but should require even less surface soil loss.

Surface Soil Loss- Proposed THP

- **Yarding Methods:** The use of existing skid trails will reduce the amount of surface soil loss in the project area since those were already converted in the past. Ground-based operations will result in some displacement of topsoil through skidding of logs; however, the disturbance is minimal and the topsoil generally stays on site.

In-lieu Practices: Limitations to the WLPZ and access to areas where surface soil could be lost reduce the impact of surface soil loss. The THP will use segments of existing skid trails within the WLPZ. The skid trails will be kept to the minimum necessary for the removal of logs. The displacement and removal of topsoil is not expected, and organic matter in the form of slash and mulch will be applied to the skid trails after operations.

Surface Soil Loss Conclusion

The existing conditions within the Soil Productivity Assessment Area regarding surface soil indicate that there may have been an impact in the past, but since the last harvest the effects have become less than significant in many aspects. There has been a natural input of organic matter and topsoil has stayed relatively undisturbed after the last harvest to the present day with the exception of those areas that were inundated from flooding. The proposed THP activities do not have a significant impact on surface soil loss. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on surface soil loss is that there are no significant cumulative impacts, and that current conditions will be maintained or improved through the project implementation.

3. Soil Compaction

Highly compacted soils inhibit plant growth for a variety of reasons and can cause increased surface water runoff resulting in erosion. Soil compaction in timberlands is typically caused by heavy equipment running repeatedly over soils that are fully or partially saturated.

The THP area contains the following baseline conditions regarding soil compaction:

- **Depth of Surface Litter** – The depth of the surface litter is variable within the THP area, however on average the depth ranges from 2-12 inches. The surface litter is comprised of leaf litter (Pepperwood and alder), needle cast (redwood and Douglas-fir), branches, native grasses and duff. The surface litter is well distributed and is neither lacking nor excessive within the THP area. The surface litter in the THP area is sufficient to prevent excessive soil compaction due to ground-based operations.
- **Soil Structure** – The soil structure within the Plan area is low to highly permeable and well-drained indicating pore space between soil particles. Soil structure is susceptible to soil compaction when the space between pores is large. Further information on soils present in the THP may be found in Sec V.

- **Soil Organic Matter Content** – The soil organic matter content within the THP area is primarily composed of decaying leaf litter, needle cast, branches, bark, and logs. Forb species (bracken fern, sword fern, and redwood sorrel) and berries from brush species (huckleberry, salal and blackberry) also contribute to the soil organic matter content. Because the soils within the THP area have a healthy amount of soil organic matter, the risk of excessive soil compaction is reduced.
- **Presence and Amount of Course Fragments in the Soil** – Soil within the THP area has a moderate to high depth to bedrock. The soil is derived from sandstone, mudstone, and marine sediment. The amount of course fragments in the soil is moderate to high. The light harvest proposed will equate to very little of the ground being crossed by equipment.
- **Soil Texture** – The soil has a fine texture but the ground is mostly flat and covered with live and dead vegetation. There is a low chance for mobilization of soils.
- **Soil Moisture Status** – The soil moisture within the THP area varies throughout the year. On average the available water capacity of the specific soil types is low, but the area itself has a higher water table. Soil moisture depends greatly on microsite within the Plan area. Riparian corridors with higher amounts of LWD, canopy cover, and organic soil material tend to retain soil moisture throughout the year.

Soil Compaction Past Projects

The main activities that may have contributed to past adverse impacts of the Soil Productivity Assessment Area (THP area), specifically to soil compaction, are development, road building and timber harvesting.

- Grazing: Conversion of timberland to grassland for livestock grazing can have isolated impacts to the compaction of soil.
- Road/Skid Trail Building: Road building within the project area removed topsoil and compacted soil within its prism.
- Timber Harvesting: Past timber harvesting in general did not consider the surface soil in the production of soil, a vital component of a healthy forest. The last timber harvest in the project area was the project that resulted in the most organic matter and surface soil loss, however because there are few permanent roads and a limited amount of skid trails the loss was not significant.

Soil Compaction -Reasonably Foreseeable Probable Future Projects

Future projects within the project area will follow the FPRs, and have the same impact as the current project, which is that there is not a significant adverse impact. The roads proposed in this THP should be sufficient for management, but if more roads are to be built in future projects, new soil compaction would be offset by the access the road allows to manage and support the rest of the forested area to continue to produce soil. The project area will likely be managed again in the same manner in roughly 10-20 years but should require even less soil compaction. Future development is the highest risk to soil compaction in the assessment area.

Soil Compaction - Proposed THP

- **Yarding Methods:** The use of existing skid trails will reduce the number of new areas being compacted in the project area since those were already converted in the past. Additional skid trail constructed is not deemed necessary for this project. Ground-based operations will result in some further compaction of existing trails, but the surface of the skid trails will still be able to provide growing space (to some grass, shrub and tree species) and will contain waterbars and dips for drainage.
- **Road Use:** Though new road construction is not proposed within the THP, there are a number of permanent and seasonal existing roads that are proposed for use. Running equipment or log trucks on these existing roads could result in soil compaction. No additional areas, outside of existing roads and skid trails, are anticipated to experience soil compaction. Any changes in overall soil compactions will be negligible and limited to the existing transportation infrastructure.
- **In-lieu Practices:** Limitations to existing and identified WLPZ trails will not result in additional areas exposed to soil compaction. There are only a few segments of skid trails within the WLPZ proposed for use, and the displacement and removal of topsoil is not expected, and organic matter in the form of slash and mulch will be applied to the skid trails after operations.

Soil Compaction Conclusion

The existing conditions within the Soil Productivity Assessment Area regarding soil compaction indicate that there may have been an impact in the past from development, especially due to a lack of proper drainage, but there is not a present significant adverse impact to soil productivity in the assessment area. Future projects are not anticipated to require extensive new road construction. This THP will not result in more soil compaction than currently present or the recent past. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on soil compaction is that there are no significant cumulative impacts, and that current conditions will be maintained or improved through the project implementation.

4. Growing Space Loss

Potential losses to growing space would primarily result from new roads, landing, skid trail construction, and/or mass wasting events. There are no roads proposed for construction. Existing roads and skid trails will be utilized within the proposed plan. There are no present significant effects to soil productivity due to growing space loss in the project area.

The Caspar Creek watershed study (Keppeler, Reid, and Lisle, 2009) provides an example of how practices related to growing space have improved over the past two to three decades. When the South Fork was logged selectively with tractors from 1971 to 1973, approximately 15% of the watershed was compacted through the creation of roads, skid trails, and landings. When the North Fork was logged from 1985 through 1991, only about 3% of the basin was found to be compacted by creating new roads. Since practices have continued to improve, this level of impact to growing space can be anticipated to continue at the 1985 through 1991 level or decline even further.

The THP area contains the following baseline conditions regarding growing space loss:

- **Skid Trails-** Skid trails exist throughout the project areas as the result of past logging. Several segments of legacy skid trails are proposed for in lieu utilization. Measures are incorporated in the THP to avoid potential cumulative impacts.

Growing Space Loss Past Projects

The main activities that may have contributed to past adverse impacts of the Soil Productivity Assessment Area (THP area), specifically to growing space loss, are road building and residence building.

- Skid Trails: Much like roads, skid trails are crucial in facilitating the harvest of trees. Past logging practice limitations resulted in more skid trails being constructed than would typically be seen on a modern timber harvest.
- Grazing: Historic agrarian efforts attempted to convert forestland to grasslands for livestock grazing. This included the clearcutting of forests and broadcast burning in so that only annual grasses persist. This area is no longer grazed. The plan area is zones and managed for timber production. The areas within the plan boundary were selected as they had commercial conifers.

Growing Space -Reasonably Foreseeable Probable Future Projects

Future projects within the project area will follow the FPRs, and have the same impact as the current project, which is that there is not a significant adverse impact. The existing roads proposed in this THP should be sufficient for management, and more roads are not expected to be built in future projects. The project area will likely be managed again in the same manner in roughly 10-20 years with no additional growing space loss.

Growing Space Loss - Proposed THP

- **Road Construction:** No new roads are proposed for construction. The existing infrastructure will be utilized to facilitate yarding and hauling activities.
- **Yarding:** Although many existing skid trails will be reused, it is likely that some of the older skid trails that once did result in growing space loss, will not be reused. This is because trees that these trails access are not marked for harvest. These trails are regrowing vegetation, therefore there will be a net positive for growing space in this regard.

Growing Space Loss Conclusion

The existing conditions within the Soil Productivity Assessment Area regarding growing space loss indicate that there was not a significant impact in the past, and there is not a present significant adverse impact to soil productivity in the assessment area. Future projects are not anticipated to require extensive new road construction. This THP should not result in additional growing space lost. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on growing space is that there are no significant cumulative impacts, and that current conditions will be maintained through the project implementation.

Soil Productivity Resource Overall Conclusion

The current condition of the assessment area (project area) in terms of soil productivity is that of high soil productivity, and no significant impacts to soil productivity from past activities. This project will result in some organic matter displacement, surface soil displacement, soil compaction and little to no growing space loss, but will also result in growing space gain through the lack of use of inaccessible skid trails, surface soil protection through proper drainage, organic matter inputs through management and logging, and less long term soil compaction through the implementation of adequate road construction now. Soil productivity impacts tend to occur when operations are conducted without regard for minimizing effects on soil resources. This operation will limit its effects by operating under the BMPs of the Forest Practice Rules to minimize organic matter, surface soil, soil compaction and growing space losses. Based on the above information, no significant adverse cumulative effect associated with soil productivity is anticipated with this plan.

Identification of Information Sources: B. Soil Productivity Resources

Keppeler, Elizabeth & Reid, Leslie & Lisle, Tom. (2009). Long-term Patterns of Hydrologic Response after Logging in a Coastal Redwood Forest.

Past THPs on record with the California Department of Forestry and Fire Protection. Howard Forest/ Santa Rosa Calfire Office.

USDA Natural Resources Conservation Service Web Soil Survey web site:

<https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

GRT's geographic information system maps

Personal Communications

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C. Biological Resources: Assessment

The Biological Assessment Area (BAA) is the same as the WAA but also includes all areas within 0.7 miles of the THP boundaries. The BAA is portrayed on the WAA Maps. A broad array of habitat is encountered across the biological assessment area which includes coastal redwood forests, coastal bluffs and shoreline, riparian areas, floodplains, small and large grassy openings, sag ponds, rural development, the community of Gualala, beaches, ocean, the Gualala River Estuary, and many small watersheds contributing to the Gualala River Watershed. Eastern parts of the assessment area are covered by a generally mountainous area. This assessment area as described is large enough to account for any effects that may be caused by this THP.

Notably, there are two Class I watercourses (The South Fork and the Main Stem of the Gualala River) proximal to the plan boundary. There are two Northern Spotted Owl Activity Centers that are within 0.7 miles from the THP boundary. These are both over a quarter mile from the THP boundary.

The biological resources are the plants, vertebrate, and invertebrate species that inhabit the Biological Assessment Area during all or part of the year. Species of concern are those identified as known Rare, Threatened or Endangered listed (US & CA) species and Sensitive Species (BOF). The Natural Diversity Data Base (NDDB) of the California Department of Fish and Wildlife (DFW), California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California, the California Wildlife Habitat Relationships System (WHR) and various wildlife biologists were consulted for occurrences of special plants, animals and natural communities on the biological assessment area. While the BAA is comprised of the area within 0.7 miles of the THP, six adjacent USGS quadrangles were assessed for plant and animal occurrences. This information is found in Section V of the THP.

Biological Resources- Baseline Conditions

The THP contains the following baseline conditions regarding biological resources, in which each are expanded on below this list:

(1) **Known Listed Species** – Please see the extensive list below for all species that could be directly or indirectly affected by proposed project activities. Although there are many species known to exist within the BAA and have habitat within the project area, there are no species that are expected to be adversely affected by proposed operations.

(2) **Significant Known Wildlife or Fisheries Resource Concerns-** The Gualala River is 303(d) listed as sedimentation/siltation, aluminum, and temperature impaired (with a TMDL). Suitable habitat for the NSO activity centers is plentiful in the BAA and will not be downgraded as a result of operations on this THP. Some forest habitats are limited or impacted within the project area and BAA due to a lack of burning over the last century (large scale fire suppression) and lack of maintenance of forests and grasslands which allows for an overabundance of dense brush species like manzanita and huckleberry to persist and take over.

(3) **Aquatic and Near Aquatic Habitat Conditions-** Please see the species list below for the current conditions of pools and riffles, large woody material, and near-water vegetation as it applies to aquatic species. Overall, this resource is generally in good condition in the BAA. The Gualala River system has a high amount of deep sediment, and these gravel bars move substantially during flood events, but the increasing amount of LWD being reintroduced to the river allows for the development of pool structures in certain portions of the river. Aquatic habitat is in good condition within the plan area and immediate surrounding area, but some effects like sedimentation are evident today at a less than significant level to aquatic species.

(4) **Biological Habitat Conditions-** Please see the section below for the current conditions of snags/den trees/nest trees, downed large woody material, multistory canopy, road density, hardwood cover, late seral (mature) forest characteristics, late seral habitat continuity, and special habitat elements. There is a moderate presence of snags (firs from drought; redwoods from storm damage) and special characteristic trees near riparian areas, a healthy multistory canopy, downed large woody material, moderate road density with few drainage issues, moderate hardwood cover, no late seral forests or habitats.

(1) Known Listed Species

Birds

During layout of this plan the THP area was traversed numerous times. Signs of possible raptor predation have been seen on the appurtenant road system. No raptor nests were observed during the course of layout.

Northern Spotted Owl (*Strix occidentalis caurina*): (Status: Federal Threatened, State Threatened CDF Sensitive Species)

There are two Activity Centers within 0.7 miles of the THP.

The Northern Spotted Owl primarily inhabits old growth forests in the northern part of its range (Canada to southern Oregon) and landscapes with a mix of old and younger forest types in the southern part of its range (Klamath region and California). The species' range is the Pacific coast from extreme southern British Columbia to Marin County in northern California. It nests in cavities or on platforms in large trees and will use abandoned nests of other species. The Northern Spotted Owl is primarily nocturnal. Its diet consists mainly of wood rats (*Neotoma* sp.) and flying squirrels, although it will also eat other small mammals, reptiles, birds and insects.

One threat to spotted owl populations, at least in the northern part of its range, has been the loss of old-growth and mature late-seral forest, which contains large dead trees for nesting and prey habitat, as well as cool, dark roosts under the dense overstory canopy. Fragmentation of remaining habitat results from logging and roads and may have increased predation by Great Horned Owls and other species. More recently (since 1960s), a related eastern species, the Barred Owl (*Strix varia*), has invaded the Pacific Northwest. Barred owls are larger, more aggressive, and compete for both nest-sites and food. It is believed that Barred Owls occasionally attack spotted owls but the evidence for this is sparse. More likely the slightly larger barred owl displaces Spotted Owls from their territory. Barred Owls will also mate and hybridize with spotted owls. Barred Owls in the west occur in both young and old forest and are thought to displace spotted owls from their territories in old growth and mature forests. Additional threats to Spotted Owls include loss of habitat to wildfire and forest diseases as well as the West Nile Virus.

The habitat typing used in this assessment is consistent with the USF&WS Coastal Northern Spotted Owl Habitat Description.

Nesting-roosting habitat includes: 60% (or greater) canopy cover of trees 11 inches (or larger) diameter at breast height.

Foraging habitat includes: 40% (or greater) canopy cover of trees 11 inches (or larger) diameter at breast height. Basal area of 75 (or greater) sq. ft. of trees 11 inches (or larger) diameter at breast height.

Priority Ranking of Habitat Retention Areas.

Tree Species Composition.

Mixed conifer stands should be selected over pine-dominated stands.

A. Abiotic Considerations include the following:

i. Distance to Nest.

I. Nesting-roosting and foraging habitat should be located closest to identified nest tree(s), or closest to roosting tree(s), if no nesting trees are identified.

ii. Contiguity.

I. Nesting-roosting habitat within the 0.5-radius circle around an activity center must be as contiguous as possible.

II. Fragmentation of foraging habitat must be minimized as much as possible.

iii. Slope Position.

I. Habitats located on the lower one-third of slopes provide optimal microclimatological conditions and an increased potential for the presence of intermittent or year-round water resources.

iv. Aspect.

I. Habitats located on northern aspects provide optimal vegetation composition and cooler site conditions.

v. Elevation.

I. Habitat should be located at elevations of less than 6000 feet, although the elevation of some activity centers (primarily east of Interstate 5) may necessitate inclusion of habitat at elevations greater than 6000 feet.

Size and Shape of Habitat Patch

a. Narrow strips of habitat (WLPZs, retention areas between clearcuts, etc.) may contain the characteristics of nesting-roosting habitat. However, when these narrow strips of habitat are surrounded by unsuitable or low-quality habitats, they function as foraging habitat at best.

b. Narrow strips of habitat (100 meters or less) provide for a lot of edge habitat and little or no interior habitat. Franklin et al (2000) describe interior habitats as the amount of spotted owl habitat ≥ 100 meters from an edge. They describe edge habitat as edge between spotted owl habitat and all other vegetation types.

c. Because WLPZs, for example, are 100 meters or less in total width, they are generally considered edge habitats surrounded by unsuitable habitat. Edge habitats do not provide for protection from predators, nor do they provide the microclimates of interior habitats.

No take discussion-

The THP as proposed will not 'take' NSOs nor will NSO habitat within the assessment area be reduced below threshold levels established by the Forest Practice Rules or guidelines recommended by USFWS. Approval of this THP will require the Director to determine there will not be a take of Northern Spotted Owl (NSO) because of timber operations. This determination will be based on the fact that the plan is in conformance with 14CCR 919.9 (d) and take will be avoided through guidance provided by the listing agency(s) or Director, or (iii) proposed alternative take avoidance standards based upon substantial site-specific information for review and approval by the Director. The USF&WS guidelines are intentionally ultraconservative to ensure that, if followed, the

Director can confidently determine no take will occur. THP Section II, Item 32 contains operational actions to avoid take of NSO. THP Section V contains non-operational information such as CNDDDB reports, activity center walk-in survey results, evening survey results, pre and post-harvest habitat maps, a map of survey routes and tables of activity center habitat acreage summaries. This non-operational information provides the Director supporting evidence that the THP conforms to the USF&WS guidelines and 14CCR 919.9 (d). Methods to avoid take of NSO include locating the birds, seasonal restrictions, restrictions based on proximity to NSO activity centers and prohibitions on reducing acres of habitat below thresholds determined by USF&W and the Rules of the Board of Forestry. Because this THP will not result in take and conforms to USF&WS guidelines, cumulative negative impacts are avoided. The effects of the proposed operations cannot accumulate with effects of past or foreseeable future projects to negatively impact NSO. Additional information on the Spotted Owl has been attached in Section II and Section V of the plan.

Marbled Murrelet (*Brachyramphus marmoratus*) Status: Federal Threatened, State Endangered, Board of Forestry Sensitive Species.

In California the species ranges from the Oregon border south to Santa Cruz County. Specific nesting habitat of this species is large, older, sometimes decadent trees (Carter and Erickson 1988, and others). Although marbled murrelets have been found nesting in some cases in younger trees, and also on the ground, they have primarily been found nesting in over mature coniferous forest throughout most of their range (Carter and Erickson 1988, Paton and Ralph 1988, Hamer and Cummins 1990, 1991). Throughout most of the year this species is found in small groupings in near shore coastal waters where they feed on small baitfish. Habitat loss, gillnetting, and catastrophic events such as oil spills and wildfire are potential threats to this species.

Department of Fish and Game biologists have utilized radar technology near where the Annapolis Road crosses the South Fork and Wheatfield Fork. They suspect that murrelets fly up the Gualala River, although currently murrelets have not been visually confirmed. Private biologists working for landowners have conducted extensive surveys along the South Fork Gualala River and at the confluence of the North Fork and South Fork. The nearest known occurrence of Marbled Murrelet is approximately 7.5 miles south of the plan area, where in 1999 CDF&W staff documented vocalizations and below canopy flight over the Clipper Mill Bridge.

On September 13, 2022, CDFW stated to the landowner as part of a pre-consultation that the habitat along the SF Gualala River shall be classified as a “not suitable” site, and that habitat will be re-evaluated every 10 years.

Northern Goshawk (*Accipiter gentilis*): (Status: Board of Forestry Sensitive Species and CDF&W Species of Special Concern.)

In California the northern goshawk is an uncommon resident. Goshawks typically breed on north slopes, near water in the densest parts of mature conifer forests but close to openings. The nest is usually located in fork of large horizontal limbs in large live trees at the bottom of the live canopy. In the north coast redwood belt goshawks are extremely rare nesters and irregular transients. They are not known to breed this far south in the coast range. It is unlikely that goshawks are present within the THP area. The habitat present is not suitable for the species, and there are no recorded occurrences within the assessment area.

Cooper's Hawk (*Accipiter cooperii*): (Status: CDF&W Species of Special Concern)

In California, this species ranges throughout the state, but is not common in the northwest and southeast. In the north coast region, they are an uncommon resident, more regularly seen in winter, and breed sparingly throughout (Harris 1991). Incidental sightings on this ownership corroborate this assessment. Nesting habitat of this species in California is most frequently in dense stands of live oak, deciduous riparian stands, and other forested habitats near water.

The potential nesting habitat for this species within the THP is possibly in the hardwoods or small conifers that exist adjacent to the watercourses. Since all harvest trees within the WLPZs will be pre-marked, destruction of any possible nests can be prevented. Cooper's hawks have been observed by residents on the east side of the Gualala River downstream of the THP area, however there are no official recordings within the assessment area.

Sharp-shinned hawk (*Accipiter striatus*): (Status: CDF&W Species of Special Concern)

Both the breeding and wintering habitats of this species have been characterized as woodlands of young or open forests with a variety of plant life forms (Johnsgard 1990). Remsen (1978) suggested that timber harvest may be a threat to nesting habitat of this species, but the work of other authors indicates that forest harvest resulting in younger stands benefits the species (Postovit and Postovit 1987, Reynolds et al. 1982).

Sharp-shinned hawks prefer to breed in young stands of conifer and tanoak. Habitat does exist within the THP for this hawk. Sharp-shinned hawks are regularly observed hunting on landowner's property. No sharp-shinned hawks or nests were observed during plan layout. Prey remains of small birds are commonly found on the landowner's property and these are most likely from Sharp shinned hawks.

Osprey (*Pandion haliaetus*): (Status: BOF Sensitive Species, CDF&W Species of Special Concern)

The range of this species in California is the northern portion of the state where their nest sites are associated with large fish-bearing bodies of water. In the north coast region this species is a common summer resident and breeder; but rare in winter (Harris 1991). Typical habitat consists of large, elevated trees or artificial structures for nesting within a few kilometers of a fish source (Johnsgard 1990). Although ospreys are most often very tolerant of human activity and often nest adjacent to roads and other conspicuous locations, disturbance of nest sites during the nest season (April-early October) can cause nest abandonment.

Osprey nests have been continually monitored on landowner's property since at least 1975. There are no known nests within the buffer zones given under FPR 919.3b(5) for this species. There are several known osprey nests clustered around the mouth of the Gualala River. There are also three to five known nests facing the Pacific Ocean either on the German Rancho side of the Gualala or on the north side of the Gualala in China Gulch. None of these nests are close to any units of this plan.

Bald eagle (*Haliaeetus leucocephalus*): (Status: Federal Delisted, California Endangered, BOF Sensitive Species)

In California, bald eagles breed in the northern quarter of the state. The species winters throughout most of their breeding range, with half of the state's population wintering in the Klamath Basin (Zeiner et al. 1990b). Specific winter habitat of this species is generally large trees with open crowns near large creeks, rivers, or lakes that have a fish supply. In Mendocino and Sonoma County bald eagles are a rare winter migrant; only a few individuals are observed annually. These wintering eagles are opportunistic hunters and scavengers, normally passing through the area during their winter migration. The Gualala River drainage provides foraging habitat. Bald eagles prefer large trees to hunt from, and many large trees will be left standing after operations are complete. The proposed project will have no effect on bald eagles foraging opportunities.

There are no known nests of bald eagles in the assessment area. Bald eagles are a premier species and are quite visible. If nesting was occurring in the area, it is doubtful that it would be missed by local residents or by foresters or biologists working for the company. A mature bald eagle was seen wintering on the estuary of the Gualala River in December 2007 and again in the winter of 2013, and a pair have been seen in the vicinity of the lower estuary of the Gualala on a number of occasions since 2017. Within the 9-quad assessment area one occurrence is known.

Golden Eagle (*Aquila chrysaetos*): (Status: BOF Sensitive Species, CDF&W Species of Special Concern)

The range of golden eagles in California is throughout the state, scarce in the southeastern desert region, and they are found in rolling country with lightly wooded areas, savannas, grasslands, desert edges, farms, or ranches. The species is a rare to uncommon resident and breeder (Harris 1991). The overall breeding densities of this species are relatively low, due to territorial spacing of nesting and foraging habitats. Overall population densities of this species currently appear stable, but excessive disturbance at nest sites can cause nest failure.

In Mendocino County and Sonoma County the golden eagle is an uncommon permanent resident and local breeder. Locally, golden eagles use a variety of habitats, including conifer and hardwood forests, mixed conifer-hardwood woodlands, coastal oak woodlands, and grasslands. Golden eagle forage and roosting habitat with some nesting habitat can be found in the assessment area. Usually, golden eagles prefer cliff ledges or large wolfy trees in more upslope and remote areas. No large nest structures were observed, and no golden eagle nests are known to exist in the assessment area. Within the 9-quad assessment area no occurrences are known.

Peregrine Falcon (*Falco peregrinus*): (Status: Federal – Delisted in 1999, California – Candidate for Delisting (Fully Protected), BOF Sensitive Species)

In California, the species breeds and winters throughout the state, with the exception of desert areas (CDF&G 1990). In the north coast region, they are an uncommon migrant and winter visitor; a rare, local breeder, and summer resident (Harris 1991). Logging activities should not negatively impact the birds' ability to specific habitat of this species is tall cliffs for nest and perch sites with protection from mammalian predators and the weather, most often close to water and adequate prey populations. Peregrines are not known to be present in the vicinity of the project and there are no large vertical cliffs within the biological assessment area. It is known that peregrines forage up and down the coast, up some of the major river valleys and over capture prey. No peregrine falcon

habitat is known to exist within or adjacent to the THP. The proposed project will have no effect on Peregrine Falcons.

Great Blue Heron (*Ardea herodias*): (Status: BOF Sensitive Species)

In California this species ranges throughout most of the state up to approximately 4,900' above sea level, with heronries scattered throughout northern California (Zeiner et al. 1990b). Great blue herons inhabit a wide variety of freshwater and saltwater habitats. Foraging areas include coastal bays, lagoons, tidal flats, mud flats, and rocks along rivers, creeks, ponds, and lakes (Yocom and Harris 1975) and agricultural lands and along watercourses in mountainous areas. Their heronries are often found in brush, on rocks and ledges, or on the ground, but they prefer groves of trees near feeding areas (Zeiner et al. 1990). Individual large trees are sometimes used by single pairs of herons as well. Threats to this species include alteration of habitat through development and harvesting or inadvertent destruction of nest trees.

The birds are often seen foraging along the larger forks of the Gualala River. The main concern with this species would be protection of a nesting colony from disturbance although these species are known to nest singly as well. A heronry or individual heron nest should have been visible during the THP layout, and none were observed. An individual heron nest is often placed in the largest tree around and since the 13 largest trees per acre in the near stream environment are being protected on this plan any possible nest sites will be protected.

Great egret (*Casmerodius albus*): (Status: BOF Sensitive Species)

In California, the range of great egrets is widespread throughout the state except at high elevations, and in desert areas (Brown et al. 1986). The specific habitat of this species is nearly synonymous with that of the great blue heron, with the two species often foraging and breeding in proximity. After severe population declines around the turn of the century due to the harvest of their feathers, populations have rebounded. Alteration or draining of wetlands habitat, as well as industrial or residential development are considered threats to the continued wellbeing of this species. As with great blue herons, no great egret rookeries are known in the BAA. No egrets or nests were observed.

Purple Martin (*Progne subis*): (Status: CDF&W Species of Special Concern)

In California, the range of purple martins is throughout the state west of the desert regions from sea level to approximately 6,000' above sea level. Purple martins are most observed near coastal lowlands near river mouths. Harris (1991) lists this species as an uncommon summer resident and breeder. Specific habitat of this species for breeding is abandoned woodpecker cavities in isolated tall trees or snags, man-made martin houses (Allen and Nice 1952), or on cliffs (Bent 1942). Although apparently once a common breeder in this region, populations have decreased due to competition from introduced starlings, removal of snags, and loss of riparian habitat (Remsen 1978, Zeiner et al. 1990b). No Purple Martins were observed. Their preferred habitat will be protected by not harvesting snags or large decadent trees (live culls).

Vaux's Swift (*Chaetura vauxi*): (Status: CDF&W Species of Special Concern)

The range of this species in California is the length of the state in migration, and breeding in a narrow coastal belt from Del Norte County south to Santa Cruz County. On the north coast the species is considered a common summer resident and breeder; casual in winter (Harris 1991). Specific habitat for this species includes hollow trees, snag-tops with cavities, and also chimneys for nests and roosts. The removal of old, decadent redwoods and Douglas-firs with hollow snag-tops can cause loss of nesting habitat for this species. Vaux's swift have been regularly observed over the Gualala River. Snags and large decadent trees for roosting or nesting will be protected. No large decadent trees or snags that might provide habitat for this species will be felled (unless they are a safety hazard). Within the boundaries of this THP there are no known Vaux's swift nests and

none have been observed during layout.

Grasshopper Sparrow (*Ammodramus savannarum*) (Status: CDFW Species of Special Concern)

In California, the grasshopper sparrow ranges exist in a wide range of habitats, from the central valley to the colder coasts of northern California. On the coast, their habitat is typically characterized by native grassland and shrubland. Due to habitat loss and fragmentation, their population has seen a steep decline since the 1980s. There is one occurrence noted at the mouth of Stewarts Creek outside of BAA. The THP project area contains very little suitable habitat for the grasshopper sparrow, and because no grassland will be a part of a timber harvest, there should not be any impact on the local population during the harvesting process.

Tufted Puffin (*Fratercula cirrhata*): Status: CDF&W Species of Special Concern

Tufted puffins are migratory aquatic birds. They inhabit islands or cliffs where they can avoid land mammals and access the ocean to hunt for fish and marine invertebrates. There is one occurrence of tufted puffin reported in the CNDDDB within the nine-quadrangle search area near the community of Fish Rock. Timber harvest should not significantly impact tufted puffin populations because they do not typically inhabit timbered stands and forested areas.

Rhinoceros auklet (*Cerorhinca monocerata*) Status: CDF&W Watch List

Rhinoceros auklets are mostly aquatic migratory birds. They breed in coastal areas and eat fish and marine invertebrates in the ocean. The nearest known occurrence was at the mouth of the Gualala River. Timber harvests should not significantly impact tufted puffin populations because they do not inhabit forests.

Mammals

Point Arena Mountain Beaver (*Aplodontia rufa nigra*) Status: Federally Endangered

This species is found along streams in dense, riparian-deciduous forests and open stages of most forest types near water. This species typically needs dense understory vegetation and friable, moist soils for burrowing into. WLPZ measures applied properly should protect their food sources, i.e. herbaceous and deciduous vegetation and the moist, friable soils important for denning. According to "California's Wildlife" Volume III Mammals, this THP is south of their range. Their burrows are described in the Audubon field Guide as being up to 19" in diameter surrounded by fan shaped earth mounds and in wet areas a tent of sticks erected over entrances. No such burrows or structures were observed in the WLPZs.

Pacific Fisher (*Martes pennanti*): (Status: Federally Endangered, State Threatened for Southern Sierra Nevada ESU/DPS)

The THP is located within the Historic Fisher Range and where Fishers are rare or absent (Quick Reference: Range of *Martes pennant*, The Pacific fisher in California, Coastal California Map, CALFIRE, August 2009).

The range of the Pacific fisher in California is the Pacific coastal range, Siskiyou range and Sierra Nevada Mountains. Primarily nocturnal, the pacific fisher is a good climber and swimmer. Its home

range on the California coast can be up to 3,700 acres for females and 14,000 acres for males. The fisher prefers stands with large trees and high canopy closure. Douglas fir and true fir were the preferred forest types in the Coast Range. Oaks, especially black oaks, appear to be important for denning in some areas. Its main quarry is hares, porcupines, squirrels, mice, chipmunks, carrion, fruit and other plants. It dens in hollow trees, logs or rocky crevices. It has natal denning areas and once kits are old enough, they are moved to maternal denning areas. The natal period occurs as early as March 1 and extends to May 15th. Maternal denning occurs from May 16th and is usually completed by July 31st.

Resting areas include large limbs, raptor or squirrel nests, and mistletoe brooms. The fur is especially prized, which has caused its extirpation in some areas. It requires extensive wilderness, so loss of habitat has also depleted populations. One threat to fishers may be the loss of large decadent trees that contain cavities that are used for natal and maternal denning.

No fishers have ever been detected within the GRT ownership. Within the watershed, loss of large decadent features that would be used by fishers occurred mostly at the turn of the century and again in the 1950s and 1960s.

Pacific Fisher Analysis

Regulatory mechanisms that exist to protect habitat and structural elements for existing fisher populations within the planning watershed and the need to provide additional protection measures.

The ASP rules require leaving the 13 largest trees per acre near Class I and Large Class II watercourses. These are the trees that are most likely to have features that are most conducive to fisher denning. These areas are also equipment exclusion zones, outside those operations which are proposed in Item 27(a), which reduces the possibility of disturbance. Class IIs have zones adjacent to them that are no-harvest zones, and these often have the largest trees in the watershed which are protected from harvest. Also, snags are generally left across the entire landscape unless they create a safety concern. GRT will retain trees with significant wildlife values and decadence. These trees are evaluated by foresters and chosen based on qualities such as cavities, large size, platforms, broken tops and large branches, which are many of the same qualities that fishers prefer for denning and for resting. GRT will continue to voluntarily leave hardwoods 24 inches DBH or larger up to four trees per acre and all downed large woody debris within WLPZs are left. Most large woody debris outside of WLPZs is also left unless it is being used for creek restoration work.

Measures that have been incorporated in this THP to avoid take include:

- a) leaving of all snags that aren't a safety risk;
- b) leaving the 13 largest trees per acre in the flood prone areas of the THP; and
- c) Leaving all large hardwoods (24" or greater) up to 4 per acre.

The specific requirements for fisher regarding structural elements for denning and resting sites within the Plan area. As mentioned above the fishers need large trees and snags with cavities, large limbs, downed logs, witches' brooms, for both denning and resting. Since this THP is in the redwood belt there exist many hollow old growth redwood stumps in addition to decadent Douglas fir trees and large woody debris scattered across the plan area.

Existence of large-scale habitat plans on or near the proposed Plan area.

- Across the landscape the existence of numerous alluvial flats adjacent to the Class I watercourses on this property provide linearly connected habitat corridors where all the best elements needed by fishers are provided for. These elements are contiguous with Class I and II watercourse protection zones which also provide habitat and areas of no-cut or selectively cut zones that provide additional habitat. Even the even-aged management units

on the property provide habitat in the form of down logs and foraging opportunities by supporting a greater number of small mammal prey species. Anticipated change in fisher habitat quantity and quality within the planning watershed and biological assessment area as it relates to possible future projects.

- It is projected that fisher habitat on GRT property will improve over time since structural elements that fishers prefer are mostly not harvested. There will be some loss of large snags as these deteriorate over time however the large redwood snags and goose pens are likely to be present and relatively stable for long periods of time into the future. Some snags of existing live trees will develop over time. In addition, the stands that exist on alluvial flats, which are quite extensive on this property, will have only light harvesting of the smaller trees in the future and the largest and oldest trees will continue to age slowly, developing old growth qualities eventually.

Gray Wolf (*Canis lupus*): (Status: Federally Endangered, State Endangered)

Range in California: Although gray wolves formerly inhabited California, their historic abundance and distribution is unclear (Schmidt 1991, Shelton and Weckerly 2007). While there are many anecdotal reports of wolves in California, specimens were rarely preserved. The historic range of the wolf in California has been reported to include the Sierra Nevada, southern Cascades, Modoc Plateau, Klamath Mountains, and perhaps the North Coast Ranges (Stephens 1906; Grinnell et al 1937; Hall 1981; Paquet and Carbyn 2003). However, Schmidt (1991) concluded that wolves also “probably occurred in the Central Valley, the western slope of the Sierra Nevada foothills and mountains, and the Coast Ranges of California until the early 1800s, although their population size is unknown and may have been small.”

Habitat: The gray wolf is a habitat generalist, and can occur in deserts, grasslands, forests and arctic tundra. Habitat use by gray wolves is strongly correlated with the abundance of prey, snow conditions, absence or low livestock densities, road densities, human presence and topography. Actual dens are usually constructed for pups during the summer period. When building dens, females make use of natural shelters such as fissures in rocks, cliffs overhanging riverbanks and holes thickly covered by vegetation. Sometimes, the den is the appropriated burrow of smaller animals such as foxes, badgers or marmots. An appropriated den is often widened and partly remade. On rare occasions, female wolves dig burrows themselves, which are usually small and short with 1–3 openings. The den is usually constructed not more than 500 meters away from a water source, and typically faces southwards, thus ensuring enough sunlight exposure, keeping the denning area relatively snow free. According to CDFW information titled California’s Known Wolves Past and Present (February 2020) the gray wolf is moving back into northeastern California in small but increasing numbers. Two wolf packs identified as the Lassen and Shasta packs are known. The Shasta pack is thought to be no longer operating as a pack. Other wolves fitted with tracking collars that are known to have been in California include (OR7 now deceased), (OR25), (OR54, now deceased), (OR44) and (OR59, now deceased). Other contemporary wolf sightings have been reported in Siskiyou, Modoc, Lassen, Tulare, and Plumas counties. There are no known wolves near the THP. Habitat is poor in the vicinity of the THP because of the lack of prey species, particularly deer, which would be the main prey species available in California. See Section II for protection measures.

Red Tree Vole (*Phenacomys longicaudus*) (Status: CDF&W Species of Special Concern)

Red tree voles are distributed along the North Coast from Sonoma County to Oregon border. They tend to occur in mature Douglas-fir, redwood, and Montane hardwood-conifer habitats in fog belt. Red tree vole feeds on Douglas-fir and grand fir needles. Needles and twigs gathered at night may be consumed or brought to nest. Needle resin ducts are removed with the remaining needle eaten and the discarded resin ducts used to line nest cup. Males occur mostly in fir needle tree nests, or less often, in shallow burrows at base of tree beneath the litter. Females spend most of their lives in trees constructing large, domed nursery nests of Douglas-fir needles 6-150 feet above ground. Medium to large nests are generally females and small nests more likely males. Nests may be occupied by succeeding generations, increasing in size. Nests may be situated on whorls of limbs against trunk or at outer limits of branches. In young second-growth Douglas-fir, the broken tops of trees frequently are used. Older nursery nests may encircle the entire tree. Water is obtained mostly from food, but individuals lick dew and rain off needles near nests. Red tree voles are preyed upon by spotted owls, saw-whet owls, steller's jays, and raccoons. Severe winter storms may also affect local populations adversely.

Habitat potential within the project area and the BAA is high. A nine quad search resulted in no occurrences. No RTV nests have been observed in the plan area. Most of the timber will be individually marked; thus, tress will be examined for wildlife nest occurrence. If a tree is found to contain an active nest it will be retained, along with associated screen trees, where feasible. A variety of sizes of Douglas-fir trees will be retained. Given these management strategies, sufficient protection will be afforded to prevent potential adverse impacts on this species.

Sonoma Tree Vole (*Arborimus pomo*): (Status: CDFW Species of Special Concern)

The range of this species in California includes coastal forests in the humid fog belt (Jameson and Peters 1988) south to Sonoma County on the coast and to Mendocino County in the coastal mountains, and east to Trinity County (Maser 1966). They have been located at elevations of from 150'-3,100' above sea level (Maser 1966). The habitat of this species predominantly includes the existence of Douglas-fir trees, with grand fir, Sitka spruce, redwood and western hemlock also used (Meiselman 1987, Williams 1986). Some authors have suggested that this species is associated with old growth or dense mature forest with large trees (Carey et al. 1991, Williams 1986). However, habitat records reviewed by Maser (1966) suggested that this species also uses young second growth Douglas-fir trees 7"-15" DBH, and habitats described as broken, isolated, and scattered by clearcuts, open grassland, bracken fern and cultivated fields; or 30-50-year-old stands with a few interspersed older trees, but little evidence of dense forest. It is known from the experience of foresters working for GRT that Sonoma Tree Voles also nest in redwood trees, Bay Laurel trees and snags, and are often found near water on GRT property. There also seems to be an affinity for nesting near waterfalls, perhaps because of the higher humidity in the vicinity of a waterfall since this species gets all its moisture from the vegetation it consumes. Numerous tree voles have been documented and protected in the last ten years on the landowner's property. If a tree is found to contain an active nest it will be retained, along with associated screen trees, where feasible. Sufficient protection will be afforded to prevent adverse impacts on their population.

Townsend's Big Eared Bat (*Corynorhinus townsendii*) (COTO): (CDF&W Species of Special Concern) (note: the following was taken from CWHR's Townsend's Big Eared Bat by J. Harris, and updated by pers. comm., M. Baker, Nov. 12, 2015)

Distribution, Abundance, and Seasonality

Townsend's big-eared bat is found throughout California, but the details of its distribution are not well known. This species is found in all but subalpine and alpine habitats and may be found in any season throughout its range. Once considered common, Townsend's big-eared bat now is considered uncommon in California.

Specific Habitat Requirements

Feeding: Small moths are the principal food of this species. Beetles and a variety of soft-bodied insects also are taken. Captures their prey in flight using echolocation, or by gleaning from foliage. Flight is slow and maneuverable. Capable of hovering.

Cover

Requires caves, mines, tunnels, buildings, or other human-made structures for roosting. COTO are also known to roost in basal hollows of large trees (>42" dbh) or perhaps stumps if the stumps are closed at the top. The roost entrance in buildings, caves, and mines has been reported to be as small as 1 square foot in size (Pierson & Rainey 1998). The roost entrance in basal hollows has been reported ranging from 1 to 5.9 feet wide, and 2.6 to 14 feet high in size (Fellers & Pierson 2002). Basal hollow roost entrances greater than 2 square feet that extend 1 foot or more upward into the tree above the top of the entrance to buffer changing microclimates and are greater than 3 feet above the ground for protection from predators. The only light penetrating the roost area originates from the roost entrances so that the internal roost area remains semi-dark to dark, however COTO are also known to roost in complete darkness and away from cave and mine entrances to roost also. COTO roost in a range of light conditions in anthropogenic structures and in basal hollows.

COTO may use separate sites for night, day, hibernation, or maternity roosts. Hibernation sites are cold but not below freezing. Individuals may move within the hibernaculum to find suitable temperatures. Maternity roosts are warm. Roosting sites are the most important limiting resource. Disturbance of roost is noted as the reason for the species recorded population declines.

Reproduction

Maternity roosts are found in caves, tunnels, mines, and buildings. Small clusters or groups (usually fewer than 100 individuals) of females and young form the maternity colony. Maternity roosts are in relatively warm sites.

Water

Drinks water. Relatively poor urine-concentrating ability in comparison to other southwestern bats.

Foraging Pattern

Prefers mesic habitats for foraging. Gleans moths from trees, shrubs, or bushes. COTO also feeds along habitat edges, including riparian corridors along streams and smaller tributaries, forest edges, and occasionally in more open habitat with large shrubs and scattered trees.

SPECIES LIFE HISTORY

Activity Patterns

Nocturnal. Hibernates. Peak activity is late in the evening preceded by flights close to the roost. Bats at hibernacula from October to April. Seasonal Movements/Migration: This relatively

sedentary species makes short movements to hibernation sites. Of 1500 banded bats, the longest movement was 32.2 km (20 mi) (Pearson et al. 1952).

Home Range

In early studies it was reported that colonies usually are at least 16-19 km (10-12 mi) apart. A density of 1 bat/126 ha (1/310 ac) was reported on Santa Cruz Island (Pearson et al. 1952). The greatest traveled distance recorded for a banded individual is 64 kilometers (Kunz 1999). This species shows high site fidelity if undisturbed. Territory: Not territorial. Males are solitary in spring and summer. Females form maternity colonies. Hibernates singly or in small clusters, usually several dozen or fewer.

Reproduction

Most mating occurs from November-February, but many females are inseminated before hibernation begins. Sperm is stored until ovulation occurs in spring. Gestation lasts 56-100 days, depending on temperature, size of the hibernating cluster, and time in hibernation. Births occur in May and June, peaking in late May. A single litter of 1 is produced annually but not all females reproduce every year. Young are weaned at 6 wk. and fly in 2.5-3 wk. after birth. Growth rate depends on temperature. The maternity group begins to break up in late August. Females mate in their first autumn, males in their first or second autumn. About half of young females return to their birth site after their first hibernation. Subsequent return rates are 70-80%. Maximum recorded age is 16 years.

Niche

Forages with many other species. Relatively specialized on moths, and slow, maneuverable flier. Gleans, and captures prey in the air by echolocation. Roosting sites may be shared with other species. Rabies is found in this species, but incidence is usually less than 1%.

Comments

This species is extremely sensitive to disturbance of roosting sites. A single visit may result in abandonment of the roost. All known nursery colonies in limestone caves in California apparently have been abandoned. Numbers reportedly have declined steeply in California. Especially sensitive to injury by wing banding (Humphrey and Kunz 1976).

Although this THP is within the historic range of the Townsends big-eared bat (COTO) no bats of this species have ever been known to occur on GRT property and there are no caves, mines, or abandoned buildings within the THP, which are currently considered the preferred habitat based on available literature; however, no targeted COTO surveys have taken place. Within the THP area there are large old snags and large old growth redwood stumps that could contain hollows sufficient for roosting. During layout of the plan no evidence of COTO was found which, given that COTO are widespread, but low-density in California and bats are nocturnal and cryptic in general, may be expected outside of targeted survey efforts by bat biologists.

Measures that have been incorporated in this THP to avoid take are:

1. Leaving of all snags and goospeens.
2. Carefully inspecting large standing basal hollows.
3. Leaving thirteen largest trees per acre in all flood prone areas and leaving all large hardwoods.

North American porcupine (*Erethizon dorsatum*): Status: not listed

The North American porcupine, also known as the Canadian porcupine, is a large rodent in the New World porcupine family. It is the second largest rodent in North America, behind the North American beaver (*Castor canadensis*). In the western United States they range from Alaska to northern mountains in Mexico. They are commonly found in coniferous and mixed forested areas, but have adapted to harsh environments such as shrublands and tundra. They typically make their dens in hollow trees or in rocky areas. Porcupines are usually dark brown or black in color, with white highlights. They have a stocky body, a small face, short legs, and a short, thick tail. The most distinguishing feature of the porcupine is its coat of quills. An adult porcupine has about 30,000 quills that cover all of its body except its underbelly, face, and feet. Quills are modified hairs formed into sharp, barbed, hollow spines. They are used primarily for defense but also serve to insulate their bodies during winter. Porcupines do not throw their quills, but when threatened, they contract the muscles near the skin, which causes the quills to stand up and out from their bodies. When the quills are in this position, they become easier to detach from the body, especially when a porcupine swings its tail toward an attacker. The barbs at the tail tip become lodged in the flesh of an attacker and are difficult and painful to remove. The quills are normally flattened against the body and in this position are less easily dislodged.

No North American porcupines were observed during plan layout although potential habitat for this species does exist within the BAA and the plan area. There is one observation reported in 1997 within the BAA, approximately 4 air miles north of the THP boundary along Fish Rock Road. The proposed project will not have a significant impact on the species because many coniferous trees will be retained and snags will be retained unless they present a safety hazard to harvesting operations.

American Badger (*Taxidea taxus*) Status: N/A

Distribution includes most of North America and along the California coast north to Humboldt County. This species is well adapted to a variety of habitats but prefers open grasslands and shrublands with little ground cover. During their inactive period in the winter months, they remain in their home area and may retreat to underground burrows for several days or weeks during extreme weather events (IUCN Red List 2019). Their primary diet consists of small mammals associated with grasslands. Other prey includes snakes, lizards, birds, scorpions, and various insect species. A major factor leading to habitat loss is forest expansion into grassland habitats. Beginning in the early to mid-20th century, fire suppression efforts have allowed forest ingrowth into grasslands once maintained by routine control burning. Recent forest encroachment has likely confined prey species to smaller, less contiguous areas; therefore, decreasing suitable habitat for the American badger.

Habitat for the American Badger does exist within the THP area in scattered pockets near the edge of the plan. No occurrences have been recorded in close proximity to the THP, and as such, the proposed THP is not likely to result in a significant adverse impact to Badger habitat within the assessment area.

Fish

Fisheries Habitat

The following are the Class I watercourses and bodies of water within the biological assessment area associated with the Steam Donkey THP for aquatic life: Gualala River, North Fork of the Gualala River, South Fork Gualala River and unnamed tributaries. Additional information may be included below for upstream and downstream areas even though they are outside the assessment area.

Current Fish Species in the Gualala River Watershed, California

Common Name, Scientific Name

Anadromous

Coho salmon, *Oncorhynchus kisutch*
Steelhead trout, *Oncorhynchus mykiss*
Pacific lamprey, *Lampetra tridentata*

Freshwater

Gualala Roach, *Lavinia symmetricus parvipinnis*
Coast range sculpin *Cottus aleuticus*
Prickly sculpin, *Cottus asper*
Riffle sculpin, *Cottus gulosus*
Threespine stickleback, *Gasterosteus aculeatus*

Marine or Estuarine

Surf smelt, *Hypomesus pretiosus*
Pacific herring, *Clupea pallasii*
Staghorn sculpin, *Leptocottus armatus*
Starry flounder, *Platicthys stellatus*
Tidewater goby, *Eucyclogobius newberryi*

Many of the issues that affect fish survival such as large woody debris, sedimentation and temperature are addressed above in the watershed assessment. The following aquatic species have potential habitat in the watercourses and will be protected by WLPZ protections and other FPA rules as listed elsewhere in the THP: Southern Torrent Salamander, California Red-legged Frog, Tailed Frog, Foothill Yellow Legged Frog, and the Western Pond Turtle.

The life cycles of anadromous fish involve habitation of both inland freshwater streams and the ocean. Adult fish migrate into inland fresh water from the ocean and spawn. The offspring hatch and live a portion of their lives in freshwater and then migrate into the ocean. In the ocean the fish continue to grow and mature. After several years the fish return to the streams (usually of their birth) and spawn.

The decline of anadromous fish populations in the Gualala River and on the north coast of California has been attributed to many factors. Quantitative assessment of what the decline is caused by is somewhat lacking. Possible factors affecting the anadromous fish include stream habitat conditions, water diversion, ocean conditions, global and regional climate changes, introduction of hatchery bred fish, introduction of exotic species, spread of disease by hatchery stock, predation by birds and mammals, commercial, sport and subsistence fishing, and poaching. Most likely, declines in coho and steelhead populations are caused by a combination of factors with higher temperatures, shallower pools, and limited ocean access to the river (because the mouth is

often closed by the gravel bar) being primary causes for declines in populations.

Coho salmon (*Oncorhynchus kisutch*) (Status: Endangered under Federal and State Endangered Species Act). The plan area is located in the Central California Coast ESU for Coho salmon. Coho salmon are riffle spawners that typically utilize smaller streams and gravel. Coho Salmon are anadromous salmonids that require access to stream migration, cold, clean, well oxygenated water and prefer the cover of overhanging vegetation, undercut banks, submerged vegetation, rocks, logs and deep water. Coho typically initiates upstream migration between late October and mid-February. Coho, as a rule, spawn in smaller tributaries than Chinook salmon. Preferred temperatures to Coho are as follows: Spawning migration 4.0 – 14.0°C (40.0 – 58.0°F), Rearing 7.2 – 16.7°C (45.0 – 62.0°F). Redds are laid in gravel that range in size from 1.3 – 10.2 cm in diameter; intergravel mortality occurs when fine sediments exceed 13% of the substrate composition. Embryos hatch after 8 to 12 weeks of incubation. Coho migrates to the ocean at age one and return to fresh water to spawn after 2 to 3 years. Coho are known to exist in the Gualala River.

Protective measures for the Coho salmon and other aquatic wildlife species have been incorporated into the silvicultural methods (see Item #14), soil stabilization measures (Item #18), watercourse protection measures (Item #26), and other provisions in this THP and others within the assessment area. Given the standards and practices in place now, no significant adverse impacts are expected.

Steelhead (*Oncorhynchus mykiss irideus*) (Status: Threatened under Federal and State Endangered Species Act)

The proposed timber harvest plan is located within the Northern California DPS for Steelhead. Summer steelhead ascend spawning watercourses in the spring, and hold in deep pools until the fall, when they spawn. Winter Steelhead enters river systems during fall and winter when water levels are sufficient to permit upstream migration. The effects of timber harvesting concerning this species are elevated water temperatures and sedimentation of spawning gravels. Steelhead mortality at the different life stages are closely affiliated with water temperatures. Preferred temperatures for different stages are as follows: Spawning migration 3.9 - 9.4° C(39 – 49°F), Egg development 10.0° C(56°F), Rearing 10.0 – 13.0° C(50 - 56°F). Steelhead prefer to spawn in gravels 0.6 – 10.2 cm in diameter, with eggs developing in approximately 31 days. When fine sediments exceed 13% of the substrate composition, intergravel mortality can occur. Juvenile steelhead spend 1 to 3 years in freshwater habitats before migrating to the ocean. They typically spend 2 years in the ocean before spawning. Although summer and winter steelhead use the same spawning gravels, they are genetically distinct and do not interbreed. Steelhead can utilize smaller tributaries and smaller sized gravels (2-3 in. in diameter) for spawning. Steelhead are known to exist in the Gualala River.

Measures that are proposed for the protection of coho, should also be considered adequate for the protection of steelhead. Protections provided by WLPZs, ELZs, and water drafting requirements ensures no cumulative impacts due to timber operations within the plan area.

Chinook (*Oncorhynchus tshawytscha*) (Status: Threatened under the Endangered Species Act).

The proposed timber harvest plan is located within the California Coastal ESU for Chinook. Sustained water temperatures greater than 80 degrees Fahrenheit are fatal for adult salmon, which will migrate into the headwaters of smaller Class I waters to spawn when water is sufficient and debris dams do not prevent access. Chinook salmon are riffle spawners and typically construct redds near the head of riffles in gravel 6 inches or less in diameter. Ideal temperatures for spawning occur between 41-58 degrees Fahrenheit. Chinook salmon prefer to spawn in the main stem of

rivers or larger tributaries but will come further up watercourses depending on the stream flow in any given year. Chinook uncommon in this watershed but would benefit from the same protection measures as Coho and Steelhead.

Measures that are proposed for the protection of coho and steelhead should also be considered adequate for the protection of chinook. Protections provided by WLPZs, ELZs, and water drafting requirements insures no cumulative impacts due to timber operations within the plan area. Given the allowable activities and limitations in the plan, the Forest Practice Rules, and our standards and practices, no significant impacts are expected.

Summary of Historic (1964-1981) Stream Surveys Conducted in the Gualala Mainstem/South Fork Sub-basin (from NCWAP, Appendix 5, pg. 8-11)

Mainstem South Fork Subbasin	Date Surveyed	Habitat Comments	Barrier Comments	Recommendations Management
South Fork	9/23 and 9/24 1964 5/17 and 18/1977	Plentiful spawning areas throughout the stream. Pool: Riffle 95:5. Generally poor shelter consisting of overhanging banks, boulders, logs, aquatic plants and overhanging aquatic plants. Summer flows are limited. Pool: Riffle ratio 7:3. The majority of pools had little to no shelter. Shelter consisted of boulders, aquatic plants, logs, undercut banks, and overhead canopy	Old Log Jams. None Complete. No barriers observed. Each summer a dam is constructed approximately ½ mile below the Wheatfield Fork.	Continue to manage for production of juvenile steelhead trout and coho salmon.
Marshall Creek Marshall Creek Tributary #3 Marshall Creek Tributary #5	9/28/1964	Deposits of good spawning gravel exist throughout the stream from the mouth to the upper fisheries value. Pool: Riffle ratio 50:50. Good shelter provided by logs, boulders, undercut banks, roots, and trees.	No complete barriers.	Should be managed as a steelhead trout and coho salmon spawning and nursery stream.
	9/28/1964	Very limited fisheries value. Watershed severely burned 10 years ago. Lower half mile has spawning gravel available, but summer flow is very low.	Total barrier to fish a half mile above the mouth.	None
	9/29/1964	Summer flows are limited. Some suitable spawning gravel directly above large log jams.	Over 40 log jams in a 1 mile stretch of stream. A number of which form complete fish passage barriers.	Remove log jams.

McKenzie Creek	9/23 and 24/1964	Spawning areas fair to good in the lower 1/3 of stream, excellent in the middle section of stream, and fair in the upper 1/3 of stream; Pool: Riffle ratio 60:40; Good shelter provided by rocks and undercut banks.	7 partial barriers; Large 7 feet high 40 feet dam present 1/6 mile upstream from mouth; Large bedrock falls 1-1/4 miles upstream	Continue to manage as a coho salmon, steelhead trout spawning and nursery area. After removal of falls, possible planting of coho salmon to re-establish a self-sustaining population.
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The following pages contain Coho Salmon and Steelhead Trout Data Summary by Decade, for the Gualala River Watershed, California.

Decade	Coho Salmon	Steelhead Trout
1940s	A.C. Taft, chief of the Bureau of Fish Conservation, noted that the fishing pressure on the Gualala River increased 200-300% immediately after World War II ended in 1945.	A.C. Taft, chief of the Bureau of Fish Conservation, requested that the entire Gualala River and its tributaries be closed to fishing for small and immature steelhead trout and salmon. Upon his recommendation, the summer closure began in 1945 and remained until 1982.
1950s	In 1952, electrofishing below the confluence of the North Fork revealed that the length frequencies of the fish removed showed a healthy condition (Kimsey 1952). Bruer (1953) wrote that there are millions of young steelhead trout and coho salmon in the Gualala watershed. In 1957, Fisher, cited that the adverse logging conditions and past improper practices had done considerable damage to the headwaters. This was primarily in the form of old logjams, debris and siltation. By 1959, the summer opening was not worthwhile for a person who must travel any distance (Kastner 1959).	During December 1954 through February of 1955, creel surveys were conducted to determine the quality of the steelhead trout fishery on the Gualala River. Five hundred and seven fish were checked. A total catch estimate of 1,352 fish for the season was extrapolated with data from a use count. In 1956, Fisher, concluded that the Gualala remained one of the better Region III steelhead trout streams. It appeared to sustain a good steelhead trout population despite the poor environmental conditions over a considerable portion of its headwaters. He speculated that unaffected tributary streams must have provided good spawning conditions.
1960s	Stream surveys were conducted in 1964. The species presence and relative abundance of salmonids were estimated from observations recorded while walking upstream along the banks. These surveys had no quantitative basis from which to estimate populations. Where coho salmon were observed during these stream surveys the management recommendations included "possible planting to re-establish a self-supporting run" (Table 3-5). Based on CDFG's management prescriptions of the time, this recommendation likely indicated that the native coho salmon populations were not self-sustaining prior to 1964. CDFG reported population estimates of 4000 coho salmon in 1965. This population estimate was made without any supporting data thus is not reliable. The estimate was ranked "C without data" the lowest quality rating designated by the California Fish and Wildlife Plan, Volume III. In 1969, 90,000 coho salmon were planted.	Steelhead trout were present during stream surveys in 1964. Only one creel census survey was conducted on January 24, 1962. The result of the survey showed 11 steelhead trout caught by 18 anglers. Total angler hours were 56.5 resulting in a catch-per-unit-effort of 0.20 fish/hour. CDFG reported steelhead trout population estimates of 16,000 in 1965. This population estimate was made without any supporting data, thus is not reliable. The estimate was ranked "C without data", the lowest quality rating designated by the California Fish and Wildlife Plan, Volume III.

<p>1970s</p>	<p>Hatchery plants of coho salmon; 1970, 30,000; 1971, 30,000; 1972, 15,000; 1973, 20,000; 1975, 10,000. Total number of coho salmon planted in the 70s, 105,000. Some streams were surveyed in 1970 with methods similar to those conducted in 1964 (Table 3-5). It is not known how many of the coho salmon observed during these stream surveys were from the 120,000 planted in 1969-1970. No mention of marked or unmarked hatchery coho salmon were found in the planting records or stream reports.</p> <p>In the mid-1970s, the CDFG's Coastal Steelhead Project was conducted, in part, on the Gualala River, California. In 1972-73, the creel censuses began in November and resulted in high counts of coho salmon catches with 831 total coho salmon counted. All other years, the creel censuses began in December after the peak of the coho salmon run had passed. In the 1973-74 survey fifty-two coho salmon were counted, in the 1974-75 survey ten coho salmon were counted, in the 1975-76 survey ten coho salmon were counted and in the 1976-77 survey no coho salmon were counted.</p>	<p>Some streams were surveyed in 1970 with methods similar to those conducted in 1964 (Table 3-5). The steelhead trout observed during these stream surveys were assumed native as planting did not occur until 1972. The steelhead trout planted during the 1970s were 12,750 in 1972; 20,300 in 1973; 15,600 in 1974; 24,600 in 1975; and 10,070 in 1976, a total of 83,320. The Mad River Hatchery yearling steelhead trout were marked by a fin-clip. CDFG reports cite origins of brood stocks as Mad River Hatchery, South Fork Eel River and San Lorenzo River. In 1972-73, L.B. Boydston, CDFG fish biologist, estimated that the fishing effort on the Gualala River had probably increased over 60% since the early 1950s, when the only other creel censuses were conducted. In spite of the increased pressure during the 1972-73 season, the steelhead trout catch was around 25% of what it was during the 1953-54 and 1954-55 seasons. He attributed the poor catch to smaller populations. During the 1972-73 creel census, 288 steelhead trout were caught. No recognizable hatchery fish from the spring planting in 1972 were observed.</p> <p>During 1975-76 and 1976-77, steelhead trout population estimates were made as part of a five-year study. This study utilized creel census, use counts, adult tagging, and downstream migrant trapping in conjunction with the planting of steelhead trout. The goal of the project was to estimate winter adult steelhead trout populations, estimate angler harvest rates and evaluate the contribution of hatchery steelhead trout to the fishery. This program focused on enhancing the Gualala River as a sport-fishing stream. The steelhead trout population estimate was 7,608 in 1975-76 and 4,324 in 1976-77, 95% confidence intervals. Two years of data is not sufficient to establish a population trend. Adult steelhead trout population data does not exist after 1977. Harvest estimates were made at the end of the fishing seasons for each of the five years studied. In the 1972-73 season, 288 fish were surveyed.</p> <p>In 1973-74, 1682 steelhead trout were marked for possible recapture. In 1974-75, there were 793 fish counted and in 1975-76, there were 1418 fish counted. Eleven percent of the fish surveyed in 1975-76 were hatchery fish, and a 20.3 % harvest rate was calculated. In the 1976-77 season, there was a 19.8% harvest rate with no hatchery fish recorded. No creel census results were documented from the 76-77 season. The surveys typically began in December. The 1972-73 survey began in November.</p>
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<p>1980s</p>	<p>From 1985-1989, 102,000 coho salmon were planted.</p>	<p>From 1983-89, 301,770 steelhead trout were planted in the Gualala River. The year totals of steelhead trout planted were; 12,500 in 1983; 13,400 in 1984; 9,700 in 1985; 57,450 in 1986; 26,250 in 1987; 108,750 in 1988 and; 73,700 in 1989. Bag seines were employed five times during the years of 1984-1986, to sample the game and non-game fishes of the Gualala River estuary. The purpose of this survey was to assess the impact of proposed water diversions on aquatic species, in general, and juvenile salmonids, in particular.</p> <p>On Robinson Creek, one station was three-pass electro-fished and showed a steelhead trout density of 0.85 per meter. Since electrofishing data were collected only in 1983 on Robinson Creek, insufficient data exists in which to make comparisons. Three pass electrofishing data were collected on a lower and upper site in the Little North Fork in 1988 and 1989.</p> <p>The surveys resulted in an average steelhead trout density of 0.45 per meter on the Little North Fork. In 1989, juvenile steelhead trout population on Fuller Creek (approx. 6 mile long, 3 rd order stream) was estimated at 62 with a standard error of 8.599. Four stations were fished with a two or three pass depletion electro-fish method. These stations were located on South Fork and Mainstem of Fuller Creek. The intent of this survey was to assess the impacts from the upstream logging. Station 4 was upstream of the falls on the South Fork, where resident rainbow trout were observed.</p> <p>Young-of-the-year and one year and older steelhead trout, western roach, and three-spined stickleback were found during these surveys.</p>
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<p>1990s</p>	<p>Over three years, 45,000 juvenile coho salmon from the 1995-1998 brood years were planted in the Little North Fork. The juveniles were from the Noyo River Egg Collecting Station run by CDFG in Fort Bragg, CA. During snorkel surveys, Gualala Redwoods, Inc. observed coho salmon young-of-the-year on the Little North Fork, Robinson and Dry Creek in 1998. Between July 1, 1999, and June 30, 2000, spawner and electrofishing surveys were conducted on the Little North Fork Gualala River. These surveys were conducted to determine whether the planting of coho salmon during the 1996-98 periods was effective. No coho salmon were found.</p>	<p>In 1990, a total of 41,300 steelhead trout were planted in the Gualala River. Since 1993, the Gualala River Steelhead Project rescued steelhead trout juveniles from streams in danger of drying up during the summer months. Rescued fish were kept in two Doughboy pools at the hatchery on Doty Creek, a tributary to the Little North Fork of the Gualala River. The fish are released in the North Fork Subbasin and main stem Gualala River after the first substantial winter rains increase stream flows.</p> <p>From 1993-1997 and 1999-2000, 37,030 steelhead trout have been rescued and 20,328 have been released. During 1990-93, 95, 98, 99 and 2000 three-pass electrofishing data were collected on a lower and upper site in the Little North Fork. No effort was recorded in 1990-1992. Both sites showed small fluctuations in young-of-the year populations. Both sites showed a slight increase in one year old fish from 1995-2000. Two year and older steelhead trout numbers were identical at the lower site and slightly increased at the upper site from 1998-2000.</p> <p>In 1995, one-pass electrofishing surveys were conducted on Fuller Creek and South Fork Fuller Creek. Young of the year, year plus and two year plus steelhead trout were observed. The results were not comparable to the 1989 survey, due to differences in sampling techniques. Gualala Redwoods, Inc. conducted snorkel surveys in 1997, 1998 and 1999. In 1997-98, one year and older steelhead trout were observed in Buckeye Creek and South Fork. In 1998, one year and older steelhead trout were observed in the Wheatfield Fork.</p> <p>In 1999, one year and older steelhead trout were observed in Little North Fork, Robinson Creek, North Fork and Doty Creek.</p>
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<p>2000-2002</p>	<p>Between July 1, 1999, and June 30, 2000, spawner and electrofishing surveys were conducted on the Little North Fork, a tributary to the North Fork by CDFG. These surveys were conducted to determine whether the planting of coho salmon during the three-year period of 1995/96-1997/98 was effective. Robinson Creek and Dry Creek were surveyed in 1999, 2000, and 2001, no coho salmon were found (CDFG unpublished data) Historical coho salmon streams listed by Brown and Moyle (1991) were electro-fished in September 2001.</p> <p>The method used was the modified ten-pool protocol (Attachment D). The streams electro-fished were North Fork, Doty Creek, South Fork, Franchini Creek, Wheatfield Fork, Haupt Creek, Tombs Creek, House Creek, Pepperwood Creek and Marshall Creek. This survey was specifically aimed at establishing coho salmon presence in the streams sampled. Coho salmon were not found in any of the streams surveyed. Coho Salmon Status Review (2001) stated no known remaining viable coho salmon populations in the Gualala River system.</p> <p>In September 2002, coho salmon young-of-the year were present on Dry Creek, a tributary of the North Fork during a snorkel survey and two sites on the Little North Fork and Doty Creek during electrofishing. Coho young-of-the-year were present on McGann Creek, rescued and released (R. Dingman, pers. comm.).</p>	<p>In 2000-2001, 7,600 and 5,450 steelhead trout were planted on the North Fork between Elk Prairie and Dry Creek. During snorkel surveys, Gualala Redwoods, Inc. observed one year and older steelhead trout on: Little North Fork, Robinson, North Fork, and Dry Creek in 2000 and 2001; on the mainstem of Buckeye Creek in 2000 and 2001; and on the South Fork in 2000 and 2001. February-April 2001, a volunteer effort steelhead trout spawning surveys observed redds on Wheatfield Fork, Tombs Creek, Britain Creek, House Creek, and South Fork. Redds were observed on Rockpile Creek in 2001 (K. Morgan, pers. comm).</p>
<p>2003 to 2019</p>	<p>The last observed coho were in Dry Creek in 2004.</p>	<p>The survey in 2008 shows steelhead in every creek surveyed which included Dry, Robinson, Big and Little Pepperwood, Buckeye the Little North Fork, the North Fork, the South Fork and Wheatfield forks of the Gualala. Since then, surveys have been conducted in 2009 and 2011 to 2018 in most of the watercourses listed above with steelhead present in all surveys although numbers have been depressed since 2016 probably as a result of the drought.</p>

Amphibians

Southern torrent salamander (*Rhyacotriton variegatus*): (Status: CDF&W Species of Special Concern)

The range of this species in California coincides with the extent of humid coastal forests in the northwestern part of the state, up to approximately 3,900' above sea level, south to Mendocino County (Anderson 1968). The specific habitat of southern torrent salamanders includes cold mountain streams, springs, seeps, waterfalls, and moss-covered rock rubble with flowing water in humid coastal coniferous forests (Anderson 1968, CWHR 1979, Bury and Corn 1988, Welsh 1990). These salamanders seem to inhabit the splash zone and are rarely found more than one meter from water (Anderson 1968, and Nussbaum and Tait 1977). Southern torrent salamanders' range includes Del Norte, Humboldt, western Siskiyou, Trinity and Mendocino Counties. Marginal suitable habitat does exist within the watershed and but not within the THP. The THP is south of the recognized range, and none of these salamanders have been discovered on GRT property. WLPZ protections and operations will prevent any damage to individuals that may be present and will preserve potential habitat.

California Red-Legged Frog (*Rana Draytonii*): (Status: Federally Threatened, CDF&W Species of Special Concern)

Some of the following habitat description is excerpted from: U.S. Fish and Wildlife Service. 2002. Recovery Plan for the California Red-legged Frog (*Rana draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon. viii + 173 pp.

General Habitat: The frog uses a variety of areas, including various aquatic, riparian, and upland habitats usually below 3,500 feet in elevation.

Breeding Habitat: Breeding sites of the California red-legged frog are in a variety of aquatic habitats; larvae, tadpoles, and metamorphs have been collected from streams, deep pools, backwaters within streams and creeks, ponds, marshes, sag ponds, dune ponds, springs and lagoons. Breeding adults are often associated with deep (greater than 0.7 meter [2 feet]) still or slow-moving water and dense, shrubby riparian or emergent vegetation (Hayes and Jennings 1988). Reis (1999) found the greatest number of tadpoles occurring in study plots with water depths of 0.26 to 0.5 meters (10 to 20 inches). California red-legged frogs also frequently breed in artificial impoundments such as stock ponds.

Dispersal and Use of Uplands and Riparian Areas: During periods of wet weather, starting with the first rains of fall, some individuals may make overland excursions through upland habitats. Most of these overland movements occur at night. Frogs have been observed to make long-distance movements that are straight-line, point to point migrations rather than using corridors for moving in between habitats. During dry periods, the California red-legged frog is rarely encountered far from water. California red-legged frogs have been known to travel up to 1.4 km straight line from the breeding site however most frogs never travel further than 30 meters from the breeding site.

Summer Habitat: California red-legged frogs often disperse from their breeding habitat to forage and seek summer habitat if water is not available. This summer habitat could include spaces under boulders or rocks and organic debris, such as downed trees or logs, or in mammal burrows and moist leaf litter; industrial debris; and agricultural features, such as drains, watering troughs, abandoned sheds, or hay-ricks. California red-legged frogs use large cracks in the bottom of dried ponds as refugia.

Water Quality: California red-legged frogs are sensitive to high salinity, which often occurs in coastal lagoon habitats. Observations indicate that California red-legged frogs were absent when temperatures exceed 22 degrees Celsius (70 degrees Fahrenheit), particularly when the temperature throughout a pool was this high and there are no cool, deep portions.

Predators and Disturbance: Raptors, bobcats, racoons, foxes, rough-skinned newts, otters, herons (both great blue and green) and other predators are known to be in or around the project area. The wider assessment area includes developed areas of The Sea Ranch and associated paved roads. Dogs, domestic cats, vehicles, lawn mowers, pesticides and livestock associated with developed areas are a threat to frogs. Residential lighting may affect frogs during migration. Bullfrogs (a predator of red-legged frogs) have been heard and seen in ponds in the assessment area. Falling, skidding, log hauling and other vehicle traffic associated with logging could disturb or kill individuals.

Nearest recorded sighting: CRLF egg masses were reported to have been found in a pond on Mill Bend approximately a few miles from the THP area.

Timber Harvest Plan Habitat: The THP area contains Class I, II and Class III watercourses. The Class III watercourses flow only in response to rain or a temporary rise in the water table, and do not offer potential habitat. Class II watercourses in the plan area may exhibit shallow pools but when flowing the current may be too fast to offer breeding habitat. Class II watercourses may have water present into spring and summer and can function as a corridor for migration however telemetry studies indicate that the frogs that do migrate usually just go in a straight line to their destination. Some areas of the THP may provide habitat in the form of shallow standing water but the canopy is quite dense, and the areas dry out early in the year, so the habitat does not appear to be optimal. The Class II watercourses have no-cut zones adjacent to them and then have limited selection harvesting outside of that zone. See item 26 for specifics on watercourse protection measures.

Foothill Yellow-Legged Frog (*Rana boylei*): Status: CDF&W Species of Special Concern

North Coast population are abundant in the Gualala River and other stream systems and are not listed. Adult foothill yellow-legged frogs are moderately sized (between 1.5 and 3 inches long) with yellow color under their legs. They inhabit partially shaded, rocky perennial streams and their life cycle is synchronized with the seasonal timing of streamflow conditions. Adult frogs move throughout stream networks from winter refugia to mating habitat where eggs are laid in spring and tadpoles rear in summer. These frogs need perennial water where they can forage through the summer and fall months. The primary cause of mortality in eggs is desiccation. This makes drafting from shallow watercourses where the water level is lowered a concern for this species, however there is no habitat at risk of this within the plan area. The installation of crossings on watercourses is another area where this frog or its egg masses can be impacted.

This species is also occasionally found in other riparian habitats including moderately vegetated backwaters, isolated pools, and slow-moving rivers with mud substrates. (Don T. Ashton, Amy J. Lind, and Kary E. Schlick; 1997) Threats include predators such as garter snakes, bullfrogs, herons and raccoons. Other threats include droughts, floods and human disturbance. Populations of *R. boylei* have declined in southern and central California south of the Salinas River, Monterey County, and in the west slope drainages of the Sierra Nevada and southern Cascade Mountains east of the Sacramento and San Joaquin Rivers. In the Coast Ranges north of the Salinas River *R. boylei* stills occurs in significant numbers in some coastal drainages. (Jennings and Hayes 1994).

These frogs do occur in suitable habitat in the assessment area. Any adult frogs that may exist near the THP will be protected by WLPZ requirements and additional protections required in ASP zones. The limitations adjacent to watercourses contained in the plan for protection of the red-legged frog, as well as fish, will also protect the foothill yellow-legged frog and its habitat. Operations of this THP under stated plan restrictions and allowable practices will not likely result in a take, nor have any adverse impact on the species. The nearest occurrence is along the Mainstem Gualala River, over 1 mile south of the plan boundary.

Pacific Tailed Frog (*Ascaphus truei*): CDF&W Species of Special Concern

This species is restricted to perennial montane streams in steep-walled valleys with dense vegetation. Permanent water is critical and individuals are rarely found more than 40 feet from streams. Although considered uncommon, experienced observation reveals abundant populations in suitable habitat. Preferred habitat includes montane hardwood-conifer, redwood, Douglas-fir and ponderosa pine forests with perennial streams in steep-walled, densely vegetated valleys. Adult frogs consume a wide array of prey, taken along stream banks and in the water. Aquatic and terrestrial insects (larval and adult), spiders and snails are all consumed. Tadpoles derive their energy by grazing diatoms on submerged rocks; small quantities of filamentous algae are also consumed. Conifer pollen is consumed in large quantities when available. Cover is sought under submerged rocks and logs in the stream, or under similar objects close to the stream. Tadpoles require cool stream temperatures (15C or less). Tadpoles require rocks around 2½ inches in diameter to which they attach themselves via a large oral sucker; turbulent water is preferred to smooth, swiftly flowing water. The breeding period typically occurs in the early fall with the eggs being laid during the following summer. Eggs hatch in about 1 month with aquatic larvae requiring 2 to 3 years to fully transform. Metamorphosis usually takes place in the fall. There is marginal habitat within the BAA, but no optimal habitat exists within the THP boundary. Conservation measures include WLPZ measures for Class II watercourses as well as for Class II springs, which have been shown to correlate with healthy populations. The implementation of WLPZ protection measures as well as ASP protections required by the FRPs are highly likely to avoid take and adverse impacts to this species. There are many occurrences of this species in the CNDDB 9 quad search, however none occur within the THP area, no occurrences were observed in the THP area during plan layout and fieldwork.

California giant salamander (*Dicamptodon ensatus*): Status: CDF&W Species of Special Concern

The California giant salamander's distribution ranges from extreme southern Mendocino County south to Sonoma, Napa, Marin, and Santa Cruz counties. They are most commonly found in habitats characterized by coast redwood, Douglas-fir/tanoak, and true oak woodland. This species co-occurs and hybridizes with the coastal giant salamander (*Dicamptodon tenebrosus*) in a narrow hybrid zone which extends south of Manchester, CA to just south of Point Arena, CA. The exact boundaries to this hybrid zone still remain ill-defined on both a north-south and east-west gradient.

More systematics and population genetic work is needed utilizing contemporary molecular methods to delineate the range of this species.

Terrestrial forms of the California giant salamander are found on land under the forest canopy, underneath rocks, logs, other coarse and large woody debris, and in subterranean burrows. Most terrestrial individuals are found in moist areas near watercourses. During rainy periods, adults may be very active and move overland to forage. Larvae are found in cool, clear streams with rocky substrates. Larvae are generally abundant in streams with cool water temperatures (< 18 °C), low levels of siltation and substrate embeddedness. Larvae utilize rocks, woody debris, and detritus as cover in streams. Small larvae may be found several inches beneath the stream bottom in gravel to avoid predation by larger conspecific larvae and other predators. Larvae have been observed in heavily silted small streams using the silt as camouflage. They may be more tolerant of warmer water temperature conditions and the presence of silt compared to other co-occurring headwater amphibian species (i.e. *Ascaphus* and *Rhyacotriton*).

Very little specific life history information has been reported for this species but is thought to be similar to the coastal giant salamander (*D. tenebrosus*). Adult and neotenic forms breed in small and medium-sized streams with rocky substrates during the early spring when high flows recede. Seventy to 100 eggs are individually attached to the underside of rocks or woody debris in slow moving portions of streams. Females may guard and defend nests until larvae hatch and disperse. Complete metamorphosis of larvae may take several summers, and different age classes are regularly seen in streams where they are abundant. Neotenic forms (reproductive adults with larval characteristics) may occur in perennial bodies of water. Larvae feed on a variety of aquatic invertebrates, though prey selection changes with body size and metamorphosis, and may include fish, smaller conspecific larvae, and amphibians. Adults regularly feed on banana slugs (*Ariolimax columbianus*) and other small vertebrate prey such as rodents.

Habitat for the species does exist within the THP area. Protection from WLPZ measures for Class II watercourses as well as for seeps and springs should avoid any negative impacts to California giant salamander populations. The nearest known occurrence is in China Gulch outside of the plan boundary. If present, no impact from the proposed timber management activities on the California giant salamander is anticipated.

Red-bellied newt (*Taricha rivularis*): Status: CDF&W Special Concern

The red-bellied newt is distributed from southern Humboldt, western Lake, Mendocino, and northern Sonoma counties. It is one of four species in the genus *Taricha* residing in California and has the smallest range.

This species breeds in flowing sections of small to mid-sized streams with rocky/cobble substrates in oak woodland, Douglas-fir/tanoak, and coast redwood forests. Adults utilize terrestrial habitats such as burrows, loose rock formations, fallen trees, coarse woody debris, and remnant logging debris for cover and foraging during the dry season (May-October).

Emergence of terrestrial adults begin after the onset of the wet season in November and December. This species is a long-distance migrant and may travel several miles overland to natal streams for breeding. Breeding occurs from February to May, with March and April representing the peak months when large numbers of adults congregate in streams to mate. Multiple adult males can be seen amplexing with females in "mating balls" to stimulate breeding. The male will deposit a spermatophore (sperm packet) on a small rock, then the female picks it up with her vent. Oviposition generally occurs on the underside of rocks in the fast-flowing section of streams, or on submerged roots along the stream bank. Egg masses consist of 6-16 eggs and form single flattened

clusters one-egg layer thick. Developmental rates are a function of stream temperature, and the period from hatching to metamorphosis ranges from 4-6 months. Following breeding, adults migrate from streams to terrestrial habitats. Red-bellied newts are thought to be long lived. Twitty (1966) noted that many recaptured newts marked as reproductive adults were at least 17 years old. Others have suggested they may live 20-30 years, but this has yet to be verified. Newts forage on a variety of aquatic and terrestrial invertebrate prey, small fish, and larval amphibians.

Class I and Class II (WLPZ) measures apply to all occupied watersheds reduce sedimentation and maintain cool water temperatures conducive for breeding adults, oviposition, and larval rearing. Additional considerations should be given to seeps, springs, and even ponds immediately adjacent to occupied watercourses as these habitats have been demonstrated to be important both for foraging and refugia during the dry season. Adult newts, in general, are more tolerant of warmer terrestrial environments and water temperatures compared to headwater stream amphibian species (e.g. *Ascaphus*, *Rhyacotriton*, and *Dicamptodon*). Several publications have suggested that industrial logging has had an impact on *T. rivularis* due to much of its range being owned by privately held companies (Reilly et al. 2014). While many watersheds on industrial forestlands were intensively harvested over the past 100 years, they still have large breeding populations of *T. rivularis*. In general, most logging activities are scheduled during the dry season, which may further minimize direct mortalities along active roadsides when newts are less likely to be migrating overland in large numbers. Additional voluntary measures, such as wet season restrictions, drift fences, migration culverts, and new road design may further reduce mortalities; however, the feasibility of these measures has yet to be explored.

Desirable habitat does exist within the THP boundary, and the nine quad CNDDDB search indicated several occurrences of the red-bellied newt. The species has not been observed during layout of the harvest plan, and adjustments can be made if they are discovered, however preventative protections from WLPZ measures for Class II watercourses as well as for seeps and springs should address any negative impacts to red-bellied newt populations. If present, no impact from the proposed timber management activities on the red-bellied newt is anticipated.

Reptiles

Northwestern pond turtle (*Clemmys marmorata marmorata*) Federal Proposed Threatened and State Species of Special Concern.

The northwestern pond turtle is found in ponds, lakes, or permanent pools of streams below 6,000 ft in elevation. Basking sites are partially submerged logs, rocks or mud banks and normally associated with permanent or nearly permanent water. Nesting may occur adjacent to or in openings of forest habitat. Nests are generally located on south, southwest or southeast facing exposures. Three to 11 eggs are laid between March and August. Eggs are deposited in soil with relatively high humidity and containing significant amounts of clay or silt. Surrounding vegetation tends to be short grasses or forbs. The incubation period is approximately 75 days. Sexual maturity is thought to take 8 years. This turtle is omnivorous, feeding on aquatic plant material (pond lilies), aquatic insects, and a variety of aquatic invertebrates, frogs and fish. The Northwestern Pond turtle is the only abundant native turtle in California. No northwestern pond turtles were observed during field preparation activities. Habitat potential is moderate within the plan area, with aquatic needs being fulfilled but a lack of basking sites, upland nesting habitat, and upland overwinter/aestivation habitat being present within the plan boundaries. Within the BAA there is high habitat potential, particularly along Gualala River and its major tributaries. The watercourse protection measures stated in the plan are sufficient to protect the habitat for this species.

Insects

Behren's Silverspot Butterfly (*Speyeria zerene behrensi*): (Status: Federally Endangered)

The historic range of Behren's silverspot butterfly is based on six known locations which extended from near the community of Mendocino, Mendocino County, south to the area of Salt Point State Park, Sonoma County (USFWS 2003). The current known range of the Behren's silverspot butterfly is limited to a small number of sites located from the Point Arena-Manchester State Park area south to the Salt Point area. South of Salt Point in coastal Sonoma County, populations of Zerene Fritillary occur, which have similarities to both the Behren's and Myrtle silverspot subspecies.

Adult Behren's silverspot butterflies feed on nectar, which is their only food source, besides internal reserves present when they emerge from the pupae. Observations of nectar feeding are few but based on observations of this and closely related silverspot subspecies, plants in the sunflower family (Asteraceae) dominate as nectar sources, including thistles (*Cirsium* spp); gumplant (*Grindelia stricta*); goldenrods (*Solidago* spp); tansy ragwort (*Senecio jacobaea*), California aster (*Aster chilensis*), pearly everlasting (*Anaphalis margaritacea*), seaside daisy (*Erigeron glaucus*), and yarrow (*Achillea millefolium*). Reported nectar species from other plant families include: yellow sand verbena (*Abronia latifolia*), sea-pink (*Armeria maritima*) and western pennyroyal (*Monardella undulata*).

The Behren's silverspot butterfly inhabits coastal terrace prairie habitat west of the Coast Range in southern Mendocino and northern Sonoma Counties, California. This habitat is strongly influenced by proximity to the ocean, with mild temperatures, moderate rainfall, and frequent summer fog. Coastal terrace prairie is a dense grassland dominated by perennial grasses, on sandy loam soils on marine terraces below about 1,000 feet elevation and within the zone of coastal fog.

The primary threats to the Behren's silverspot butterfly, cited at the time of listing, are over collecting, and habitat destruction, fragmentation and degradation due to urban development, alien plant invasion and competition, and excessive livestock grazing. Other factors include potential genetic problems associated with small populations, the lack of natural, periodic fires to maintain coastal prairie habitats, and the inadequacy of existing regulatory mechanisms to protect the species and its habitat.

The CNDDDB 9 quad search showed several occurrences within the region. Some coastal terrace prairie habitat does occur within the BAA. Due to no operations within potential habitat areas, no negative impacts are expected.

Obscure Bumble Bee (*Bombus caliginous*) (Status: N/A)

Distribution primarily occurs along the California coast with sightings throughout the Central Valley. Habitat includes grassy coastal prairies and shrublands. Their diet consists of nectar and pollen collected from plants. Nests are built either underground or above ground in abandoned bird nests, rock piles, and other objects with protected cavities. (Hatfield et al 2014).

Potentially suitable habitat exists within the assessment area and the THP area. However, much more suitable food sources exist outside of the THP area in grasslands with abundant wildflower species.

The 9-quad search reveals several sightings within the region. No individuals were detected during THP field operations. The plan area contains very little favorable habitat for the Obscure bumblebee. Potentially significant impacts to this species resulting from this project are not anticipated.

Western Bumble Bee (*Bombus occidentalis*)

The western bumble bee is a California Endangered Species Act (CESA) candidate as of September 2022.

All bumble bees have three basic habitat requirements: suitable nesting sites for the colonies, availability of nectar and pollen from floral resources throughout the duration of the colony period (spring, summer, and fall) and suitable overwintering sites for the queens. In addition, their populations can be negatively affected by both pathogens and pesticides; thus they may require habitat that is free from exposure to high levels of both native and exotic pathogens, and pesticides that cause harm to colonies. Bumble bees are found in a wide variety of natural, agricultural, urban, and rural habitats, although species richness tends to peak in flower-rich meadows of forests and subalpine zones. The western bumble bee nests, forages, and overwinters in meadows and grasslands with abundant floral resources and may be found in some natural areas within urban environments (Williams et al, 2014).

The western bumble bee was historically found in much of California and is now thought to be limited to mostly high elevation meadows and coastal areas. While flower rich areas are present within the THP area or adjacent, no significant adverse impact is expected to this species given that pesticides are not associated with the proposed project and that the meadows present within and adjacent to the THP area will be maintained as meadows. The 9-quad search identifies 1 occurrence of the western bumble bee within the region.

Monarch butterfly - California overwintering population (*Danaus plexippus pop. 1*) (Status: Federal Candidate)

North American monarchs that overwinter along the Pacific coast, mostly in California, are often called the "western monarch". Taxonomically these are part of *Danaus plexippus*. The extent to which they interbreed with eastern monarchs that overwinter in the Mexican mountains is uncertain, but apparently substantial because microsatellite analyses suggest that the western and eastern Monarch populations are panmictic (Lyons et al. 2012). The distinction between eastern and western monarch winter habitats is also not as absolute as it was formerly thought to be some monarchs from the western states overwinter with the eastern ones in the Mexican mountains. A number of sightings have occurred within the 9 quad search. 1 occurrence is mapped as occurring with the plan however the detailed location describes it as occurring near Robinson or China Gulch outside of the THP boundary. No individuals or clusters were detected during THP field operations. The plan area contains favorable habitat for the monarch while other areas within the BAA are much more suitable. Potentially significant impacts to this species resulting from this project are not anticipated.

Lotis Blue Butterfly (*Plebejus anna lotis*) Status: Federally Endangered

The Lotis Blue has been known to exist in a few sites along the north coast of California. The known habitat of this butterfly is a rare type of coastal bog that has been highly impacted both by development and climate change. Human impacts have likely altered the successional stages of these habitat types and therefore impacted the butterfly's ability to survive. There is no suitable habitat within the plan area, and the nearest detection was in Point Arena. No impacts to the species are expected because of the timber operations.

Botanical Resources

The THP is within the Stewarts Point and McGuire Ridge USGS quadrangle. The USGS Quad maps considered as part of this analysis are: Ornbaun Valley, Point Arena, Gube Mountain, Zeni Ridge, Gualala, McGuire Ridge, and Stewarts Point. Stewarts Point OE W quadrangle was not located on the CNNDDB database list, and one quad map region is located entirely in the Pacific Ocean. A total of 39 plant species are known to exist within the scoping area. These 40 plant species were then further evaluated for rarity (listing status), the potential to occur on or near the THP area, habitat suitability, and subsequent potential for cumulative negative significant impact to the species as a whole throughout the species' range as the result of the THP operations. Past surveys within the project area have identified **Carex aquatilis, lenticularis and Veratrum fimbriatum as present. The Carex aquatilis does not have a California rare plant rank and the veratrum fimbriatum (fringed corn lily) has a California rare plant rank of 4.3. The Carex is outside the THP area and will not be affected by operations. The corn lily is inside the area of operations but is an area where all skid trails have been preflagged.** Based on the Keeler-Wolf classification system, the primary natural communities present within the THP most closely resembles the Redwood (*Sequoia sempervirens*, G3, S3.2) Forest and Woodland Alliance, Douglas fir - tanoak (*Pseudotsuga menziesii* -*Notholithocarpus densiflorus*, G3, S3) Forest and Woodland.

Definition of Rare Plant-

The plants designated in this document as "rare" are the vascular plant species currently protected on both the federal and state levels. These plants have been derived from the following lists: Federal listed or proposed threatened or endangered plants in California, State listed or proposed rare, threatened or endangered plants, California Native Plant Society's (CNPS) list 1A (plants presumed extinct in California), CNPS list 1B (plants rare, threatened or endangered in California and elsewhere), and CNPS list 2 (plants rare, threatened or endangered in California but more common elsewhere). The California Native Plant Society's (CNPS) list 1A, 1B and 2 plants are included in the interest of being thorough, as their inclusion reflects the current knowledge and concerns of the professional and amateur botanists throughout California. In addition, these lists meet the criteria for state listing under Sec. 1901, Chapter 10 of the Native Plant Protection Act, or Secs. 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Game Codes and are probable candidates for state listing. The CNPS list 1A, 1B and 2 plants are to be considered in the preparation of documents relating to the California Environmental Quality Act.

Analysis of botanical resources consisted of an assessment of the capacity for this THP to cause significant adverse impact on special status plant species by evaluating the following: rarity presence or presence, species ranges, habitat needs, and the degree to which the specific operations proposed in this THP could cause a cumulative negative impact to special status plant species throughout their ranges.

Please refer to the Botanical Survey Report in Section V for focused survey results.

The THP area contains the following baseline conditions regarding botanical resources:

- Competition— The species that could potentially exist in the THP are struggling to establish with the competition of grasses, shrubs, and other vegetation that may shade out the plants. Disturbance for some of the species is needed for proliferation. Other species exist in riparian areas which receive protection under the Forest Practice Act.

Botanical Resources- Past Projects

The main activities that may have contributed to past adverse impacts of the Biological Assessment Area, specifically to botanical resources, are the lack of forest management, over protection, and intensive logging and habitat reduction of the 20th Century. Some species present need disturbance to proliferate in the plan area and more recent disturbances have resulted in blooming of coast lily and swamp harebell in directly previously disturbed soil by heavy equipment on other parts of the ownership.

Botanical Resources- Reasonably Foreseeable Probable Future Projects

Future projects within the project area will follow the FPRs, and have the same impact as the current project, which is that there is not a significant adverse impact to botanical resources. Continuing disturbance through operations at each successive entry are expected to result in a high abundance of these species and the ability to spread to other areas and will have a positive impact towards this species across its range.

Botanical Resources - Proposed THP

The THP includes a focused floristic survey. This survey was limited to plants listed under the Federal or State Endangered Species Acts as Threatened or Endangered. The survey and report are located within Section V and include additional information about past species documentation after disturbance near the plan area. Prior to conducting surveys, the California Native Plant Society (CNPS) Electronic Inventory of Rare or Endangered Vascular Plants of California, THP 1-19-098 MEN (withdrawn), and the California National Diversity Data Base (CNDDDB) were reviewed to develop a scoping list of potential listed plant species and their habitats.

Botanical Resources Conclusion

The existing conditions within the BAA regarding botanical species indicate that there was not a significant impact in the past, and there is not a present significant adverse impact to soil productivity in the assessment area. Future projects are not anticipated to require extensive new road construction. This THP should not result in additional growing space lost. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on growing space is that there are no significant cumulative impacts, and that current conditions will be maintained through the project implementation.

The scoping list used for the Card THP is located below:

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Scientific Name	Common Name	CRPR	G Rank	S Rank	CESA	FESA	Natural communities	Blooming periods	Habitat in the THP n=no p=possible y=yes
<i>Abronia umbellata</i> ssp. <i>breviflora</i>	pink sand-verbena	List 1B.1	G4G5T2	S2	None	None	Coastal dunes. 0-10 meters in elevation.	Jun-Oct	n
<i>Agrostis blasdalei</i>	Blasdale's bent grass	List 1B.2	G2G3	S2	None	None	Coastal bluff scrub, Coastal dunes, Coastal prairie. 0-150 meters in elevation.	May-Jul	n
<i>Astragalus agnicidus</i>	Humboldt milk-vetch	List 1B.1	G2	S1	Endangered	None	Broad-leafed upland forest, North Coast coniferous forest. Disturbed areas, Openings, Roadsides (sometimes). 120-800 meters in elevation.	Apr-Sep	y
<i>Calystegia purpurata</i> ssp. <i>saxicola</i>	coastal bluff morning-glory	List 1B.2	G4T2T3	S2S3	None	None	Coastal dunes, Coastal scrub, North Coast coniferous forest	May-Sep	n
<i>Carex californica</i>	California sedge	List 2.3	G5	S2	None	None	Bogs and fens, Closed-cone coniferous forest, Coastal prairie, Marshes and swamps (margins), Meadows and seeps. 90-335 meters in elevation.	May-Aug	y
<i>Carex lyngbyei</i>	Lungbye's sedge	List 2B.2	G5	S3	None	None	Marshes and swamps (brackish, freshwater). 0-10 meters in elevation.	May-Aug	n
<i>Carex saliniformis</i>	deceiving sedge	1B.2	G2	S2	None	None	Coastal prairie, Coastal scrub, Meadows and seeps, Marshes and swamps (coastal salt)/mesic. 3-230	Jun	p

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Scientific Name	Common Name	CRPR	G Rank	S Rank	CESA	FESA	Natural communities	Blooming periods	Habitat in the THP
							meters in elevation.		
<i>Castilleja ambigua</i> var. <i>humboldtiensis</i>	Humboldt Bay owl's-clover	1B.2	G5T2	S2	None	None	Coastal bluff scrub, Coastal prairie, Coastal scrub, Marshes and swamps, Valley and foothill grassland, Vernal pools (margins). 0-435 meters in elevation.	Mar-Aug	n
<i>Castilleja mendocinensis</i>	Mendocino Coast paintbrush	1B.2	G2	S2	None	None	Coastal Strand, Northern Coastal Scrub, Closed-cone Pine Forest, Coastal Prairie	Apr-Aug	n
<i>Coptis laciniata</i>	Oregon golden thread	4.2	G4	S3	None	None	Redwood Forest, Douglas-fir, wetland-riparian. Elev 500-2000 meters	Mar-Apr	y
<i>Eastwoodiella californica</i>	swamp harebell	List 1B.2	G3	S3	None	None	Bogs and fens, Closed-cone coniferous forest, Coastal prairie, Marshes and swamps (freshwater), Meadows and seeps, North Coast coniferous forest. Mesic. 1-405 meters in elevation.	Jun-Oct	y
<i>Erigeron supplex</i>	supple daisy	1B.2	G2	S2	None	None	Northern Coastal, Coastal Prairie	May-Jul	n
<i>Erysimum concinnum</i>	Headland wallflower	1B.2	G3	S2	None	None	Northern Coastal Scrub	Mar-May	n
<i>Fritillaria roderickii</i>	Roderick's fritillary	1B.1	G1Q	S1	Endangered	None	Northern Coastal Scrub, Coastal Prairie, Valley Grassland.	Mar-May	n

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Scientific Name	Common Name	CRPR	G Rank	S Rank	CESA	FESA	Natural communities	Blooming periods	Habitat in the THP
<i>Gilia capitata</i> ssp. <i>Pacifica</i>	Pacific gilia	1B.2	G5T3	S3	None	None	Steep slopes, ravines, open flats, or coastal bluffs, grasslands and dunes	Apr-Aug	n
<i>Glyceria grandis</i>	American manna grass	List 2B.3	G5	S3	None	None	Bogs and fens, Marshes and swamps (lake margins, streambanks), Meadows and seeps. 15-1980 meters in elevation.	Jun-Aug	y
<i>Hesperevax sparsiflora</i> var. <i>brevifolia</i>	Short-leaved evax	1B.2	G4T3	S3	None	None	Dunes, coastal	Mar-June	n
<i>Hesperocypris pygmaea</i>	pygmy cypress	1B.2	G1	S1	None	None	• Closed-cone coniferous forest (usually podzol-like soil). 30-600 meters in elevation.	NA	n
<i>Horkelia marinensis</i>	Point Reyes horkelia	1B.2	G2	S2	None	None	Coastal strand, Northern Coast Scrub, Coastal Prairie	May-Sept	n
<i>Horkelia tenuiloba</i>	thin-lobed horkelia	List 1B.2	G2	S2	None	None	Broadleaved upland forest, Chaparral, Valley and foothill grassland/mesic openings, sandy. 50-500 meters in elevation	May-Jul	p
<i>Kopsiopsis hookeri</i>	small groundcone	2B.3	G4?	S1S2	None	None	Lower montane coniferous forest, North Coast coniferous forest, Upper montane coniferous forest Elevation 460 to 2165 ft	Apr-Aug	y

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Scientific Name	Common Name	CRPR	G Rank	S Rank	CESA	FESA	Natural communities	Blooming periods	Habitat in the THP
<i>Lasthenia californica</i> ssp. <i>bakeri</i>	Baker's goldfields	List 1B.2	G3T1	S1	None	None	Closed-cone coniferous forest(openings), Coastal scrub, Meadows and seeps, Marshes and swamps. 60-520 meters in elevation.	Apr-Oct	p
<i>Lasthenia californica</i> ssp. <i>macrantha</i>	Perennial goldfields	1B.2	G3T2	S2	None	None	Northern coastal scrub	Jan-Nov	n
<i>Lasthenia conjugens</i>	Contra Costa goldfields	1B.1	G1	S1	None	None	Freshwater wetlands, Valley Grasslands, wetland-riparian	Mar-Jun	n
<i>Lathyrus palustris</i>	marsh pea	List 2.2	G5	S2	None	None	Bogs and fens, Coastal prairie, Coastal scrub, Lower montane coniferous forest, Marshes and swamps, North Coast coniferous forest/mesic. 1-100 meters in elevation.	Mar-Aug	p
<i>Lilium maritimum</i>	coast lily	List 1B.1	G2	S2	None	None	Broadleafed upland forest, Closed-cone coniferous forest, Coastal prairie, Coastal scrub, Marshes and swamps(freshwater), North Coast coniferous forest/sometimes roadside. 5-475 meters in elevation.	May-Aug	p
<i>Lycopodium clavatum</i>	running-pine	4.1	G5	S3	None	None	Freshwater Wetlands, Douglas-Fir Forest, wetland-riparian	Jun-Aug	p

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Scientific Name	Common Name	CRPR	G Rank	S Rank	CESA	FESA	Natural communities	Blooming periods	Habitat in the THP
<i>Microseris paludosa</i>	Marsh scorzonella	1B.2	G2	S2	None	None	Northern Coastal Scrub, Closed-cone Pine Forest	Apr-June	n
<i>Oenothera wolfii</i>	Wolf's evening primrose	1B.1	G2	S1	None	None	Coastal Strand, Northern Coast Scrub, Yellow Pine Forest, Coastal Prairie	May-Oct	n
<i>Piperia Candida</i>	White-flowered rein orchid	List 1B.2	G3?	S3	None	None	Broad-leaved upland forest, Lower montane coniferous forest, North Coast coniferous forest. Serpentinite (sometimes). 30-1310 meters in elevation.	Mar-Sept	p
<i>Potamogeton epihydrus</i>	Nuttall's ribbon-leaved pondweed	List 2B.2	G5	S2S3	None	None	Marshes and swamps (freshwater, near coast). 3-75 meters in elevation.	June-Sept	p
<i>Sidalcea calycosa</i> ssp. <i>rhizomata</i>	Point Reyes checkerbloom	List 1B.2	G5T2	S2	None	None	Marshes and swamps (freshwater, near coast). 3-75 meters in elevation	Apr-Sep	p
<i>Sidalcea malachroides</i>	Maple-leaved checkerbloom	4.2	G3	S3	None	None	Redwood Forest, Mixed Evergreen Forest, Coastal Prairie. Elev <700 meters	Apr-Aug	y
<i>Sidalcea malviflora</i> ssp. <i>Purpurea</i>	Purple-stemmed checkerbloom	1B.2	G4G5T1	S1	None	None	Meadows, open coastal forest, prairie. Elev 0-30 meters	May-Jun	n
<i>Sulcaria spiralifera</i>	Twisted horse hair lichen	List 1B.2	G3G4	S2	None	None	Coastal dunes (SLO Co.), North Coast coniferous forest (immediate coast). Usually on conifers. 0-90 meters in elevation.	NA	p
<i>Trifolium</i>	Santa Cruz	1B.1	G2	S2	None	None	Mixed Evergreen Forest,	Apr-	n

Scientific Name	Common Name	CRPR	G Rank	S Rank	CESA	FESA	Natural communities	Blooming periods	Habitat in the THP
buckwestiorum	Clover						Coastal Prairie	Oct	
Usnea longissimi	Methuselah's beard lichen	4.2	G5	S4	None	None	Redwood Forests	NA	y

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Of the above listed species, the following 18 rare plants have the potential to occur in the project area:

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Scientific Name	Common Name	CRPR	G Rank	S Rank	CESA	FESA	Natural communities	Blooming periods	Habitat in the THP
									n=no p=possible y=yes
Astragalus agnicidus	Humboldt milk-vetch	List 1B.1	G2	S1	Endangered	None	Broad-leaved upland forest, North Coast coniferous forest. Disturbed areas, Openings, Roadsides (sometimes). 120-800 meters in elevation.	Apr-Sep	y
Carex californica	California sedge	List 2.3	G5	S2	None	None	Bogs and fens, Closed-cone coniferous forest, Coastal prairie, Marshes and swamps (margins), Meadows and seeps. 90-335 meters in elevation.	May-Aug	y
Carex saliniformis	deceiving sedge	1B.2	G2	S2	None	None	Coastal prairie, Coastal scrub, Meadows and seeps, Marshes and swamps (coastal salt)/mesic. 3-230 meters in elevation.	Jun	p
Coptis laciniata	Oregon golden thread	4.2	G4	S3	None	None	Redwood Forest, Douglas-fir, wetland-riparian. Elev 500-2000 meters	Mar-Apr	y
Eastwoodiella californica	swamp harebell	List 1B.2	G3	S3	None	None	Bogs and fens, Closed-cone coniferous forest, Coastal prairie, Marshes and swamps (freshwater), Meadows and seeps, North Coast coniferous forest. Mesic. 1-	Jun-Oct	y

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Scientific Name	Common Name	CRPR	G Rank	S Rank	CESA	FESA	Natural communities	Blooming periods	Habitat in the THP
							405 meters in elevation.		
<i>Glyceria grandis</i>	American manna grass	List 2B.3	G5	S3	None	None	Bogs and fens, Marshes and swamps (lake margins, streambanks), Meadows and seeps. 15-1980 meters in elevation.	Jun-Aug	y
<i>Horkelia tenuiloba</i>	thin-lobed horkelia	List 1B.2	G2	S2	None	None	Broadleaved upland forest, Chaparral, Valley and foothill grassland/mesic openings, sandy. 50-500 meters in elevation	May-Jul	p
<i>Kopsiopsis hookeri</i>	small groundcone	2B.3	G4?	S1S2	None	None	Lower montane coniferous forest, North Coast coniferous forest, Upper montane coniferous forest Elevation 460 to 2165 ft	Apr-Aug	y
<i>Lasthenia californica</i> ssp. <i>bakeri</i>	Baker's goldfields	List 1B.2	G3T1	S1	None	None	Closed-cone coniferous forest(openings), Coastal scrub, Meadows and seeps, Marshes and swamps. 60-520 meters in elevation.	Apr-Oct	p
<i>Lathyrus palustris</i>	marsh pea	List 2.2	G5	S2	None	None	Bogs and fens, Coastal prairie, Coastal scrub, Lower montane coniferous forest, Marshes and swamps, North Coast coniferous forest/mesic. 1-	Mar-Aug	p

HHC

Scientific Name	Common Name	CRPR	G Rank	S Rank	CESA	FESA	Natural communities	Blooming periods	Habitat in the THP
							100 meters in elevation.		
<i>Lilium maritimum</i>	coast lily	List 1B.1	G2	S2	None	None	Broadleafed upland forest, Closed-cone coniferous forest, Coastal prairie, Coastal scrub, Marshes and swamps(freshwater), North Coast coniferous forest/sometimes roadside. 5-475 meters in elevation.	May-Aug	p
<i>Lycopodium clavatum</i>	running-pine	4.1	G5	S3	None	None	Freshwater Wetlands, Douglas-Fir Forest, wetland-riparian	Jun-Aug	p
<i>Piperia Candida</i>	White-flowered rein orchid	List 1B.2	G3?	S3	None	None	Broad-leafed upland forest, Lower montane coniferous forest, North Coast coniferous forest. Serpentinite (sometimes). 30-1310 meters in elevation.	Mar-Sept	p
<i>Potamogeton epihydrus</i>	Nuttall's ribbon-leaved pondweed	List 2B.2	G5	S2S3	None	None	Marshes and swamps (freshwater, near coast). 3-75 meters in elevation.	June-Sept	p
<i>Sidalcea calycosa</i> ssp. <i>rhizomata</i>	Point Reyes checkerbloom	List 1B.2	G5T2	S2	None	None	Marshes and swamps (freshwater, near coast). 3-75 meters in elevation	Apr-Sep	p
<i>Sidalcea malachroides</i>	Maple-leaved checkerbloom	4.2	G3	S3	None	None	Redwood Forest, Mixed Evergreen Forest, Coastal Prairie. Elev <700 meters	Apr-Aug	y
<i>Sulcaria spiralis</i>	Twisted horse hair lichen	List 1B.2	G3G4	S2	None	None	Coastal dunes (SLO Co.), North Coast coniferous	NA	p

Scientific Name	Common Name	CRPR	G Rank	S Rank	CESA	FESA	Natural communities	Blooming periods	Habitat in the THP
							forest (immediate coast). Usually on conifers. 0-90 meters in elevation.		
Usnea longissimi	Methuselah's beard lichen	4.2	G5	S4	None	None	Redwood Forests	NA	y

SHC

11 plant species occur in riparian or aquatic environments. Riparian habitats are present within and adjacent to the proposed project. Given the restrictive nature of timber operations within riparian environments provides that even if these species are present there is no reasonable cause for concern that survival and reproduction could be in immediate jeopardy causing it to be federally or states listed within the foreseeable future throughout all or a significant portion of the species ranges. As none of the potential impacts identified will be significant in nature, therefore this THP will not cause a significant adverse impact on these species.

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Scientific Name	Common Name	CRPR	G Rank	S Rank	CESA	FESA	Natural communities	Blooming periods	Habitat in the THP n=no p=possible y=yes
Carex californica	California sedge	List 2.3	G5	S2	None	None	Bogs and fens, Closed-cone coniferous forest, Coastal prairie, Marshes and swamps (margins), Meadows and seeps. 90-335 meters in elevation.	May-Aug	y
Carex saliniformis	deceiving sedge	1B.2	G2	S2	None	None	Coastal prairie, Coastal scrub, Meadows and seeps, Marshes and swamps (coastal salt)/mesic. 3-230 meters in elevation.	Jun	p
Coptis laciniata	Oregon golden thread	4.2	G4	S3	None	None	Redwood Forest, Douglas-fir, wetland-riparian. Elev 500-2000 meters	Mar-Apr	y
Eastwoodiella californica	swamp harebell	List 1B.2	G3	S3	None	None	Bogs and fens, Closed-cone coniferous forest, Coastal prairie, Marshes and swamps (freshwater), Meadows and seeps, North Coast coniferous forest. Mesic. 1-405 meters in elevation.	Jun-Oct	y
Gilia capitata	Pacific gilia	1B.2	G5T3	S3	None	None	Steep slopes, ravines, open	Apr-	p

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Scientific Name	Common Name	CRPR	G Rank	S Rank	CESA	FESA	Natural communities	Blooming periods	Habitat in the THP
<i>ssp. Pacifica</i>							flats, or coastal bluffs, grasslands and dunes	Aug	
<i>Glyceria grandis</i>	American manna grass	List 2B.3	G5	S3	None	None	Bogs and fens, Marshes and swamps (lake margins, streambanks), Meadows and seeps. 15-1980 meters in elevation.	Jun-Aug	y
<i>Lasthenia californica ssp. bakeri</i>	Baker's goldfields	List 1B.2	G3T1	S1	None	None	Closed-cone coniferous forest(openings), Coastal scrub, Meadows and seeps, Marshes and swamps. 60-520 meters in elevation.	Apr-Oct	p
<i>Lathyrus palustris</i>	marsh pea	List 2.2	G5	S2	None	None	Bogs and fens, Coastal prairie, Coastal scrub, Lower montane coniferous forest, Marshes and swamps, North Coast coniferous forest/mesic. 1-100 meters in elevation.	Mar-Aug	p
<i>Lycopodium clavatum</i>	running-pine	4.1	G5	S3	None	None	Freshwater Wetlands, Douglas-Fir Forest, wetland-riparian	Jun-Aug	p
<i>Potamogeton epihydrus</i>	Nuttall's ribbon-leaved pondweed	List 2B.2	G5	S2S3	None	None	Marshes and swamps (freshwater, near coast). 3-75 meters in elevation.	June-Sept	p
<i>Sidalcea calycosa ssp. rhizomata</i>	Point Reyes checkerbloom	List 1B.2	G5T2	S2	None	None	Marshes and swamps (freshwater, near coast). 3-75 meters in elevation	Apr-Sep	p

Two species (Maple-leaved checkerbloom and Methusealah's beard lichen) are on the CNPS watch list (List 4.2), those two species may be present, but given their status, were not evaluated for potential impacts. The remaining 5 plant species have ranges intersecting the project area and could have habitat present indicating potential for significant impact. Impacts for individual species are considered below:

SHC

Scientific Name	Common Name	Range	Natural communities	Blooming periods	Habitat in the THP
					n=no p=possible y=yes
Astragalus agnicidus	Humboldt milk-vetch	Outer North Coast Ranges in southern Humboldt County and northern Mendocino County	Broad-leaved upland forest, North Coast coniferous forest. Disturbed areas, Openings, Roadsides (sometimes). 120-800 meters in elevation.	Apr-Sep	y
<p>Humboldt milk-vetch occurs in full to partial sunlight on xeric soils and is highly susceptible to damping off (Sholar 2007). The species is tolerant of disturbances and populations are observed to be more robust on uncompacted soils (Sholar 2007). Much of the soil within the project area are mesic and Gualala Redwood staff are unaware of any occurrence of the Humboldt milk-vetch within or adjacent to the project area. On the GRT ownership this species has been observed to occur mostly along roads, skid trails, landings, and burn pile remains. All these microhabitats are directly associated with timber operations, as this species is CESA Threatened, a focused survey for this species occurred and no species were identified.</p>					
Horkelia tenuiloba	thin-lobed horkelia	central and southern North Coast, the central and southern Outer North Coast Ranges, and the northwestern San Francisco Bay Area	Broadleaved upland forest, Chaparral, Valley and foothill grassland/mesic openings, sandy. 50-500 meters in elevation	May-Jul	p
<p>The thin-lobed horkelia is found in forest openings and requires xeric to seasonal hydric soils with excellent drainage. Most of the soils within the project area are mesic. The species is tolerant to soil disturbance but not compaction (Sholar 2007). The general redwood forest habitat is described as the forest shrubland interface (Golec 2007), the project area is entirely forested with no forest/shrubland interface being observed. As most of the project area is fully closed canopy this species is likely to only occur on existing roads and other areas disturbed by timber operations. The proposed operations may benefit this species by introducing forest openings which benefit herbaceous growth during the early seral stage. While timber operations may or may not impact</p>					

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Scientific Name	Common Name	Range	Natural communities	Blooming periods	Habitat in the THP
<p>individual species it will not place the survival and reproduction throughout all or a significant portion of its range in immediate jeopardy, affect range size, or cause the species to become endangered within the foreseeable future throughout all or significant portion of its range.</p>					
Kopsiopsis hookeri	small groundcone	British Columbia to Santa Cruz County, California	Lower montane coniferous forest, North Coast coniferous forest, Upper montane coniferous forest Elevation 460 to 2165 ft	Apr-Aug	Y
<p>The small groundcone is a parasitic plant that is associated with Salal (<i>Gaultheria shallon</i>). Salal has been observed within the project area. The species produces a large seedbank which may assist with species persistence after disturbance events. While timber operations may or may not impact individual species it will not place the survival and reproduction throughout all or a significant portion of its range in immediate jeopardy, affect range size, or cause the species to become endangered within the foreseeable future throughout all or significant portion of its range.</p>					
Lilium maritimum	coast lily	southern North Coast, extirpated in the northern Central Coast	Broadleafed upland forest, Closed-cone coniferous forest, Coastal prairie, Coastal scrub, Marshes and swamps(freshwater), North Coast coniferous forest/sometimes roadside.5 -475 meters in elevation.	May-Aug	P
<p>Habitat for the coast lily exists within the project area. The CNPS rare plant inventory lists roadside as a microhabitat condition of this plant. 84 occurrences of this species occur in CNDDDB, including 29 occurrences in the entire assessment area. The plant is generally found on poorly drained soil. Wet areas in the plan receive protection measures. Coast lilies are generally found in vegetation gaps, presently much of the project area has closed forest conditions. After operations there will be substantially more vegetation gaps until those gaps close back in. While timber operations may or may not impact individual species it will not place the survival and reproduction throughout all or a significant portion of its range in immediate jeopardy, affect range size, or cause the species to become endangered within the foreseeable future throughout all or significant portion of its range.</p>					

Scientific Name	Common Name	Range	Natural communities	Blooming periods	Habitat in the THP
Piperia Candida	White-flowered rein orchid	Alaska to Santa Cruz County, California	Broad-leafed upland forest, Lower montane coniferous forest, North Coast coniferous forest. Serpentinite (sometimes). 30-1310 meters in elevation.	Mar-Sept	P
<p>The white-flowered rein orchid is a perennial herb with habitat in the project area. This species is generally found in areas of shade and has been observed growing on a wide variety of soil types. This species may be sensitive to impacts from timber harvesting, however there is little research on the threats to this species. Much of the project area is closed canopy forest, the use of selection harvest along with WLPZ protection/geology protection will retain areas of closed canopy forest after operations. It is expected that much of the project area will return to closed canopy conditions within a few years of operations. While timber operations may or may not impact individual species it will not place the survival and reproduction throughout all or a significant portion of its range in immediate jeopardy, affect range size, or cause the species to become endangered within the foreseeable future throughout all or significant portion of its range.</p>					

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Findings

No significant adverse impact on special status plant species will occur. The analysis contained herein identified 18 plant species not likely to be present given documented geographic and elevation ranges do not overlap with the THP. While biotic and abiotic conditions described for species accounts may be present in the THP area, absence of species within the geographic and elevation extent of the THP area indicate absence of realized portions of their fundamental niche habitat capable of supporting self-sustaining populations. 11 plant species grow in riparian or aquatic habitats that fall within designated Watercourse and Lake Protection Zones required by

California forest practice rules. Harvest restrictions and protection measures designed primarily to protect water quality, fish, non-fish and terrestrial wildlife equally protect riparian special status plant species. In addition to retention requirements for basal area, canopy cover, and vertical diversity, microclimate and surface cover are specifically protected by retaining ground cover and undisturbed areas. 5 plant species are considered to have habitat within the project area with evidence indicating potential for significant adverse impact. These species are most at risk of impacts from Timber Operations which are considered insignificant because of disturbance tolerance, microsites generally subjected to minimal disturbance, or host species is either absent or prolific throughout the THP and assessment areas. Beyond this, no species has a range so restricted that it would be possible for this THP to place survival and reproduction in immediate jeopardy or cause it to become endangered within the foreseeable future throughout all or a significant portion of its range. As a CESA listed species Humboldt milk-vetch has received a focused botanical survey. The survey did not identify the presence of this species within the plan area. Survey results are included in Sec V. of the THP.

(2) Aquatic and Near-Water Habitat Conditions

Pools and Riffles

These habitats are found within the assessment area along the Gualala River.

Riffles are areas of swifter flowing water, where the surface is turbulent. Young-of-the-year steelhead like low gradient riffles but coho generally does not. The flowing water delivers insects for food and the broken surface provides cover from predators. Glides (flatwater) are slow moving areas in the stream, where the surface is smooth. Often, streams suffering from cumulative watershed effects have a large percentage of flatwater habitats, such as glides and runs, and riffles. Pools often have filled in and represent a small percentage of habitat types. Plunge pools are formed where water falls over a boulder or log. The falling water scours a hole where juvenile and adult fish often hide. Backwater pools are formed as water swirls around an obstacle such as a root wad, boulder, or stream bank.

Large Woody Debris

Large woody debris (LWD) is a very important component in the creation of pool habitat in streams. Rainville et al. (1985) found that in nearly 80% of the pools surveyed in small streams, LWD was the structural agent forming the pool or associated with the pool. In general, the larger the size of the woody debris the greater its stability in the stream channel. Heavier pieces require higher flows for mobilization and longer pieces are more likely to be caught by the stream bank and its vegetation (Spence et al., 1996). Reeves et al. (1993) found "that wood is a primary element influencing habitat diversity and complexity in streams. Consequences of decreased amounts of wood include loss of cover and structural complexity, decreased availability and abundance of habitat units, and reduced varieties of current velocities and other hydraulic features."

During the 1950s and 60s LWD was considered an impediment problem to fish passage and the Department of Fish and Game removed large amounts of LWD from North Coast streams.

The amount of large woody debris present in the watercourses in the assessment area varies widely but is not a limiting factor within the Biological Assessment Area. A significant amount of well distributed LWD exists within the plan area and is providing adequate cover.

Near-Water Vegetation

The area of vegetation near streams is known as the riparian zone. A riparian zone helps maintain good stream habitat for salmon and steelhead in the following ways:

- Helps maintain cool water temperatures through provision of shade and creation of a cool and humid microclimate over the stream
- Provides food resources for the aquatic ecosystem in the form of leaves, branches, and terrestrial insects
- Stabilizes banks through provision of root cohesion on banks and floodplains
- Filters sediment from upslope sources
- Filters chemicals and nutrients from upslope sources
- Supplies large wood to the channel which maintains channel form and improves in-stream habitat complexity
- Helps maintain channel form and in-stream habitat through the restriction of sediment input or slowing of sediment moving through the system
- Moderates downstream flood peaks through temporary upstream storage of water

Estimates of canopy cover on the watercourses within the assessment area range from 0% to 100%, with an average of 80% canopy. Please see the stream-side vegetation section within the Watershed Resources section above.

(3) Biological Habitat Conditions

Snags/den/nest trees

Snags, den trees, nest trees and their recruitment are required elements in the overall habitat needs of more than 160 wildlife species. Many of these species play a vital role in maintaining the overall health of timberlands. Snags of greatest value are >16" DBH and 20 ft. in height. All snags on the plan area will be retained except where state and federal safety laws require their removal. Small, medium and large size snags in varying decay classes exist in the assessment and project area.

For clarification, the following table describes the 5 classes of decaying snags (adapted from Holloway et al. 2007):

Brown's Snag Decay Classes	Description/Characteristics
Decay Class 1	Recently dead trees with intact tops and the majority of fine branching present.
Decay Class 2	Trees with loose bark, intact tops, and most of the fine branches.
Decay Class 3	Trees with <50% of coarse branches and <50% bark.
Decay Class 4	Trees with broken tops and few or no coarse branches, less >6 m in height.
Decay Class 5	Trees with broken tops and no coarse branches, less than or equal to 6 m in height.

Conifers and hardwoods that show active signs of use by wildlife will be retained. High levels of standing "live" culls greater than 30" dbh and greater than 100' tall exist and will be retained. Specific trees to be retained are obvious wildlife trees displaying multiple (meaning two or more) wildlife habitat attributes such as basal hollows, small cavities, internal rot or mistletoe broom, crevice cover, broken or multiple crowns, large (greater than 7 inches diameter) lateral limbs, epicormic branching, stick nests and Sonoma tree vole nests. These trees will be evaluated by the RPF, or supervised designee, and retained by marking "NO" or "W" in any color paint or not marking with a horizontal line in blue paint (which would indicate a harvest tree). These trees will provide for future snag recruitment.

A few large Douglas-fir snags were observed during plan layout, and these will be protected as wildlife trees. Requirements specified in this plan are to save all snags and large decadent trees (live culls) that don't represent a safety risk for the LTO. The clearcut silviculture coupled with the Special Treatment Areas (unstable areas) will leave areas of unharvested forest between the harvested portions of the THP. Large snags with high biological value within selection units will also be retained, and if screen trees are needed to provide protection for the snag, those will also be retained. The implementation of aggregated retention areas, retention of all snags and decadent trees, in combination with the heavily forested condition within the assessment area, is expected to maintain or increase the potential for the future development of snags and decadent trees throughout the BAA.

There were no dens located on the plan area however, non-listed wildlife that utilize dens were observed or signs of their presence were observed, and den sites are expected to occur within the BAA. Any den located during operations will be flagged off and protected. No known nest trees of any rare or endangered species exist on the plan area. Nest trees located within the plan area will be protected as per 14 CCR 919.2.

Downed large, woody debris

Large downed logs (particularly conifers) in the upland and near-water environment in all stages of decomposition provide an important habitat for many wildlife species. Large woody debris of greatest value consists of downed logs >16" diameter at the large end and >16 feet in length. Large, down woody debris is a vital component of a properly functioning ecosystem. Large logs serve as "sponges" and maintain moist refugia for numerous insects, amphibians and mammals during the hot summer months. The THP area currently has a healthy amount of large woody debris from previous harvest entries. The logs from the older entries were very large, therefore the residual logs and buckskins are quite large and scattered throughout the THP, and in the immediate surrounding area.

Multistory Canopy

Multistoried stands are defined as stands composed of two or more canopy layers. Multistoried stands contribute to vertical heterogeneity of stands and influence species diversity. While a majority of the plan area currently contains a generally uneven-aged stand structure with trees in a wide variety of age and size classes, there is not a well-differentiated over or understory. The stands are situated in an unbalanced or irregular condition with larger overstory trees either clumped in patches or very widely spread out.

Road Density

Except for mainline (i.e., designated permanent) roads, the majority roads in use within the BAA are native soil surfaced roads. These roads are maintained on an "as needed" basis. Main haul roads are subject to low to moderate truck traffic during the logging season. The landowner is in the process of refining its road system by gradually abandoning portions of old roads that parallel near watercourses and on steeper slope areas where cable logging can be conducted. Rerouting the road system to facilitate cable yarding systems and road placement above and away from watercourses will ultimately reduce future potential road impacts. Also, a large percentage of the road system on GRT's ownership has been made hydrologically invisible

over the last fifteen years through use of cost share watershed restoration grants. Many other roads within the BAA over any given year are only subject to infrequent use by GRT's forest management staff. During the rainy season much of the assessment area is inaccessible and receives no traffic. The effect is a seasonal intrusion upon wildlife during the logging season and results in little to no potential impacts over the balance of the year. Within the 167 acre Logging Area there is one road that runs the length of the THP. A significant portion of these roads see very little road usage as they occur within the lands of GRT and have restricted access. No additional roads are proposed within this THP. The sparsely traveled private roads in the assessment area have signs (scat, tracks, and observations) of mammal utilization that includes black tailed deer, black bear, coyote, and fox.

This project will not interact with past, present, or future levels of road density, and its use, to cause or create a significant adverse impact on animal use patterns in the assessment area, nor is it anticipated to cause any adverse impacts on wildlife.

Hardwood Cover

Hardwoods are present in varied densities and size classes throughout the BAA. Principle species present include tanoak, California bay-laurel, madrone, and bigleaf maple. The majority of the tree cover in the BAA is provided by conifer trees. The BAA contains hardwoods of the age and size classes necessary for nesting, and foraging habitat for most bird species. Cavities favored by wildlife are more often found in the larger trees and provide potential nesting sites for birds, bats, and rodents. Oak mast and madrone berries are important food sources for deer, squirrels, birds, etc. Berry and mast-bearing trees occur throughout the BAA as food sources and cover for bird and mammal species. Selected hardwoods shall be retained such as tanoak, Pacific madrone, chinquapin, red alder and California bay laurel which will be recruited for habitat diversity, food and/or cover for the many bird and mammal species in the immediate area. Since the THP area is adjacent to areas with abundant hardwood stocking and does not have enough throughout the THP to warrant reduction in most areas, the control of hardwood does not create adverse cumulative effects.

Late Seral (Mature) Forest Characteristics

Individual effects on wildlife and cumulative effects of the loss of late successional forests and individual large trees through even-aged management or because of repeated entries from uneven aged management have been recognized by the Board of Forestry and addressed by memorandum to RPF's ("Disclosure, Evaluation and Protection of large old trees" Duane Shintaku 2005).

Some of the issues relating to the reduction of large old trees are:

- 1) loss of late succession stands and late succession continuity;
- 2) loss of decadent and deformed trees that are of special value to wildlife by providing nesting platforms, nesting cavities for birds as well as basal cavities for mammals;
- 3) loss of high quality downed large woody debris recruitment; and
- 4) loss of other special habitat elements such as loose bark that provides for bat roosting sites and nest sites for smaller birds, perching opportunities for aerial hunters, foraging opportunities for woodpeckers and other insect eaters, territorial perches, etc.

The greatest impact to a late successional and larger tree resource occurred nearly 100 years ago with the logging of the old growth trees present in the watersheds associated with this THP. The goal of contemporary forestry is to maintain the elements of this habitat type that remain and recruit additional late seral stage elements while still harvesting timber products.

No Late Succession Forest Stands (14 CCR 895.1) are known to remain on the GRT ownership. There are elements of late seral forest scattered across ownership in the form of individual or small clusters of old

growth trees that have been left for the following reasons:

- 1) They are rotten, hollow or busted and previous entries did not take them because of the lack of economic value;
- 2) They are sound but hanging over Class I or Class II watercourses where the current rules protect them from harvesting for the sole intention of eventual LWD recruitment into the stream or river;
- 3) They are sound but are on an unstable area or in an area that is inaccessible; and
- 4) They contain a known nest site, have some other significant wildlife value, or are being left as part of a wildlife habitat retention area or grouping.

By far the most common reason for sound late seral trees that are still on the property is that they are hanging over watercourses, especially adjacent to the Gualala River but also many of the main tributaries have scattered residuals. Though there are a number of single, decadent, residual trees scattered across the property, sound merchantable late seral trees outside a WLPZ are infrequent. No numbers have been collected regarding the number of residual large old trees per acre across the property, but the number is very likely far less than 0.1 per acre (considering conifers only).

Recruitment of Late Seral Elements

Wildlife agencies desire that some trees be recruited over time so that the special habitat elements that late seral trees provide do not continue to decrease because of the loss of the existing trees through mortality and decay. There are several ways that the rules accomplish this.

- 1) The 2009 Salmonid (ASP) rules require the thirteen largest trees per acre within the Class I and large Class II watercourse protection zones to be left.
- 2) The ASP rules also require that the first 30 feet adjacent to a Class I and variable widths adjacent to Class II watercourses be no-cut zones.
- 3) Large trees on landslides and on the edges of landslides are often left.
- 4) Some of the largest trees on the property are in inaccessible areas and although there is no guarantee that someday these won't be taken by helicopter, GRT has no plans to yard with helicopters at this time.
- 5) Much of the timber on GRT lands is 65 to 105 plus year old second growth which means on the higher site areas there are already some very large second growth trees. The biggest of these trees are often Douglas-fir and many of these Douglas-fir trees already have conk on them because of past logging injury or just as a result of natural processes. Since Douglas fir trees often make better wildlife trees than comparably sized redwood trees, and because they have lower economic value (and trees with a lot of conk have little to zero economic value), these are the first trees to be marked as wildlife trees. GRT has an internal policy to mark a minimum of four trees per acre as wildlife trees where feasible. The largest trees with defects are the first to get marked. These trees often occur in upslope areas therefore spreading out the benefit away from the WLPZs.

- 6) GRT will continue to leave hardwoods (up to 4 trees per acre) that are 24" or larger. Many hardwoods in this size class are late seral and most of these have high value as wildlife trees. Additionally, all hardwoods in WLPZs are left.

Late Seral Habitat Continuity

As stated above, there is no late seral stage habitat present within the THP that meets the definition of late seral stage forest stated above. However, there are some individual large second growth trees throughout the assessment area. Although these trees individually contribute to special habitat elements present within the assessment area, the RPF has not identified any areas that are a minimum of 20 acres with multistory canopy, large snags and downed logs that lead to an increased level of stand decadence. Generally, these areas with larger trees exist in a narrow strip along watercourses, confined to the channel or Core Zone, which are no-harvest, equipment exclusion zones.

Special Habitat Elements

Although there is not a continuous habitat of late seral stage forest present within the THP, there are a few scattered old-growth trees that have been retained as wildlife trees throughout the harvest area. This generally includes retaining the individual old growth tree as well as any screen trees that have interconnecting branches with the retained old growth tree.

Biological Resources- Past Projects

Past projects within this assessment area across all ownerships are the same as the WAA discussed within the A. Watershed Resources Assessment section above. The total BAA acreage is approximately 2012 acres.

Other land use activities as discussed before, including agriculture, development, timberland conversion, grazing, and ranching also took place within the assessment area for more than a century, and may have impacted the populations of certain species by displacing or removing habitat. Recreation in the past may have had an impact on species as there were not as many laws protecting species through no-take measures, but there were less people recreating in Sonoma County than there are today.

Although there have been impacts to species on a regional level in Sonoma and Mendocino Counties, there is not a significant impact on species within the project area or BAA due to recent past projects.

Biological Resources Future Projects

Timber harvesting, grazing, development, and recreation have been the primary historic activity within the BAA and are expected to continue. The RPF is unaware of any future NTOs on NTMPs. Increased levels of rural residential and agricultural development are expected to occur in the assessment area in the future.

Biological Resources- Proposed THP

Measures for Occupied Nests:

Should an occupied nest site of a listed bird species be discovered during the timber operations, the timber operator will protect the nest tree, screening trees, and replacement trees, and will apply the provisions of 14 CCR 919.2(d), and will immediately notify the Department of Fish and Wildlife, the Department of Forestry and Fire Protection, and the landowner or his agent. Appropriate measures will be devised through consultation with the agencies and the landowner and representative. A minor amendment will then be filed reflecting such additional protection as is agreed between the operator and the Director after

consultation with the Department of Fish and Wildlife. The specific protection measures to be implemented will be based on the establishment of buffer zones, compliance with year-round restrictions, and the established critical periods for each species.

Measures for Fish: Impacts to all fish species that occur or have habitat located within the assessment area will be minimal. The watercourse protection measures listed throughout the plan provides for canopy retention, LWD recruitment and sedimentation prevention. There will be no timber harvesting operations within Class I and Class II-S core zones and harvest operations within the WLPZ will be subject to the provisions of 14 CCR 916.9. In addition, an Erosion Control Plan has been prepared, which will further ensure sedimentation of the watercourses is minimized and that the beneficial uses of water are not adversely impacted by the proposed operations.

Measures for Amphibians: Impacts to all amphibian species that occur or have habitat located within the assessment area will be minimal. The watercourse protection measures listed throughout the plan provide for canopy retention, protection for springs, protection for wet areas, LWD recruitment and sedimentation prevention. In addition, an Erosion Control Plan has been prepared, which will further ensure sedimentation of the watercourses is minimized and that the beneficial uses of water are not adversely impacted by the proposed operations.

Protections for Plants: If State or Federal Listed plants are determined to exist within the plan area protection measures will be developed in conjunction with appropriate agencies.

Post Approval Discovery Protection Measures: Should a State or Federally Listed plant species be discovered during the timber operations, a 50-foot diameter EEZ shall be flagged around the area. This EEZ does not include existing haul roads or mainline skid trails. CalFire, CDFW, and the plan submitter or his agent shall be immediately notified. If protections are required, an amendment shall be filed reflecting such additional protection as is agreed between the plan submitter and the Director after consultation with CDFW. During the pre-operations meeting with the LTO, the RPF will explain the characteristics of wet areas, the location of mapped wet areas, and the importance of protecting them. The RPF will also explain the importance of not operating heavy equipment on saturated soils. The combination of botanical surveys, existing WLPZ protections, site conditions, population presence and the general protections listed above will further ensure that the botanical resources are not adversely impacted by the proposed operations.

Measures to benefit pool habitats: These are described under Large Woody Debris discussion. This project as proposed has little or no potential to negatively impact pool habitat conditions. The limited use of equipment and other harvesting related activities in the WLPZ, and the Forest Practice Rules will reduce the potential for impacts associated with the operation. Not harvesting in the core zone of Class I or Class II-S watercourses may provide LWD for the future of these lower order streams.

Measures to benefit canopy: There will be no timber harvesting within any Class I or Class II WLPZ where current canopy levels are less than required post-harvest retention. Heavy equipment limitations within WLPZs established in the plan will help to protect near water vegetation on the watercourses. Please see the discussion of stream-side vegetation above under the "Watercourse Condition" heading for a further analysis of near-water vegetation.

Measures to benefit dens and nests: There were no dens located on the plan area however, non-listed wildlife that utilize dens were observed or sign of their presence was observed, and den sites are expected to occur within the BAA. Any den located during operations will be flagged off and protected. No known nest trees of any rare or endangered species exist within the plan area. Nest trees located within the plan area will be protected as per 14 CCR 919.2.

Measures to benefit LWD: Some naturally fresh-fallen debris exists, which is anticipated to be merchantable, and will be harvested if located outside the WLPZ. This harvest of LWD will be offset by recruiting additional LWD in the form of breakage or defective segments of proposed harvest trees. Overall, the harvest operation will add to the woody debris already on site and the slash will enhance wildlife habitat. No broadcast burning is proposed. Not harvesting in the core zone of Class I or Class II-S watercourses may provide LWD for the future of these lower order streams.

Silviculture: The variety of silvicultural methods will retain a mosaic of tree sizes, including larger and older trees and will result in more of a multistory canopy structure in the future along with beneficial ecotones. Within the BAA, where un-evenaged management is applied, multistoried stands will be maintained or developed.

Road Construction: No new construction is proposed.

Measures to benefit hardwoods: Although hardwoods will be damaged in the falling of conifers and may be removed to benefit conifers, large hardwoods shall be retained (24"+ up to 4 per acre), especially those with rotten cavities.

Biological Resources Conclusion

The distribution and amount of forested habitat within the assessment area provides a diverse forest environment suitable for wildlife needs. No key habitat elements will be lost because of these operations, and there are no significant special habitat elements present in the project area other than large snags suitable for osprey nests. There are no other known wildlife or fishery resource concerns. Past human activity on a large regional scale has impacted species, but within the BAA, there are no significant impacts from past projects or known concerns. Future projects are not expected to have significant adverse impacts on biological resources. The THP's impact on wildlife habitat has been evaluated within the project area and within the BAA and is not simply site and species specific. This broadens the context within which the THP has been analyzed and thus provides a better understanding of how the individual THP impacts wildlife habitat within an assessment area. The proposed THP includes measures to increase or maintain the quality of certain habitats. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on Biological Resources is that there are no significant cumulative impacts, and that current conditions will be maintained or enhanced through the project implementation.

Northern Spotted Owl (*Strix occidentalis caurina*)

Status: Fed - Threatened (1990); CA - Threatened; Board of Forestry - Sensitive

Habitat Requirements: The Northern Spotted Owl is distributed along the North Coast of California in a variety of habitat types containing similar characteristics including overstory canopy closure approaching 80%, a lack of understory, and canopy lift (fly-through corridors).

Habitation Potential: All of the THP area provides suitable Nesting/Roosting habitat for this species. Suitable habitat will remain in the THP post-harvest. There are two known NSO Acs within 0.7 miles of the THP. Both Acs are over a quarter mile away from the THP.

Mitigations: See Item 32 in Section II for habitat protection measures and disturbance measures. See the attached AC occupancy and survey history along with the current condition of the habitat surrounding the AC for these NSOs in Section V.

Identification of Information Sources: C. Biological Resources

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Pam Town, Biologist, Deery, Idaho.

California's Wildlife Volume I, II and III, Published by CDFG, April 1990

GRT Database On Fish Habitat-GRT Gualala CA

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Personal Communications

John Bennett, RPF and Forest Manager, Gualala Redwood Timber, LLC.

D. Recreation Resources: Assessment

The assessment area for recreation is the THP area plus 300 feet.

Recreation Baseline Conditions

The recreational impact of the proposed management area is assessed within, and 300 feet outside the THP boundary. This assessment area is recommended by the Forest Practice Rules in Technical Addendum Number 2 and represents the area most likely to be affected by the proposed harvest operation. Gualala Redwood Timber, who strictly controls access through locked gates and security personnel, controls the tract in which this harvest plan is located. The area is generally not open to the public unless specific arrangements have been made through the landowner's security office. Given the property's locale between two county roads, trespass is difficult to control. The stretch of the Gualala River, downstream of the plan, is listed as a Wild and Scenic River-Recreational. This is not a Federal listing but a State Listing. This area is adjacent to the northern end of this THP. This stretch is described as the main stem Gualala River from the confluence of the North and South Forks to the Pacific Ocean. The Gualala River has multiple points of public access along Gualala County Road. The river is frequently utilized for activities that include but are not limited to swimming, fishing, drift boat fishing, kayaking, canoeing, stand up paddle boarding, sunbathing, and wildlife watching. Because of the wide, no harvest, Core Zone buffer and the light selection harvest beyond the Core Zone, there will be no visual impact from the harvest operations. This area is an 18 acre unit of Single Tree Selection that borders less than a quarter mile of the Scenic River-Recreational. From the top of the river bank for a distance of 30 feet from the river there is a no harvest area. For the next 120 feet beyond this there will be a single tree selection harvest. In the 120 feet the 13 largest trees per acre must be retained and 80% or greater shade canopy must be retained. An average of 6 trees per acre will be harvested from the 120 feet. The harvest in the 120 feet will leave 80 to 90 percent of the preharvest volume. The post-harvest stand will regain this volume in approximately 5 years. Beyond the 120 feet the silviculture is also single tree selection. This area will also retain the largest 13 trees per acre. Approximately 10 trees per acre will be harvested from this area leaving 70 to 80 percent of the pre-harvest volume. The post-harvest stand will regain this harvested volume in less than 10 years.

Recreation- Past Projects

The assessment area has seen recent harvest activity under 1-11-087 SON.

This past logging operation, which is similar in scope and associated disturbances, are not known to have caused any significant cumulative impacts to recreation resources in the assessment area. The Gualala River watershed has had a long and ongoing history of timber harvest.

Recreation Reasonably Foreseeable Probable Future Projects

Future projects within the assessment area on GRT property will likely continue to have recreational opportunities since the county road is across the river and easily accessible. Tourists and travelers will continue to use the public access within the assessment area. Because of the Core Zone and light selection harvest mentioned above, there will be no visual impact. Future projects will not impact the Mainstem Gualala River due to the Coastal Commission Zone designated STA for the Gualala River in the same location and beyond. This area is a desirable locations for water recreation. If a new ownership adjacent to the project area focuses on or offers recreation to a significant amount of people in the future, future projects within the THP area will account for and assess the impact to that recreational resource and may require a buffer of increased retention.

Recreation- Proposed THP

The cumulative impacts to recreation from this THP will be short lived and less than significant. The primary disturbance will be noise generated by logging (see Noise discussion below). The noise generated by this project will be short-lived. There are no measures in the THP to benefit recreation within the THP boundary because it is not an objective of the landowners. Logging operations will not restrict access to areas of off property recreation during operations. Potential reactional impacts are expected to be limited to the river users. These impacts are largely expected to be in the form of noise.

Recreation Resource Conclusion

The existing conditions within the Recreation Assessment Area indicate that recreational opportunities are limited to county road access to the river. Conventional logging operations are not known to have caused any significant adverse impacts to recreation resources in the past; therefore, none are anticipated from this THP, either singly or cumulatively. Future projects likely will not impact recreation, but if recreation does increase in the assessment area, future projects will account for this change. As proposed, the THP activities are not expected to have a significant impact on recreation. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on recreation is that there are no significant cumulative impacts, and that current conditions will be maintained through the project implementation.

Identification of Information Sources: D. Recreation Resources

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Identification of Information Sources: D. Recreation Resources

California Dept. of Forestry and Fire Protection Guidelines for Assessment of Cumulative Impacts; CDF, August 13, 1991.

Cumulative Impacts Assessment Workshop Binder; CLFA, Redding, Ca., September 1991.

Google Earth

Personal Communications

John Bennett, GRT, Forest Manager

E. Visual Resources: Assessment

The visual assessment area is generally the logging area that is readily visible to significant numbers of people who are no further than three miles from the timber operation.” Technical Rule Addendum #2 further refers to viewing by “the public”.

Visual Baseline Conditions

As per 14 CCR 913.1(a) (6&7), special considerations for aesthetic enjoyment shall be considered when proposing unevenaged management within 200 feet of a State or County Road, and within 200 feet of adjacent non-federal lands not zoned TPZ. The Visual Assessment Area is similar to the Recreation area. Gualala Redwood Timber, who strictly controls access through locked gates and security personnel, controls the tract in which this harvest plan is located. Given the property’s locale between two county roads, trespass is difficult to control. The Gualala River has multiple points of public access along Gualala River County Road. The river is frequently utilized for water recreation (swimming, fishing, kayaking, etc.). Because of the wide, no harvest, Core Zone buffer and the light selection harvest beyond the Core Zone, there will be no visual impact. This area is an 18 acre unit of Single Tree Selection that borders less than a quarter mile of the Scenic River-Recreational. From the top of the riverbank for a distance of 30 feet from the river there is a no harvest area. For the next 120 feet beyond this there will be a single tree selection harvest. In these 120 feet the 13 largest trees per acre must be retained and 80% or greater shade canopy must be retained. An average of 6 trees per acre will be harvested from these 120 feet. The harvest in these 120 feet will leave 80 to 90 percent of the preharvest volume. The post-harvest stand will regain this volume in approximately 5 years.

Visual- Past Projects

Past projects within the assessment area have resulted in the current stands of dense trees with 80-100% canopy from natural regeneration. These projects have had aesthetic impacts that are typical of industrial forestlands throughout the region.

Visual- Reasonably Foreseeable Probable Future Projects

Future projects within the assessment area will likely continue to have no effect on the visual resources due to the aspect and objectives of the landowner.

Visual- Proposed THP

The cumulative impacts visible from this THP will be short lived and less than significant. The primary disturbance will be noise generated by logging. With the 30 foot Core Zone, light harvest (6 trees per acre) of 120 feet past the Core Zone and the leaving of the 13 largest trees per acre visible impacts will be less than significant. Potential visual impacts are expected to be limited to the river users. The impacts are largely expected to be in the form of noise.

Visual Resource Conclusion

The existing conditions within the Visual Assessment Area indicate that there are limited impacts to visual resources and that it has not been impacted in the past. Future projects likely will not impact visual quality. The proposed THP activities do not have a significant impact on visual resources and should improve visual resources. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on visual quality is that there are no significant cumulative impacts, and that current conditions will be maintained through the project implementation.

Identification of Information Sources: E. Visual Resources

California Dept. of Forestry and Fire Protection Guidelines for Assessment of Cumulative Impacts; CDF, August 13, 1991.

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Cumulative Impacts Assessment Workshop Binder; CLFA, Redding, Ca., September 1991.

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Identification of Information Sources: E. Visual Resources

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Cumulative Impacts Assessment Workshop Binder; CLFA, Redding, Ca., September 1991.

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Personal Communication

John Bennett, GRT, Forest Manager

F. Traffic Resources: Assessment

The traffic assessment area includes the first roads, not part of the logging area on which logging traffic must travel and those roads commonly used by logging traffic.

Traffic Baseline Conditions

The plan area is located on private roads under the control of the plan submitter behind a private gate. For this project, the roads to be assessed pertinent to this plan are Annapolis Road and Highway 1. After leaving these first order roads log traffic is expected to head east out Annapolis Road. Line of sight distance for merging safely onto Annapolis Road, and Highway 1 exceeds the minimum sight distance in accordance with Caltrans and AASHTO guidelines for these standards. All roads listed have a long history of log hauling use going back to the 1940's. Since the advent of the log truck these roads have experienced annual use in the transportation of forest products. Harvesting of this THP will not alter or measurably increase the annual log flow from the property or within the greater Gualala River subbasin. Logging traffic utilizing public roads is subject to a number of state, local, and federal regulations.

Traffic- Past Projects

As discussed above, the roads in the assessment area have a history of being utilized by logging traffic that extends at least 80 years. Often the logging industry was one of the reasons behind the construction of these roads. Past projects within the assessment area that would contribute to traffic impacts and maintenance issues for these roads, aside from residential traffic, are log hauling, heavy equipment hauling, and other related logging traffic.

Traffic- Reasonably Foreseeable Probable Future Projects

Future projects within the assessment area will likely maintain the level of traffic effects and condition of the roads similar to the past and current project. As GRT lands are managed for forest products, continued use of these roads is expected to occur annually although the exact quantity of vehicle traffic on these roads will vary annually.

Traffic- Proposed THP

Timber from this project will be hauled to Annapolis Road or Highway 1 via private roads. All these roads are routinely used for log hauling by both GRT and other landowners. There are presently no known existing maintenance issues along the assessed portions of Annapolis Road and Highway 1. Increases in traffic as a result of this project are expected to be minor, and there are no heavy traffic conditions that are known to exist along the first utilized roads.

Traffic Resource Conclusion

The existing conditions within the Traffic Assessment Area indicate that there is no impact on traffic resources and that it has not been impacted in the past. Future projects likely will not impact traffic resources. The proposed THP activities do not have a significant impact on traffic. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on traffic is that there is no significant cumulative impact, and that current conditions will be maintained through the project implementation.

Identification of Information Sources: F. Traffic Resources

California Dept. of Forestry and Fire Protection Guidelines for Assessment of Cumulative Impacts; CDF, August 13, 1991.

Cumulative Impacts Assessment Workshop Binder; CLFA, Redding, Ca., September 1991.

Conversation with Plan submitter

California Department of Transportation, Highway Design Manual (7th ed.), Chapter 200, September 2023

Identification of Information Sources: F. Traffic Resources

California Dept. of Forestry and Fire Protection Guidelines for Assessment of Cumulative Impacts; CDF, August 13, 1991.

Cumulative Impacts Assessment Workshop Binder; CLFA, Redding, Ca., September 1991.

Conversation with Plan submitter

G. Greenhouse Gases: Assessment

The assessment area for climate effects is the proposed project area, transportation routes to manufacturing facilities, and the milling of forest products. However, qualitative consideration of the carbon cycle in wood products is addressed as a cumulative effect.

There are 16.6 million acres of productive public and private timberland (statutorily available for harvest) in California (California Department of Forestry 2003). Gualala Redwood Timber owns approximately 28,000 acres in northwestern California. This represents 0.0017% of the total timberland, and 0.0038% of the 7.3 million acres of the private timberlands in the state.

912.9 Technical Rule Addendum #2 states the following concerning analysis of GHG impacts:

GREENHOUSE GAS (GHG) IMPACTS

Forest management activities may affect GHG sequestration and emission rates of forests through changes to forest inventory, growth, yield, and mortality. Timber Operations and subsequent production of wood products, and in some instances energy, can result in the emission, storage, and offset of GHGs. One or more of the following options can be used to assess the potential for significant adverse cumulative GHG Effects:

- 1. Incorporation by reference, or tiering from, a programmatic assessment that was certified by the Board, CAL FIRE, or other State Agency, which analyzes the net Effects of GHG associated with forest management activities.*
- 2. Application of a model or methodology quantifying an estimate of GHG emissions resulting from the Project. The model or methodology should at a minimum consider the following:*
 - a. Inventory, growth, and harvest over a specified planning horizon*
 - b. Projected forest carbon sequestration over the planning horizon*
 - c. Timber Operation related emissions originating from logging equipment and transportation of logs to manufacturing facility.*
 - d. GHG emissions and storage associated with the production and life cycle of manufactured wood products.*
- 3. A qualitative assessment describing the extent to which the Project in combination with Past Projects and Reasonably Foreseeable Probable Future Projects may increase or reduce GHG emissions compared to the existing environmental setting. Such assessment should disclose if a known 'threshold of significance' (14 CCR§ 15064.7) for the Project type has been identified by the Board, CAL FIRE or other State Agency and if so whether or not the Project's emissions in combination with other forestry Projects are anticipated to exceed this threshold.*

Our approach to evaluating this concern is consistent with approach #2 itemized above. Current project parameters were applied to the CalFire model and summarized on the following pages support our conclusion that the project will result in a net reduction in atmospheric carbon dioxide over time (break projected at 5 years). This is possible due two primary processes:

- 1) Wood products used for building store carbon typically for decades deferring their conversion through the natural carbon cycle process.
- 2) Forests growing at faster rates store more carbon at a correspondingly faster rate. Younger forests grow more quickly and have lower decay rates than older decadent stands of timber.

Other factors not quantified by the model include:

- A reduction in fire hazard as a result of the planned harvest where overgrown roads will be opened and rehabilitated providing much improved access for wildfire fighting equipment in the event of a forest fire.

- California consumes far more natural resources, including wood than we produce. This is a type of economic/environmental colonialism, which amongst its many other negative attributes, increases carbon emissions associated with moving bulky resources long distances. Locally produced wood products have a lower per unit "carbon cost" than those imported from abroad. Time will show that real solutions to this issue will be more consumer based than producer based.

Greenhouse Gas Baseline Conditions

Climate Change Overview

The Earth's climactic regime is cyclical by nature and driven by a variety of different factors. Since the 1980's an ever-increasing body of scientific research confirms the natural range of climactic variability has been negatively influenced by human activity. The primary conclusion is that elevated levels of greenhouse gas (GHG) emissions are causing global climate change. While the science continues to evolve regarding the extent of anthropogenic climatic change, it is clear that human activity is resulting in significant changes globally with atmospheric CO₂ concentrations increasing 100 times faster than at other periods of increases. The Stern Review of the Economics of Climate Change (2006) was a comprehensive report commissioned by the British government and provided projections of economic cost based on assumptions of impacts. Studies of past and present temperatures show a natural variability of Earth's climate. Past climates were as warm as (and even warmer than) what we currently experience, and such warm periods were typically, relatively short-lived respites from ice-age conditions that dominated the past half-million years (Ferguson, 2006).

The State of California has recognized climate change and global warming as a threat to health, safety, and the economy. Global warming could result in reductions in water supply due to changes in snowpack levels, adverse health impacts from increases in air pollution, adverse impacts on agriculture caused by changes in quantity and quality of water supplies and significant increases in diseases and pests, increased risk of catastrophic wildfires, and significant impacts to consumers and businesses due to increased costs of goods and services (AB 1493, 2002). In response, the State of California has enacted legislation and policies designed to reduce greenhouse gas emissions and to increase energy efficiency (AB 1493, 2002; AB 32, 2006; Gov. Schwarzenegger Executive Order S-3-05). The Executive Order established greenhouse gas emission targets using 1990 thresholds and established the California Climate Action Team to coordinate the State's efforts to reduce and report on progress of those efforts and on impacts of global warming to the State. The 2008 "Approved Scoping Plan" calls for a reduction in annual emissions from a per capita amount of 14 tons of CO₂ to 10 tons per person of CO₂ by 2020 (CARB 2008). According to the CARB 2020 California Greenhouse Gas Emission Inventory, California statewide GHG emissions dropped below the 2020 GHG limit in 2016 and have remained below that limit since then (CARB 2020).

Carbon dioxide (CO₂) is considered the greenhouse gas (GHG) that has the greatest effect on the dynamic of global warming due to the fact that it composes the vast majority of the releases by human activities. There are two basic ways carbon emissions are reduced. First is efficiency, where technology or conservation reduces carbon emissions through the use of less energy (electricity, fuel, heat, etc.) to accomplish an activity. Second is storage, which can be accomplished through geologic or terrestrial sequestration.

Forest activities can result in emissions through harvesting, wildfire, pest mortality and other natural and anthropogenic events. However, forestry is a net sink for carbon, the primary greenhouse gas. Plants absorb CO₂ from the air and use the carbon as a building block of plant tissue through the process of photosynthesis. Worldwide forests store approximately 2,000 billion tons (Gt) +/- 500 of CO₂ (National Energy Technology Laboratory, 2000). An acre of mature redwood can store between 600-700 tons/ac of CO₂, which is the highest of any forest type on Earth. Though redwood forests can store the largest amounts of GHGs per acre of any forest type, the expanse of this forest type is not significant on a global level. The

most recent draft Greenhouse Gas Inventory shows the forestry sector to be a net sink with emissions of 6.1 MMT CO₂ EQ. and emissions reductions of 21 MMT CO₂ EQ (Bemis, 2006).

The forest sector offers the ability to reduce emissions through a suite of possible activities: 1) substitute wood products for more energy-intensive products, 2) reduce demand for energy in growing timber, harvesting, and wood processing, 3) reduce biomass burning (wildfires), 4) afforest marginal croplands, 5) reduce conversion of forestland to non-forest use, 6) improve forest management, 7) reduce harvest, 8) increase agro-forestry, 8) plant trees in urban areas, 9) other combinations (Joyce and Nungesser, 2000). This proposed THP uses several of the activities which are considered to have the effect of reducing the overall forest emissions and improving the storage of GHGs. The harvest will add to the carbon stored in wood products, while at the same time increasing the rate of carbon storage by maintaining a healthy, fast-growing forest. Forest management may result in a reduced risk for wildfire and will maintain maximum sustained productivity of quality forest products. By maintaining timber management there is a reduced risk of deforestation through conversion of the land to non-forest uses. A key finding of the updated AB 1504 California Forest Ecosystem and Harvested Wood Product Carbon Inventory: 2019 Reporting Period, is that there has been an 18% increase in the rate of forestland conversion from the 2018 reporting period due to an increase in forestland converting to grassland. It is important to maintain productive healthy forests through active management in order to disincentivize timberland conversions to other uses that may not sequester as much carbon (Christensen et. Al., 2021).

CEQA Analysis Related to Climate Change

The California Global Warming Solutions Act of 2006 (AB 32) is California's legislative effort aimed at reducing GHG emissions. Pursuant to AB 32, CARB must develop an implementation program and adopt control measures to achieve the maximum technologically feasible and cost-effective GHG reductions. AB 32 requires CARB to prepare a Scoping Plan to achieve reductions in GHG emissions in California. On June 26, 2008, CARB staff presented the initial draft of the AB 32 Scoping Plan for Board review. The Scoping Plan was first considered by the Board in 2008 and must be updated every five years. CARB has updated the Scoping Plan in 2014 (First Update) and again in 2017 (2017 Scoping Plan). The latest update is the 2022 Scoping Plan. Details below regarding the scoping plan are taken from the CARB 2022 Scoping Plan FAQ page:

The first Scoping Plan (2008) laid out the goal of reducing greenhouse gas (GHG) emissions back down to 1990 levels by 2020. The 2013 update measured progress and fine-tuned programs toward the 2020 goal and highlighted the need to focus on short-lived climate pollutants. The 2017 update shifted focus to the SB 32 goal of a 40 percent reduction below 1990 levels by 2030 by laying out a detailed cost-effective and technologically feasible path to this target and assessed progress towards achieving the AB 32 goal of returning to 1990 GHG levels by 2020. The 2020 goal was ultimately reached in 2016—four years ahead of the schedule called for under AB 32. The 2022 update both assesses progress towards achieving the State's 2030 emissions reduction goal and draws on a decade and a half of proven regulations, incentives, and carbon pricing policies alongside new approaches to outline a balanced and aggressive course of effective actions to achieve carbon neutrality by 2045 or sooner. This includes an unprecedented pace of actions to develop the clean energy foundation on which to build the low-carbon economy.

(...)

The 2022 update presents the scenario recommended by CARB staff out of four scenarios that were analyzed for achieving California's ambitious goals. The proposed scenario builds on existing programs for the deployment of clean fuels and technologies, and for the first time brings California's forests, wetlands, and agricultural lands into the process with the potential to leverage sustainable management to use these landscapes for carbon storage. The scenarios also reflect the need for additional methods of capturing carbon dioxide that include pulling it from the smokestacks of facilities, or drawing it out of the atmosphere, and then safely and permanently storing it. This update aims to more effectively integrate equity and environmental justice throughout, and to ensure that vulnerable communities are not

disproportionately impacted by climate change. The draft incorporates five dozen recommendations from the AB 32 Environmental Justice Advisory Committee.

In addition to the 2022 Scoping Plan, the California Forest Carbon Plan completed in May of 2018 presents an assessment of forest health across California based on the best currently available information. This plan provides a description of anticipated future conditions given the ongoing and expected impacts of climate change on forested ecosystems and lays out a set of forest management goals to move the state's forests towards a more ecologically resilient state. These goals include:

1. Enhance: Expand and improve forest management to enhance forest health and resilience, resulting in enhanced long-term carbon sequestration and storage potential.
2. Protect: Increase protection of California's forested lands and reduce conversion to nonforest uses, resulting in a more stable forested land base.
3. Innovate: Pursue innovations in wood products and biomass utilization in a manner that reduces or offsets GHG emissions; promotes land stewardship; and strengthens rural economies and communities.

The Forest Carbon Plan provides guidance and input to the Natural and Working Lands Implementation Plan described in the California's 2017 Climate Change Scoping Plan. The Forest Carbon Plan describes a significant deficit in forest management in California, both on private lands and nonfederal public forestlands. To address the forest health and resiliency needs on a state-wide basis on nonfederal lands, the plan states forest treatments need to increase to 500,000 acres per year to make an ecologically significant difference at the landscape scale. The plan further describes the treatments to include those that generate revenue from harvest materials, such as commercial thinning and regeneration harvests.

Greenhouse Gas- Past and Future Projects

Carbon Sequestration and Emissions Resulting from Intensive Forest Management

Forestlands are, in general, a carbon sink where CO₂ is captured and fixed by the process of photosynthesis, which removes carbon from the atmosphere and sequesters carbon in wood fiber. (OFRI 2007, U.S.E.P.A. 2005). In California, forested lands are the largest land-based carbon sink with trees and underbrush drawing carbon from the atmosphere and storing it in their cellulosic structure and in forest soils (CA Forest Carbon Plan 2018). Forests in the North Coast, Cascade Northeast and North Sierra regions were estimated to produce a net benefit of 7.2 million metric tons of CO₂ equivalents removed from the atmosphere each year (California Energy Commission 2004). Growing forests sequester and store more carbon over time until growth stagnates as trees reach a mature age. Older trees sequester carbon through new growth at a declining rate, but they remain pools of stored carbon until they decay through decline, death, or consumptive use.

Managed commercial forests make a significant contribution to the sequestration of carbon and reduction of GHG. (IPCC 2007; Mader 2007; OFRI 2006; U.S.E.P.A. 2005). Several studies have documented a positive net effect of carbon sequestration by commercial timberlands where forests are grown, harvested, and processed into wood products. (James et al. 2007; Perez-Garcia et al. 2005; Lippke et al. 2004). Even when CO₂ emissions from timberland management, timber harvest, and forest products uses are considered, the long-term, sustainable, and intensive management of commercial timberlands to produce wood products generates a net carbon sequestration benefit that reduces GHG. These studies investigated timber harvest at various rotation ages relative to no harvest and perpetual old growth stands. They found that intensive forest management can produce net positive carbon sequestration benefits because carbon is sequestered through repeated cycles of tree growth while a substantial percentage of harvested and milled wood is sequestered for decades or centuries in buildings. Life cycle assessment studies have shown that wood products have a much smaller "carbon footprint" compared to other building materials. It is estimated that

at the end of 100 years an average of 46 percent of the solid wood products manufactured from the log are still in use, and if the wood placed in landfills is included the average over the 100-year period is 76% percent (US Dept of Energy- 1605(b) Tables).

The proposed project is one of numerous past, present, and future timber harvest projects on the GRT ownership that combine to produce substantial net carbon sequestration benefits over time. GRT timberlands are sustainably managed in accordance with the Forest Practice Rules which ensure sustained yield and strict environmental protection for wildlife and water quality. Timber harvests are scheduled across the ownership within management blocks, where uneven aged timber stands are reentered every 15-20 years. Harvested timber is converted to wood products that sequester carbon as building materials.

Not all of GRT's timberland is dedicated to intensive forest management. Large areas of the ownership remain un-harvested or lightly harvested to provide various fish, wildlife, and ecosystem benefits. In addition to these areas, extensive riparian protection zones extend like a web across the property. There are also numerous geologic features across GRT ownership which will experience little or no timber harvesting. These wildlife, riparian, and geologic areas will be managed to develop into late succession forest stands, which will provide critical habitat for wildlife, protecting water quality and is a diversification of GRT portfolio for carbon sequestration.

Following each timber harvest, such as the project, GRT manages slash to reduce fire risk and enhance forest soils that will host the next rotation of forest growth. Where necessary to facilitate site occupancy of desired tree species, harvest units are replanted with healthy cultivars that combine with advanced regeneration and stump sprouts from harvested redwoods that immediately begin to fix carbon through photosynthesis. Because the plantings require a substantial investment, there is a strong financial incentive to efficiently and effectively re-establish growing forests and timber production on harvested property. For the same reason, there is a strong incentive to protect growing tree stands from mortality that adds to forest fuels and to aggressively prevent and suppress wildfires before they can become catastrophic. The proposed project and similar past, present, and future projects have the cumulative benefit of reducing the risk of catastrophic fire and related adverse impacts to GHG and carbon sequestration.

The project will also result in minimal impacts to the carbon stored in the duff layer and the soil. Because harvesting minimizes duff and soil disturbance, and very limited broadcast burning occurs, the carbon stored in the duff layer is essentially intact following harvesting. Powers, et al (2005) found that the absolute mass of soil carbon showed little change over time. Redwood/Douglas-fir forests that include sprouting species such as redwood and tanoak are likely to have less fluctuation in soil carbon given that the root systems of these species continue to survive following harvest.

Effects of Climate Change on Timberlands

Regardless of the benefits that the project and similar past, present, and future projects will have on diminishing GHG emissions and promoting carbon sequestration, climate change is likely to occur. The rate and direction of climate change remains very uncertain (IPCC 2007). It is a certainty that the earth's climate has changed in the past with variable cooling and warming trends, but no models exist to reliably predict the rate and direction of climate change or the regional or localized effects on temperatures, precipitation, growing seasons, drought, vegetation, and wildlife (IPCC 2007).

In the face of uncertainty, the impacts of climate change must be assessed in terms of the resilience of GRT timberlands should climate changes occur. There are several indications that GRT timberlands have been and continue to be resilient. After more than a century of timber harvest, most of which occurred without the benefits of modern forest practices regulations and best management practices, GRT timberlands remain commercially productive and viable. A key tree species on the property is the coast redwood (*Sequoia sempervirens*), which is the epitome of resilience, having persisted for millennia in the coastal climate of

northern California. The redwood tree is not expected to be threatened by pests that might be advantaged by global warming, and it is expected to persist at the southern end of its range even if climate change brings higher temperatures and less precipitation. (Battle 2006). The redwood tree also benefits from coppice regeneration, which means that it regenerates from the stump after a tree has been harvested. As such, much of the living root system of redwood trees persists and the genetic diversity of each individual tree is preserved on the landscape as cut trees are replaced by genetically identical sprouts that grow from the same root system. For the same reason, the regeneration and growth of redwood forests after harvest occurs quickly and with more certainty because young trees have the benefit of mature root systems.

In addition to redwood, the plan submitter's ownership grows hearty and resilient species such as Douglas-fir, a species that thrives in open stands following harvest. Douglas-fir grows in a variety of climates throughout western North America and are believed to have rapidly colonized vast areas following the end of the last Ice Age. Through its substantial and continuous investment in their timberlands, the plan submitter has a strong incentive to nurture healthy and resilient forest stands on its property.

Greenhouse Gas- Proposed THP

The proposed project will result directly and indirectly in carbon sequestration and temporary, insignificant CO₂ emissions. Carbon sequestration is achieved through a repeating cycle of planting and growing of trees that remove CO₂ from the atmosphere and store carbon in tree fiber. When a tree is harvested, most of the carbon filled tree fibers become lumber that is sequestered in buildings while a new rotation of trees is planted and grown. Some of the tree fibers such as branches and tops are left in the forest where they are sometimes burned to reduce fire hazard. However, the vast majority of this material is left to decay and will emit CO₂ over time; but, it also supplements the forest soils and forest duff layer where carbon is stored that serves as a substrate for more tree growth. In addition, redwood is a dominant species on GRT's timberlands and redwood slash decays more slowly than slash from hardwood and whitewood species. Further, when CO₂ is released by decaying slash, it is offset by rapid regeneration of tree stands (including sprouts from redwood and hardwood species) and other vegetation that sequesters carbon. Some of this carbon-filled tree fiber, such as bark, shavings, and chips are used in other engineered building products or as fuel used to generate electricity. When this wood fiber is burned to generate electricity, the stored carbon is released into the atmosphere, but it is being done in a controlled setting, which also fills a huge demand by our society. Another factor to consider is that when wood biomass is used to generate electricity it directly reduces the amount of fossil fuels required which are non-renewable energy sources and generate CO₂ in more substantial quantities. Another point worth mentioning is that if this wood fiber were left to decompose naturally its stored carbon emissions would still nonetheless occur.

Using the CALFIRE GHG calculator, it is estimated that GHG sequestration for this project will be **80,488 metric tons of CO₂ over the 100-year planning horizon**. This sequestration total includes emissions from site preparation, non-biological emissions associated with harvesting and non-biological emissions associated with milling. GHG emissions associated with this project are insignificant relative to global CO₂ emissions that are thought to affect climate. There is virtually no opportunity to reduce these emissions in a manner that would meaningfully benefit the climate because they are already miniscule. (U.S.E.P.A. 2005). An acre of managed forest may be entered with equipment once every 15-20 years with emissions measured in hours of equipment operation over that time period. Few if any other land uses can match the low intensity of CO₂ emissions over space and time that are associated with commercial forestry. In urban areas of California, a typical California household will operate one or more vehicles every day and the demands of that household will induce a variety of additional CO₂ emissions for other forms of commerce, power production, and consumption. In rural areas, even a typical farm acre in California will be subject to equipment operation for several hours or days every year over 20 years - not once every 20 years.

The insignificant GHG effects of the proposed project are further diminished by the effects of carbon sequestered in wood products produced from harvest and by the forest stewardship principals used by GRT, which strives to increase forest stocking over time.

On the project scale, the beneficial impacts on carbon sequestration and the project-related CO2 emissions related to global warming are negligible and undetectable at the global scale. The CO2 emissions from vehicles used to implement the project over several weeks or months are dwarfed by the CO2 emissions from other routine daily activities engaged in by all Californians such as a single morning commute for even one city. Also, the implementation of new standards for diesel engines recently adopted by the CARB (CARB 2022) will help to reduce emissions. When considering the impacts of this project on climate it is doubtful that a measurable change could be detected, even at the microclimate level.

Card THP – GHG Summary Estimate

Project Boundary (167 Acres)

Emissions Source/Sink/Reservoir	Total Tons CO2 Sequestered/Emitted
Live Trees	503
Wood Products	227
Site Prep Emissions	0
Non-Bio Harvest Emissions	-6
Non-Bio Milling Emissions	-3
Total Sequestration	721
Years to Recoup	5 years

Greenhouse Gas Conclusion

This plan, alone or in combination with other harvest plans in the past in the watershed, ownership, Sonoma and Mendocino Counties, or State of California is not expected to have an adverse impact on climate change. Carbon from trees harvested will be sequestered for decades or longer in the form of the wood products cut from the logs. Importantly, additional carbon will be sequestered in the future as newly planted, sprouting, and growing crop trees occupy and grow on the site. Therefore, in combination with the goals of the State, future projects likely will not impact Climate Resources. The proposed THP activities do not have a significant impact on GHG. The stands will take an estimated 5 years to recoup carbon lost and emitted during harvest. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on GHG is that there is no significant cumulative impact, and that current conditions will be maintained through the project implementation.

Identification of Information Sources- G. Greenhouse Gases

AB 1493, Pavley, Chapter 200, Statutes 2002, Findings and Declarations.

AB 32, Nunez, 2006, Air pollution, California Global Warming Solutions Act, 2006

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Project Carbon Accounting: Harvesting Emissions Transition and Selection

This worksheet addresses the non-biological emissions associated with the project area's harvesting activities. Complete the input for Steps 9- 14 on this worksheet.

Harvest Periods	Falling Operations	Production per Day	Emissions Associated with Yarders and Loaders			Emissions Associated with Tractors and Skidders			Emissions Associated with Helicopters			Landing Saws	Trucking Emissions	
from Inventory, Growth, and Harvest Page (Time of Harvest as years from project approval)	Assumption: ((.25 gallons gasoline per MBF harvested * 5.33 (pounds carbon per gallon))/2205(conversion to metric tonnes)* mbf per acre harvested	MBF (all species) Yarded Delivered to Landing	Assumption:(((35 gallons diesel per day per piece of equipment * 6.12 pounds carbon / gallon)/2205 to convert to metric tonnes carbon)* 3.67 to convert to metric tonnes CO2 equivalent)/Production per Day			Assumption: (((55 gallons diesel per day per piece of equipment * 6.12 pounds carbon / gallon)/2205 to convert to metric tonnes carbon)* 3.67 to convert to metric tonnes CO2 equivalent)/Production per Day			Assumption: (((200 gallons jet fuel per day per piece of equipment * 5 pounds carbon / gallon)/2205 to convert to metric tonnes carbon)* 3.67 to convert to metric tonnes CO2 equivalent)/Production per Day			Assumption: (((.16 gallons gasoline per MBF * 5.33 (pounds carbon per gallon))/2205(conversion to metric tonnes)* 3.67 to convert to metric tonnes CO2 equivalent)/mbf per acre harvested. Applies to all species whether harvested or not.	Assumption: Round Trip Hours/Load average (from below, to compute the mbf/hour) ((6 gallons diesel/hour * 6.12 pounds carbon/gallon)/2205 (conversion to metric tonnes carbon dioxide equivalent)) * 3.67	
	Computed. Metric Tonnes CO2 equivalent per mbf harvested Applies to all species whether harvested or treated		Step 9. Enter the estimated volume delivered to the landing in a day.	Step 10. Enter number of pieces of equipment in use per day for each harvest entry	Computed. Yarders and Loaders CO2 equivalent/mbf (metric tonnes)	Computed. Yarders and Loaders CO2 equivalent per Acre Harvested (metric tonnes)	Step 11. Enter number of pieces of equipment in use per day for each harvest entry	Computed. Tractor and skidder CO2 equivalent/mbf (metric tonnes)	Computed. Tractors and Skidders CO2 equivalent per Acre Harvested (metric tonnes)	Step 12. Enter number of pieces of equipment in use per day for each harvest entry	Computed. Helicopter CO2 equivalent/mbf (metric tonnes)	Computed. Helicopters CO2 equivalent per Acre Harvested (metric tonnes)	Computed. Landing Saws CO2 equivalent per Acre Harvested (metric tonnes)	Steps 13 and 14 below
0	(0.03)	30	1	-0.01	-0.14	2	-0.04	-0.45	0	0.00	0.00	-0.02	Step 13. Enter Estimated Load Average: MBF/Truck 4.8	-0.208163265
20	(0.03)	30	1	-0.01	-0.15	2	-0.04	-0.49	0	0.00	0.00	-0.02	Step 14. Enter Estimated Round Trip Haul in Hours 5	-0.225510204
40	(0.03)	30	1	-0.01	-0.18	2	-0.04	-0.56	0	0.00	0.00	-0.02		-0.260204082
60	(0.04)	30	1	-0.01	-0.24	2	-0.04	-0.75	0	0.00	0.00	-0.03		-0.346938776
80	(0.05)	30	1	-0.01	-0.24	2	-0.04	-0.75	0	0.00	0.00	-0.03		-0.346938776
100	(0.04)	30	1	-0.01	-0.24	2	-0.04	-0.75	0	0.00	0.00	-0.03		-0.346938776
0	-			0.00	0.00		0.00	0.00	0	0.00	0.00	0.00		0
0	-			0.00	0.00		0.00	0.00	0	0.00	0.00	0.00		0
0	-			0.00	0.00		0.00	0.00	0	0.00	0.00	0.00		0
0	-			0.00	0.00		0.00	0.00	0	0.00	0.00	0.00		0
Sum Emissions	-0.23				-1.19			-3.73			0.00	-0.15		-1.73

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Project Carbon Accounting: Harvested Wood Products and Processing Emissions Tran & Sel

This worksheet addresses the non-biological emissions associated with the project area's harvesting activities. Complete the input for Steps 15- 16 on this worksheet.

Harvest Periods	Quantity of Forest Carbon Delivered to Mills				Non-Biological Emissions Associated with Mills	Quantity of Forest Carbon Remaining Immediately After Milling (Mill Efficiency)		Long-Term Sequestration in Wood Products		
	Conifer Percentage Delivered to Mills	Hardwood Percentage Delivered to Mills	Conifer CO2e Delivered to Mills / Acre	Hardwood CO2 equivalent Delivered to Mills / Acre	Assumption. 20 kw/hour (mill energy use) / (40mbf lumber processed/hour) * (.05 metric tonnes/kw hour) * mbf processed	Computed. Remaining CO2 equivalent after Milling Efficiency for Conifers	Computed. Remaining CO2 equivalent after Milling Efficiency for Hardwoods	Computed. CO2 Equivalent Tonnes in Conifer Wood Products in Use-100 Year Weighted Average / Acre and Landfill	Computed. CO2 Equivalent Tonnes in Hardwood Wood Products in Use-100 Year Weighted Average / Acre	
from Inventory, Growth, and Harvest Page (Time of Harvest as years from project approval)	Step 15. Insert the percentage of conifer trees harvested that are subsequently delivered to sawmills	Step 16. Insert the percentage of hardwoods harvested or treated that are subsequently delivered to sawmills	Computed: The merchantable portion determined by the conversion factors (Sampson, 2002) on the Inventory, Growth, and Harvest worksheet. This is multiplied by the percent delivered to mills to reflect the carbon delivered to mills.	Computed: The merchantable portion determined by the conversion factors (Sampson, 2002) on the Inventory, Growth, and Harvest worksheet. This is multiplied by the percent delivered to mills to reflect the carbon delivered to mills.	Calculated. The CO2e associated with processing the logs at the mill	The difference between carbon delivered to mills and carbon remaining after milling is assumed to be emitted immediately		Estimate. The weighted average carbon remaining in use at year 100 is 46.3%	Estimate. The weighted average carbon remaining in use at year 100 is 23.0%	
						The efficiency rating from mills in California is 0.67 (DOE 1605b) for conifers	The efficiency rating from mills in California is .5 (DOE 1605b) for hardwoods	Estimate. The carbon in landfills at year 100 is 29.8% of the initial carbon produced in wood products.	Estimate. The carbon in landfills at year 100 is 29.8% of the initial carbon produced in wood products.	
	0	100%	0%	44.33	0.00	-0.30	29.70	0.00	22.60	0.00
	20	100%	0%	48.02	0.00	-0.33	32.18	0.00	24.49	0.00
	40	100%	0%	55.41	0.00	-0.38	37.13	0.00	28.25	0.00
	60	100%	0%	73.88	0.00	-0.50	49.50	0.00	37.67	0.00
	80	100%	0%	73.88	0.00	-0.50	49.50	0.00	37.67	0.00
	100	100%	0%	73.88	0.00	-0.50	49.50	0.00	37.67	0.00
	0	100%	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0	100%	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0	100%	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	100%	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0	100%	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Sum of emissions associate with processing of lumber				-2.50	Sum of CO2 equivalent in wood products		188.36	0.00	

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Summary			Years until Carbon Stocks are Recouped from Initial Harvest (Includes Carbon in Live Trees, Harvested Wood Products, and Landfill)
	Beginning Stocks	Ending Stocks	
Emissions Source/Sink/Reservoir	Metric Tonnes CO2 Equivalent Per Acre Basis		5 Years
Live Trees (Conifers and Hardwoods)	327.69	831.16	
Wood Products		226.93	
Site Preparation Emissions		0.00	
Non-biological emissions associated with harvesting		-5.94	
Non-biological emissions associated with milling		-3.03	
Sum of Net Emissions/Sequestration over Identified Harvest Cycles (CO2 metric tonnes)		721.44	
Project Summary			
Project Acres	Step 17- Insert the acres that are part of the harvest area.	167	
Total Project Sequestration over defined Harvesting Periods (CO2 metric tonnes)		120,480	

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H. Wildfire Risk and Hazard: Assessment

According to the California Fire Hazard Severity Zone Map Update Project the THP area is located in a Moderate "FIRE HAZARD SEVERITY ZONE". Public Resources Code 4201-4204 directs the California Department of Forestry and Fire Protection (CAL FIRE) to map fire hazards within State Responsibility Areas (SRA), based on relevant factors such as fuels, terrain, and weather. These statutes were passed after significant wildland-urban interface fires; consequently, these hazards are described according to their potential for causing ignitions to buildings. These zones referred to as Fire Hazard Severity Zones (FHSZ), provide the basis for application of various mitigation strategies to reduce risks to buildings associated with wildland fires.

Wildfire Risk and Hazard Baseline Conditions

The plan area fire fuel conditions are typical of Western Mendocino County timberlands of the redwood forest with a high amount of fuels as a result of past land uses associated with timber harvests and fire suppression.

1. Fires Severity Zoning

Wildland fire hazard responsibility areas of the State are generally classified as state, local or federal. The plan area lies within a state responsibility area (SRA). Referencing the CALFIRE Fire Hazard Rating data, the plan area is located in Moderate zone.

2. Existing and probable future fuel conditions including vertical and horizontal continuity of live and dead fuels.

The existing fuel conditions within the THP and the immediate surrounding area associated with vertical and horizontal continuity of live and dead fuels can be classified as **moderate to heavy fuel loading**. Surface fuels include dense huckleberry patches, thick tanoak leaf litter and branches, and large woody debris horizontally on the ground. Some redwood dominant areas have very little ground cover in terms of brush and have a lower leaf litter accumulation. Throughout the project intermediate and ladder fuels include patches of small diameter dead brush and sapling sized trees (due to stem exclusion and closing of the canopy), ingrowth of tanoak into redwood areas and clumps, patches of dense small diameter Douglas-fir. Upper canopy and crown fuels include touching and interlocking crowns of co-dominant trees and intermediate trees, high tree/stem per acre in which canopies and ladder fuel branches touch (250-600 TPA), and a few spaced out large snags of multiple species. Most of the area surrounding the THP is similar with regards to fuel loads. Within the THP boundaries however, there is an overstory of redwood which have lost their lower branches and a well shaded sparsely vegetated understory with little in the way of ladder fuels.

In general, through management of stands, postharvest fuel conditions will be modified. In many cases the overly dense, poor health and poor form trees are harvested to release the dominant and codominant conifers and promote natural regeneration. The selective removal of trees will result in crown separation reducing vertical and horizontal continuity within the stand. The retention of healthy conifers will improve the overall stand health and provide for a more fire resistant stand.

A significant increase in ground fuel generated by logging slash can be created as a result of logging operations. Across the balance of the plan area accumulations of slash is not anticipated. With regards to logging slash O'Hara et al (2010) concluded the following:

“By 2008[4 years after harvest], these slash depths had declined to approximately 50 and 66% of their 2004 values in the moderate- and low-density treatments. Even if this trend was not linear, slash depths will probably approach those of the control plots within 10 years of thinning. This is the result of rapid decomposition in the humid climate on California’s north coast. It suggests that in this environment, high slash levels following severe thinning represent a relatively short-term fire hazard following these restoration treatments but minimal long-term hazards.”

Landing sites are prone to slash accumulation and piles can contain a significant quantity of slash. Current practice observed is equipment bringing landing generated slash back out to the woods. This material is drifted out and packed into skid trails. This practice reduces the vertical continuity of ground fuel and provides for erosion control beyond those areas within the plan where treatment is required by the rules. Although the plan is not a fuel hazard reduction project, operations associated with this THP will result in tree retention that is similar in some regards to a shaded fuel break.

It is the objective of the landowners to protect their timber resources for the future through fuel reduction and harvesting. To produce a more fire-resistant stand is economically impractical without a cohesive, state-wide program for biomass allowing for commercially feasible fuel treatments or at least supplanted with subsidies for precommercial thinning or shaded fuel breaks. It is cost prohibitive for large landowners in the region to conduct specific fuel treatments on their properties on a large scale for fire protection due to the lack of available outlets for the products that would be created. The current and trending sawlog market is not viable enough to allow any additional monies to be invested in fuel treatments due to the high cost and zero return to treat areas for fuel reduction. Therefore, fire prevention done in conjunction with timber harvests is the most cost-effective way to treat timberland on a large scale rather than projects that focus solely on fuel reduction. If programs were to develop in the future regarding biomass removal and commercialization of small diameter fuels, the future conditions of the project area, and potentially the surrounding properties, should be dramatically less than the existing conditions.

3. Location of known existing public and private Fuelbreaks and fuel hazard reduction activities.

Fuel breaks are wide strips of land where trees and vegetation have been reduced or removed. These areas can slow, and even stop, the spread of a wildland fire because they provide fewer fuels to carry the fire. They also provide firefighters with safe zones to take a stand against a wildfire, or retreat from fire if the need arises. Typically, fuel breaks are located in strategic locations based upon terrain, existing roads, community areas, and other key access points. Fuel hazard reduction is generally the reduction of surface and ladder fuels and the overstory and understory vegetation is spatially separated so that a ground fire will not, under normal fire conditions, climb into the canopy and turn into a crown fire. This can be achieved by thinning out dense tree stands and preserving mature sized trees.

Within and adjacent to the plan area there are no known designated public or private fuel breaks. There are no known CAL FIRE fuel treatment program projects adjacent to the plan area. The South Fork Gualala River and the flood prone areas adjacent to it make an excellent fuel break in the opinion of the RPF.

Timber harvesting maintains, reuses, and creates skid trails, cable corridors and truck roads whose presence by definition is a fuel break. During logging operations there is generally equipment on site that would be suitable for the construction of fuel breaks or to support CAL FIRE in fire suppression activities.

4. Road access for fire suppression resources.

In the event of wildfire, the plan area is well situated for fire suppression resource access and response time. The South Coast Volunteer Fire Department station is approximately 0.2 miles from the nearest plan access gate. Additional resources, both State and Volunteer, are located in the nearby communities of Sea Ranch and Point Arena. Most appurtenant roads within the plan area are existing seasonal roads. Gates are generally left open during the day while active logging operations are occurring which would allow access for fire suppression resources. Gate openings can accommodate over-sized loads. Roads on an actively managed forest are designed to facilitate logging vehicles. The externality of this is that these same roads can readily facilitate safe and rapid access for fire suppression vehicles and landings present an opportunity to safely stage vehicles and unload firefighting equipment (Moghaddas 2007).

Unsurprisingly, roads are actually among the greatest predictors of where control of fire is actually obtained (Narayanaraj 2011) and escaped fires in unroaded areas are 2.3 times larger in size for the California Coast Range compared to areas with road access (Johnston 2021). In the absence of harvesting, many of these roads would quickly deteriorate to a condition that greatly restricts the use of roads during fire suppression activities. This project in conjunction with the landowners' continued timber harvesting is expected to improve and maintain road access within the project area.

Wildfire Risk and Hazard- Past Projects

Within the project area fuels conditions are largely the result of past timber harvesting. The area has been harvested primarily under selection silviculture over the past 100 years. This has resulted stands that are well spaced and minimum fire hazard. The roads built to facilitate past logging are generally passable. The area has no known wildfire history. Previously prescribed fire was used as a tool to reduce slash after harvests, however due to liability concerns and state agency enforcement this practice stopped being utilized.

Wildfire Risk and Hazard- Future Projects

Future projects are likely to reduce fuel loading within the project area to moderate/low and likely maintain or even further reduce the level. Fire prevention is an objective of the landowners to protect the timber resource and with the income provided by harvesting, this work can be accomplished. The future is likely to hold more opportunities to use fire as a fuel reducing tool for landowners, as well as commercializing small diameter trees, which are generally accepted approaches to reducing surface and canopy fuels. The neighboring parcels may also seek more opportunities and implement projects around the proposed THP, which would further reduce risks within the project area.

Wildfire Risk and Hazard- Proposed THP

The THP silvicultures (Selection and Group Selection) will not significantly increase the risk of increased horizontal and/or vertical continuity or forest fuel loading. The intention of the plan submitters is to enter stands (where appropriate) approximately every ten to twenty years under uneven-aged silvicultures. This approach will reduce stand densities and lower fuel density by capturing mortality that occurs from self-thinning in the treated stands, lowering the chance of high intensity fire. Further, the landowner restricts public access within the ownership to lower the risk of anthropogenic fires. Stands will tend to be less flammable immediately following a typical selective type of harvest where the stand is opened to provide new growing space. As the slash created by the timber harvest dries it will slightly increase the flammability but as it decomposes rapidly it will become less of a fire threat. The reopening of skid trails periodically also helps to maintain disrupt surface fuels throughout the stands. Fire suppression access shall also be improved within the THP through the opening of the proposed seasonal road that extends the length of the THP.

Timber Operations rely on the Forest Practice rules to regulate fire prevention during timber harvest. Fire Prevention Rules are posted at the entrance to logging operations during fire season when burning permits are required, these rules list the requirements for smoking, warming fires, maintenance of power saws and equipment, resources required and warning of additional safeguards when fire danger is high. The timber operator is required to have a Fire Box on all active landings containing one backpack pump-type fire extinguisher filled with water, two axes, two McLeod fire tools, and sufficient number of shovels so that each employee at the operation can be equipped to fight fire. The LTO is also required to have a serviceable chainsaw, and all vehicles shall have a shovel and an axe.

Wildfire Risk and Hazard Conclusion

When viewed at a landscape level, management is required across the majority of the landscape to effectively reduce fire risk. This can be achieved on both industrial and nonindustrial landowners. Through the maintenance of road networks, larger landowners, such as GRT, can maintain access for fire agencies during a fire. With the landowner's long-term focus on uneven aged management, an increase in fire resilience can be expected. Although past projects contributed to the current fuel loading in areas adjacent to this THP, the risks are also part of a regional level issue. Future projects, the FPRs and the proposed THP are all expected to have a positive impact on fuel loading in the project area and immediate surrounding area by reducing fuels and managing the fuels that are created in the project. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on Wildfire Risk and Hazard is that there is no significant cumulative impact, and that current conditions will be improved through the project implementation.

Identification of Information Sources- H. Wildfire Risk and Hazard

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