

SECTION IV

Cumulative Impact Assessment

SECTION IV - CUMULATIVE IMPACTS ASSESSMENTS

<u>Contents</u>	<u>Page</u>
Introduction	170
• Cumulative Effects Checklist.....	171
 Watershed Resources Assessment	 177
2. Watershed Description	177
3. Watershed Effects.....	182
• Sediment Effects.....	182
• Water Temperature Effects.....	192
• Organic Debris Effects.....	198
• Chemical Contamination Effects.....	200
• Peak Flow Effects	
4. Watercourse Conditions	212
• Gravel Embeddedness.....	212
• Pools Filled.....	214
• Aggrading.....	216
• Bank Cutting.....	217
• Bank Mass Wasting.....	219
• Downcutting.....	222
• Scouring.....	223
• Stream Side Vegetation.....	224
• Recent Floods.....	227
• Additional Considerations.....	228
Additional Considerations.....	228
5. Soil Productivity.....	231
• Organic Matter Loss.....	232
• Surface Soil Loss.....	234
• Soil Compaction.....	235
• Growing Space Loss.....	237
6. Biological Resources.....	240
• Baseline Conditions.....	240
• Known Listed Species.....	241
i. Birds.....	241
ii. Mammals.....	247
iii. Fish.....	253
iv. Amphibians.....	262
v. Reptiles.....	266
vi. Insects.....	267
• Botanical Resources.....	269
• Aquatic and Near-Water Habitat Conditions.....	304
• Biological Habitat Conditions.....	305
• Biological Resources- Past Projects.....	309
• Biological Resources- Future Projects.....	310
• Biological Resources- Present Plans.....	313
7. Recreation Resources.....	216

8. Visual Resources.....	318
9. Traffic Resources.....	320
10. Greenhouse Gases.....	322
11. Wildfire.....	332
12. Other: Noise Assessment.....	337
13. Maps.....	338
14. GHG Spreadsheets.....	346

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 “[i]mplementation 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 Pepper THP is 356 acres, located adjacent to Annapolis, CA, in the central portion of Annapolis CalWater Planning Watershed. This watershed drains to the Pacific Ocean via the Gualala River and other minor watercourses. The Annapolis Watershed is an ASP (Anadromous Salmonid Protection) Watershed. 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.

A majority of the plan area was last harvested in the late 1980s and early 1990s under 1-85-420SON, 1-85-068SON, 1-85SON-008SON, 1-95-477SON. Additionally, some areas of this project have been entered in the 2000's under 1-03-008SON and 1-04-201SON. Some portions of this plan do not have a known harvest history but the stand composition and the presence of stumps indicate harvest some time prior to the Forest Practice Act.

There are six mapped soil types within the project area, all of which classify as Coarse, and the textures range from fine sandy loams to very gravelly loams. These soils' parent materials are generally sedimentary rock and sandstone,. The San Andreas Fault is located west of the THP, and two pre-quadernary faults are mapped near the THP.

There are three Northern Spotted Owl within the Biological Assessment Area (BAA) located within 0.7 miles 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 proximity to the Gualala River. The Gualala River is a vital feature to species within the BAA and is adjacent to 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. The plan will not be visible from the mainstem Gualala River, a Wild and Scenic River[Recreation]. This plan will not be visible from any public roads. The channel of the Wheatfield Fork of the Gualala River is accessible to the public. The RPF has not observed any members of the public utilizing this stretch of river during plan layout. WLPZ protections and the use of Unevenaged Silvicultures will make this project difficult to discern when viewed from the Wheatfield Fork.

The THP is expected to recoup carbon emissions and carbon lost from the harvest in 10 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 for the last 20 years (other than routine road maintenance). Annapolis is located to the north and The Sea Ranch to the west of the Plan Submitter's property. The project is bordered by lands zoned for timber. A review a satellite images identify several structures in the general area of the project. Because of this, noise may be heard from the proposed operations when in proximity to operations near the property line.

The Annapolis Watershed #1113.840303 (Watershed Assessment Area) is composed of a coast redwood, Douglas-fir, sugar pine, and a hardwood forest (tanoak, canyon live oak, madrone) in the upper elevations and head of the watershed (~70% of the area), and a mixed grassland and

oak woodland in the middle and lower elevations (~30% of the area). The watershed is composed of a mix of small, non-industrial landowners, with some larger vineyards, timberland owners, ranchers, and other agricultural owners dispersed throughout. The industrial forest landowners within this watershed include: Gualala Redwood Timber(The plan submitter), Mendocino Redwood Company, and Richardson Ranch (Multiuse agriculture). Additionally, the Conservation Fund, a nongovernment organization, that routinely harvests timber is a landowner within this watershed. As described below, this watershed sees routine timber harvesting. Gualala Redwood Timber(The plan submitter) owns roughly 2218 or 29% of this watershed. Timber Harvest Plans (THP) and Notice of Timber Operations (NTOs) have been filed on approximately 1359.19 acres of the 7,579 acres watershed assessment area within the past 10 years, or approximately 17% of the assessment area. Of the total WAA acreage, there has been no acres of even aged management or 0%, 1090 acres of uneven aged management or 14%, 269 acres of Special Prescription & Other Management or 3%. Within the ownerships of the plan submitters, there has been 379.5 acres of uneven aged management or 2% of the total WAA. Additionally, ~455 acres or 6% of the total WAA has been placed under NTMPs. 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, 4 Notice of Timber Operations (NTO) covering 194 acres, which are a notification of harvesting under an NTMP, were filed within the last ten years.

When considering past projects (prior to the FPRs), there may be an existing continuing significant adverse impact in the Watershed Assessment Area to item A. Watershed Resources. The impacts originate from past land use activities in regard to sediment effects. There is some evidence of sediment within watercourses in the WAA due to past logging practices, many of these impacts are associated with near or in stream timber operations. The current FPRs reduce watershed sediment impacts from timber operations through the creation of operational measures such as hydrologically disconnecting roads, appropriately sized watercourse crossings, watercourse protection measures, and other operational constraints.

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

(a) 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, agriculture, rural residential use, and 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.

The following is a list of Timber Harvest Plans, and NTMPs filed within or partially within the Watershed Assessment Area during the last ten years.

Annapolis Watershed (V2.2 #1113.840303)

THP Number	Landowner	Timber Owner	Acres in WAA	Silviculture	Yarding Method	PLS Description
1-15-042-SON	Gualala Redwood Timber LLC	Gualala Redwood Timber LLC	2.79	Selection	Tractor or Skidder	T10N R14W Sec 15
1-19-00051-SON	Gualala Redwood Timber LLC	Gualala Redwood Timber LLC	52.51	Selection	Tractor or Skidder	T10NR14W Sec 22
1-20-00144-SON	Gualala Redwood Timber LLC	Gualala Redwood Timber LLC	324.18	Group Selection	Tractor or Skidder	T10N R14W Sec 9,15,16,&22
1-21-00037-SON	Mendocino Redwood Co	Mendocino Forest Products Co	182.43	Group Section	Tractor(72.55acres) Cable(109.88 acres)	T10N R14W Sec 36
1-21-00037-SON	Mendocino Redwood Co	Mendocino Forest Products Co	21.60	Selection	Tractor(1.85 acres) Cable(19.5 acres)	T10N R13W Sec 30,31,&32
1-21-00037-SON	Mendocino Redwood Co	Mendocino Forest Products Co	87.03	Transition	Cable(7.06 acres) Tractor(79.97 acres)	
1-21-00037-SON	Mendocino Redwood Co	Mendocino Forest Products Co	64.16	Variable Retention	Cable(28.82 acres) Tractor(35.54 acres)	
1-22-00097-SON	Mendocino Redwood Co	Mendocino Forest Products Co	88.20	Group Selection	Cable System	T14N R14W Sec 24,25 T10N R13W Sec 17,18,19,20, &30
1-22-00097-SON	Mendocino Redwood Co	Mendocino Forest Products Co	149.62	Selection	Cable(66.88 acres) Tractor(82.74 acres)	T14N R14W Sec 24,25 T10N R13W Sec 17,18,19,20, &30
1-22-00097-SON	Mendocino Redwood Co	Mendocino Forest Products Co	192.38	Variable Retention	Cable(68.88 acres) Tractor(123.69 acres)	
1-00NTMP-073-SON-NT05	Gary & Dorothy Craig Family Trust Total	Gary & Dorothy Craig Family Trust Total	64.58	Selection	Tractor	
1-01NTMP-048-SON-NT04	Alice Garrett	Alice Garrett	61.49	Selection	Tractor	T10N R14W Sec 23
1-01NTMP-048-SON-NT04	Alice Garrett	Alice Garrett	3.01	Transition	Tractor	
1-05NTMP-017-SON-	Lester Gray	Lester Gray	52.01	Group Selection	Tractor	T10N R14W Sec 11,13,14,13,

NTO4						& 15
1-05NTMP-017-SON-NTO4	Lester Gray	Lester Gray	13.19	Rehabilitation of Understocked Area	Tractor	

A total of approximately 1359.19 acres of the 7,579 acres within in Watershed Assessment Area (WAA) (approximately 17%) will have had harvest documents approved in the past 10 years.

Most effects from timber harvest are apparent within the first few years and then taper off as revegetation occurs. Any effects from timber harvest are also ameliorated if some form of partial harvest or cable logging is employed. The THP area comprises a small portion of the assessment area: the Annapolis Planning Watershed and 0.7-mile buffer. 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.”

(b) 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, 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. This project proposes the limited utilization of legacy skid trails on slopes >65%. The RPF only proposes to utilize existing stable legacy skid trails in areas where operationally necessary. This practice differs from historic logging practices in that the only steep slope skid trails proposed for utilization on slopes >65%

are located outside of the WLPZ, not located on stable features, and will be subjected to operational constraints such as enhanced waterbar spacing and no winter operations. Areas where this practice is proposed are mapped on Sec II, Item 38, Operations Maps and are subjected to review both in the office and in the field by a multiple agencies.

Grazing and agriculture 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 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.

(c) Will the proposed project as presented, in combination with past, present, and reasonable 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?

Yes after

No after

No reasonably
potential
significant

	<u>mitigation (1)</u>	<u>mitigation (2)</u>	<u>adverse impacts</u> (3)
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 and Hazard	_____	_____	X
I. Other (Noise)	_____	_____	X

1) “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.

2) “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.

3) “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.

(d) 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.

Resource Subject Assessment Areas

A. Watershed

The watershed assessment area (WAA) includes the following planning watershed(s):

Annapolis Watershed (V2.2 #1113.840303), 7579 acres: partially encompasses the Wheatfield Fork of the Gualala River (ASP) and include other Class I(ASP) tributaries. The plan area occupies 356 acres or 4.8% of the Watershed.

The total WAA acreage is approximately 7,579 acres. The plan area and the planning watersheds (which is the watershed assessment area (WAA)) are portrayed on the WAA maps.

Rationale:

This assessment area is consistent with the January 7, 1992 CDF recommended guidelines to RPFs which states: “The watershed assessment area for assessing cumulative watershed effects should be selected to include an area of manageable size (usually an order 3 or 4 watershed) relative to the THP that maximizes the opportunity to detect an impact”.

B. Soil Productivity

The soil assessment areas are confined to the soils within the timber harvesting area.

Rationale:

Soils outside of this area are unlikely to be significantly impacted by operations. As a result, this best represents the area in which potential adverse impacts may be detected. Soils outside these areas should be left undamaged and untouched by this timber harvest.

C. Biological

The Biological Assessment area (BAA) comprises all the area within 0.7 miles of the plan boundary. The 3629-acre BAA is portrayed on the BAA Maps located at the end of this Section.

Rationale:

Terrestrial plants and animals further away from the harvest area will be less affected by the disturbance than those within the plan area. Aquatic species downstream from the THP area may be affected by water temperatures and sedimentation moving downstream. In addition, this assessment area was chosen because it coincides with the survey area for the Northern Spotted Owl set forth in the Forest Practice Rules.

D. Recreational

The recreational resource assessment area includes the harvest area plus 300 feet surrounding the harvest area.

Rationale:

Technical Rule Addendum No. 2 Cumulative Impact Assessment.

E. Visual

Visual resource assessment area includes those areas within a three-mile radius of the harvest area from which significant numbers of the general public may view the proposed operation.

Rationale:

Technical Rule Addendum No. 2 Cumulative Impact Assessment.

F. Traffic

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.

Rationale:

The only roads that will be affected are those used by logging trucks and trucks hauling equipment to and from the operation. The roads first roads utilized under this THP include Annapolis road. From there traffic will either head east towards Skaggs Springs Rd or West towards HWY 1.

G. Greenhouse Gases (GHG):

The Greenhouse Gases (GHG) Assessment Area is the proposed project area, transportation routes to manufacturing facilities, and the milling of forest products.

Rationale:

While all carbon sequestration is limited to the plan area, this is true for most but not all emissions generated by the proposed project. Those emissions associated with the project but not created within the plan boundary, log delivery, and processing at the mill, are accounted for in the GHG Calculator.

H. Wildfire Risk Assessment:

The Wildfire Risk Assessment area includes the THP and all of the surrounding area in the vicinity within 300 feet, including the residential homes and dwellings.

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 *Annapolis Watershed*, as the entirety of the THP acreage lies in this watershed (100% of THP).

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 derived from multiple parent materials. Watercourses within the THP range from Class I to Class III watercourses. There are no IV watercourses within the THP. Trees within the THP area range from 0-100 years (and some older second growth) 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 Wheatfield Fork Watercourse Protection Zone in which there is heavy stocking of large redwoods creating 90-100% canopy closure, even in harvested areas. 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, but not as much overstory canopy as uneven aged stands. Tree species include (in order of % composition) redwood, Douglas-fir, grand fir, bishop pine and western hemlock. 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. Much of the year the area has coastal fog that provides moisture to the redwood forests from leaf drip and absorption, and reduces evaporation by providing cover from solar radiation.

A majority of the plan area was last harvested in the late 1980s and early 1990s under 1-85-420SON, 1-85-068SON, 1-85SON-008SON, 1-95-477SON, 1-96-421SON. Additionally some areas of this project have been entered in the 2000's under 1-03-008SON and 1-04-201SON. These harvests all occurred outside of the 10 year assessment for past plans.

The following cumulative effects analysis reference 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.

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 assessment area. Additional information is 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 on 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 particular 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 Wheatfield Fork of the Gualala River Subbasin.

The Wheatfield Fork Subbasin is characterized by steep tributaries flowing into the mainstem Wheatfield Fork, which is dominated by bedrock and a relatively narrow floodplain. Large areas of active earthflows and other forms of landsliding are abundant and contribute sediment directly into subbasin streams. These relatively high sediment levels can be attributed to both natural and human land use disturbances. For example, road building adjacent to stream channels or across debris slide slopes and/or steep terrain has also contributed sediment to streams. Historic and current accounts show that steelhead trout inhabit the subbasin, while only one record described coho salmon on Haupt Creek in the 1960s. Relatively high instream sediment levels, simplified salmonid habitat, low levels of instream woody debris, open canopy cover, and a lack of appropriately sized spawning substrate indicate that present conditions are unsuitable for salmonids. Nonetheless, air photos indicate instream and near stream conditions have improved since 1984.

There are abundant opportunities for improvements in watershed stream conditions. Control measures for access to streams by livestock and feral pigs, improvements to instream complexity, such as additional large woody debris, increased riparian canopy density, and monitoring physical and biological responses to these treatments, are examples of appropriate treatments. During project planning and design, careful consideration of the watershed context and the proposed site's proximity to unstable and erosive terrain must be made. During project implementation, appropriate best management practices should be followed to minimize soil disturbance and potential sediment delivery to streams

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 was studied as part of this analysis. GRI and cooperators collected most of the 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) Most of 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 most of the sub-basins.
- 4) Gravel and substrate suitable for salmonids is 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 some 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- Continue 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 Annapolis watershed was logged for old growth at the turn of the last century, and it wasn't 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 Annapolis watershed, the history of earlier logging coupled with repeated entries in the past few decades have resulted in stands that range from 90 years to 20 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

Along the Gualala River there are extensive alluvial terrace deposits that are covered with second growth redwood forest. These alluvial flats act 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 act as sediment catch basins when they periodically overflow their banks. The side slopes are vegetated with redwood, Douglas-fir, sugar pine, tan oak, madrone, and several other hardwood species in small amounts.

The Wheatfield Fork of the Gualala has a 100-200-foot-wide aggraded alluvial channel with a low 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 generally steep upslope topography. 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 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 fairly consistent in its location over the last forty years.

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 earth 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 Annapolis Planning Watershed, primary historical and present activities include the development of the road and watercourse crossing construction, timber harvesting, milling and lumber production, agricultural production, 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. Much of the 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. This project is entirely outside of this Special Treatment

Area/Zone. The former was established for the values of “sites of significant scenic value” and for “wetlands, lagoons, streams, estuaries, These STAs have been harvested more than one time within the Plan Submitter’s ownership at a low intensity of harvest following the guidelines in the FPRs. Additionally, the Mainstem of the Gualala River is designated as a Wild and Scenic River[Recreation].

Effects of past activities can be seen today in some 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 in order 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. 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 contains 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 along the flats on Miller Ridge 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 facilities 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 within the project area, however many of them have minimal maintenance issues. This project will rectify multiple areas where drainage currently exist or may exist in the future.
- **Yarding** – The entire THP area was previously logged using a mix of ground-based and cable equipment. Therefore, there is an existing network of logging roads and skid trails the majority of which are stable and in good condition. Throughout the project area there are legacy skid trails within WLPZs(Class I and II). The RPF is proposing to reuse segments of skid trails only within Class II WLPZ. 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.

-

Waterbarring of existing skid trails in tractor units is fairly consistent with modern day FPRs as much of the area has been entered since the past 30 years. Many of the skid trails located in cable units were last utilized prior to the FPRs and Waterbarring is inconsistent. Many of these legacy skid trails have since revegetated, which aids in stabilizing these features. The existing network of skid trails includes some segments on slopes greater than 65% within Low/Moderate Erosion Hazard Rating areas. The locations of these skid trails are mapped in Sec II and these skid trails will receive enhanced waterbar spacing. This practice differs from historic logging practices in that only existing stable skids trails that are necessary for logging operations will be utilized. The utilization of these skid trails is not expected to have impacts similar in scope to historic utilization of steep slope skids as these practices are limited to existing stable skid trails that have been found not to be hydrologically connected. 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 down-cutting, and bank cutting in order to flush the perched sediment.

- **Unstable Features** – The RPF has contracted the services of a professional geologist for this project. Most unstable areas are located adjacent to watercourses and are a result of either natural erosional and tectonic (San Andreas Fault) processes, bedrock layers, or historical logging within and adjacent to watercourses. Historically, these features have likely contributed to active sedimentation, especially those that experienced heavy equipment and soil and earth displacement.

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 communities of Annapolis, 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 were 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 in an attempt 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 have made this an 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 Annapolis began in the 1860s as a mill town. During this time and decades after, the town supported the workers and families of the agriculture, logging, and mill industries. In the more recent past, the region 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 sparse residences located throughout the watershed mainly located on rural lands along Annapolis Road and Miller Ridge. 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 enters 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. Road construction that occurred along creek bottoms and mid-slope from early logging altered drainage patterns of the watershed assessment area and proper watercourse crossings were not installed. These roads likely caused detrimental impacts to watercourses. Recognizing these problems, the landowner is committed to upgrading legacy watercourse crossings on the property. There are however many 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 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 due to the fact that 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 2004 as an uneven aged, single-tree Selection harvest of redwood and Douglas-fir. These projects used ground-based methods for the removal of timber. Initial skid trail patterns that feed to 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.

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 lands remain 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 NTOs) 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 17% of the watershed assessment area has had timber harvest activity within the last 10 years.

THP Number	Landowner	Timber Owner	Acres in WAA	Silviculture	Yarding Method	PLS Description
1-15-042-SON	Gualala Redwood Timber LLC	Gualala Redwood Timber LLC	2.79	Selection	Tractor or Skidder	T10N R14W Sec 15
1-19-00051-SON	Gualala Redwood Timber LLC	Gualala Redwood Timber LLC	52.51	Selection	Tractor or Skidder	T10NR14W Sec 22
1-20-00144-SON	Gualala Redwood Timber LLC	Gualala Redwood Timber LLC	324.18	Group Selection	Tractor or Skidder	T10N R14W Sec 9,15,16,&22
1-21-00037-SON	Mendocino Redwood Co	Mendocino Forest Products Co	182.43	Group Section	Tractor(72.55acres) Cable(109.88 acres)	T10N R14W Sec 36
1-21-00037-SON	Mendocino Redwood Co	Mendocino Forest Products Co	21.60	Selection	Tractor(1.85 acres) Cable(19.5 acres)	T10N R13W Sec 30,31,&32
1-21-00037-SON	Mendocino Redwood Co	Mendocino Forest Products Co	87.03	Transition	Cable(7.06 acres) Tractor(79.97 acres)	
1-21-00037-SON	Mendocino Redwood Co	Mendocino Forest Products Co	64.16	Variable Retention	Cable(28.82 acres) Tractor(35.54 acres)	
1-22-00097-SON	Mendocino Redwood Co	Mendocino Forest Products Co	88.20	Group Selection	Cable System	T14N R14W Sec 24,25 T10N R13W Sec 17,18,19,20, &30
1-22-00097-SON	Mendocino Redwood Co	Mendocino Forest Products Co	149.62	Selection	Cable(66.88 acres) Tractor(82.74 acres)	T10N R14W Sec 11,12,13,&14
1-22-00097-SON	Mendocino Redwood Co	Mendocino Forest Products Co	192.38	Variable Retention	Cable(68.88 acres) Tractor(123.69 acres)	
1-00NTMP-073-SON-NT05	Gary & Dorothy Craig Family Trust Total	Gary & Dorothy Craig Family Trust Total	64.58	Selection	Tractor	T10N R14W Sec 23
1-01NTMP-048-SON-NT04	Alice Garrett	Alice Garrett	61.49	Selection	Tractor	
1-01NTMP-048-SON-NT04	Alice Garrett	Alice Garrett	3.01	Transition	Tractor	
1-05NTMP-017-SON-NT04	Lester Gray	Lester Gray	52.01	Group Selection	Tractor	T10N R14W Sec 11,13,14,13, & 15
1-05NTMP-017-SON-NT04	Lester Gray	Lester Gray	13.19	Rehabilitation of Understocked Area	Tractor	

*These acreages represent approximate plan acreages within the Watershed Assessment Area (WAA), and not total THP acreages. This information is supplied by CDF 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.

The total WAA acreage is approximately 7579 acres. Over the past 10 years the WAA has been managed (an approved or filed harvest document) on 1359 acres. This management has been through 1090 acres of Unevenaged, 0 acres of evenaged management and 269 as been harvested under Special Prescriptions & Other Management..

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 foreseeable 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. This THP, like all others, contains protection measures to protect the Beneficial Uses of Water. Within the Annapolis watershed, there are 7 active NTMPs with no active NTOs. Areas of NTMPs without NTOs can be considered future projects. The Plan Writer is unaware of any planned NTOs.

NTMP Number	Landowner	Timber Owner	Acres in WAA	Silviculture	Yarding Method	PLS Description
1-99NTMP-021-SON	Todd Curlee, Jamie Curlee	Todd Curlee, Jamie Curlee	38.84	Selection	Tractor or Skidder	T10N R14W Sec 13
1-00NTMP-041-SON	Michael Wilkins, Tonna Wilkins	Michael Wilkins, Tonna Wilkins	12.95	Selection	Tractor or Skidder	T10N R14W Sec 10
1-00NTMP-073-SON	Gary & Dorothy Craig Family Trust, Darrell Rogers	Gary & Dorothy Craig Family Trust, Darrell Rogers	132.38	Selection	Tractor or Skidder	T10N R14W Sec 11,12,13, &14
1-01NTMP-048-SON	Alice Garrett	Alice Garrett	113.28	Selection & Transition	Tractor or Skidder	T10N R14W Sec 23 &26
1-04NTMP-001-SON	Jim Ragle, Cindy Ragle et al	Jim Ragle, Cindy Ragle et al	71.42	Selection	Tractor & Cable	T10N R14W Sec 15
1-05NTMP-017-SON	Lester Gray	Lester Gray	86.18	Unevenaged Management	None given	T10N R14W Sec 14
1-08NTMP-011-SON	Darrell Rogers	Darrell Rogers	.14	Selection	Tractor	T10N R14W Sec 10

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

PART OF PLAN

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 is aware of one future project. The “Salt” THP is presently in project development. The project is estimated to be 339 acres and will utilize Unevenaged and Special Prescription Silvicultures. Changes to silviculture and acreage may occur as GRT continues to develop this project. This THP is expected to be submitted in late 2025. This project will incorporate measures that will avoid impact on watershed resources. Salt THP ,upon submission, will include an analysis that includes how it will interact with this present project and potential cumulative effects, should any occur, will be accounted for under that project.

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 ownership. The timing and nature of any additional future projects is difficult to predict, due to constantly changing economic conditions.

Tentative Project name	Landowner	Timber Owner	Acres in WAA	Silviculture	Yarding Method	PLS Description
Salt THP	GRT	GRT	339	Group Selection, Transition, Selection	Tractor and Cable	T10N R14W Sec 15, 22,23, 24 and 25 T10N R13W Sec 19 and 30

The total WAA acreage is approximately 7579 acres. The RPF is aware of 794.19 acres, or 10.4% of the watershed that has reasonably foreseeable future projects. Of these projects 455.19 are associated with NTMPs. It is important to note that all though a property has an approved NTMP it does not mean that a timber harvest will occur on any of the NTMP within a ten year period.

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 fill 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 and 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 additional instream large woody debris placement. To date it is estimated that more than 111 log truck loads of large wood has

PART OF PLAN

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 fish 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 that may result from harvesting the percent watershed acres harvested is a poor indicator by itself because if all silviculture were even-aged then one would expect on a sixty-year rotation to only harvest 16.7% of a watershed area a ten-year period due to adjacent harvest unit constraints imposed by the Forest Practice Rules. 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 take into account 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 many 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 many 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 a number of restrictions and considerations including watercourse protection rules, geological hazard set-asides, northern spotted owl habitat protection, as well as other plant and animal 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 have the ability to 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, Group Selection, Transition, and No Harvest. 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 allows for proper functioning of 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.

- Existing watercourse crossing upgrades: 12 proposed in this THP.
- Road drainage facility improvements: 12 proposed in this THP.
- Hydrologic disconnection of logging roads: 1
- Existing Temporary watercourse crossings: 9 proposed in this THP.
- Proposed road construction: 0 feet.

- Yarding Methods (14 CCR 914.2 & 914.6):_THP Item #16 describes the yarding methods to be employed during harvest operations. The THP proposes a mix of cable and ground-based tractor operations. Ground based yarding includes some exception skid trails (trails on slopes over 65%) which are on slopes above watercourses but outside of the WLPZ. These areas have waterbarring and soil stabilization requirements to prevent and reduce the concentration, flow, and erosion of water down trails. Skid trails in these areas have been evaluated 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 Extreme EHR Standard. This is equal to or greater protection than the standard rule. Much of the THP that is designated for ground based operations has gentle slopes with existing skid trails that required little construction. The THP proposes to use some short segments of WLPZ trails that are mapped in Sec II.. There are three total tractor crossings on skid trails proposed for use. There are 2 existing Class III crossing proposed for reuse under this plan. 1 existing Class II crossing is proposed for utilization. This Crossing and associated trail will be waterbarred and slashed packed to reduce the potential for sediment delivery.

- Unstable Features: multiple unstable areas have been identified within the plan boundaries and impact avoidance measures have been developed in conjunction with a professional geologist.
- 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):_THP Item #23 includes numerous provisions that are proposed to minimize the mobilization of sediment during the winter period. This THP includes the following measures:
 - 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
 - No WLPZ skid trail 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). The range of the calculated mean weekly average temperatures (MWAT) recorded in most of the major watercourses within these watersheds are included within the Stream Reports for the watershed. Temperature ranges indicate temperatures in excess of preferred rearing temperatures for coho and steelhead on the Gualala River. Seasonal daily maximum temperatures in excess of the upper lethal temperature for rearing coho and steelhead are also noted. MWATs taken by the GRWC for Wheatfield Fork between the years 1994 through 2019 indicate that year-round water temperatures range between 18.9C and 23.7C, with the average temperature being 21.7C which, is not suitable water temperatures for anadromous salmonids in the Gualala River watershed. The upper end of fully suitable water temperature for Coho is considered to be 15.6C. The highest recorded maximum temperature was 28.8C recorded in 2018 according to the GRWC.

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.

The NCWAP states, " Post World War II construction of roads, landings, and skid trails in riparian zones by crawler tractors eliminated overstory shade canopy cover in long sections of the Wheatfield Fork and tributaries. There was near entire canopy elimination along the lower mainstem and main tributaries, especially pronounced during the mid to late 1950s. There is

measured improvement in canopy cover since 1968, but it has not recovered to 1942 levels". It should be noted that summer water temperatures along the main river (which is transporting water from many other upstream ownerships) are higher than desirable. 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% of potential management caused adverse effects on the Gualala River system could be associated with GRT activities. Most of the creeks that originate off property have higher water temperatures when they enter GRT's land than they do when they hit the main stems. This observation directly indicates that GRT practices are likely not the leading cause of high-water temperatures and that stream temperatures are actually decreasing or at least not warming as they pass through GRT property.

Halligan states, "Increasing water temperatures in a downstream direction has been identified in streams and rivers throughout the world except where the watercourses become influenced by coastal weather conditions that can result in a cooling pattern. The general tendency for incremental increases in temperature has been attributed to increasing channel width reducing the effectiveness of shading from riparian vegetation, increasing air temperature, increasing stream depth, and decreasing proportion of cooling groundwater inflow. This reach of the Gualala River receives water from approximately 157,400 acres upstream. A review of water temperature data appears to show a river in equilibrium with regard to water temperatures".

As observed by Halligan, stream temperatures passing through GRT lands could also be moderated by the zone of coastal influence (fog belt). Besides the zone of coastal influence, the Forest Science Project out of Humboldt State University found in their study titled "Regional Assessment of Stream Temperatures Across Northern California and their Relationship to Various Landscape-Level and Site Specific Attributes" (Lewis et.al 2000) that water temperature has a positive correlation between watershed size, distance from watershed divide, bank full width, and canopy cover. Watershed size and distance from watershed divide are often related as are bank full width and canopy cover. In the case of the GRTs holdings, there is a river within a large watershed that is located at the furthest point from the watershed divide and has an immensely wide bank full width. Therefore, higher water temperatures would be expected in this type of scenario. As the river approaches the estuary, water temperatures are modified by the coastal zone of influence for macro air temperatures.

It may be that the local larger streams naturally have temperatures above the 60° F, above which is the stress inducing threshold for local salmonids. To test this, Gualala temperatures were compared with temperatures collected in old growth watersheds in Humboldt Redwood State Park. The old growth watersheds, by increasing acreage, are Cow Creek (93% uncut old growth), Squaw Creek (61% uncut old growth) Canoe Creek (62% uncut old growth) and Bull Creek, where the stream flows through 3 miles of uncut old growth, including the Rockefeller Grove, before it gets to the Bull Creek temperature station. The trend line equation for the old growth ($y=2.2886\ln(x)+43.713$) was almost identical to the equation for the Gualala trend line ($y=2.2707\ln(x)+43.683$).

The following quotation is taken from C. James(2003) study on the relationship between canopy and water temperature changes in managed forests.

"Data collected before and after timber harvest operations in years 2000, 2001, and 2002 was analyzed to determine changes in response variables to wider (175 ft.) or narrower (100 ft.) riparian buffers. The Angular canopy cover was measured to be 85% at mid-stream and no less

than 80% within the riparian buffer regardless of buffer width. Vertical canopy cover was measured to be 50% within the riparian buffer for each harvest unit following the first phase of timber operations. Microclimate results show that edge effects from the adjacent upslope clearcut harvest units had no discernible impact within 40 ft. of the stream bank. In this experiment, no practical difference in the canopy cover, near-stream microclimate, or water temperature patterns were found between the wider 175-ft. and the narrower 100-ft. buffers. Results from this study show that 100-ft. vegetative buffers that maintain at least 50% vertical or 80% angular canopy cover minimize potential negative impacts to the temperature of stream water and the near-stream microclimate from adjacent upslope clearcut harvest operations."

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 despite the fact that approximately 17% of the assessment area has either undergone timber harvesting operations within the last ten years, or has an 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 are Class I watercourses within or adjacent to the Plan area. The THP area also contains multiple Class II, Class III watercourses, and multiple wet areas. Attached 'Stream Monitoring Reports' in Section V of the THP indicate that the preharvest canopy closure within the riparian zone along the Wheatfield Fork averaged 80% at the time of data collection. See the Wheatfield Fork Inventory Report available in Section V of this THP. An average of 92% canopy cover is considered to be optimal for maintaining lower stream temperatures. It is important to note the Wheatfield Fork of the Gualala has a channel that often extends more than 100 feet.

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, grand fir, pine and tanoak in the overstory with an abundance of huckleberry, salal, and ferns 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 instances of existing roads located within a 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.

- **Pool Depth** – The major watercourses in the WAA are the Wheatfield Fork Gualala River and associated tributaries. Five monitoring reaches have been established in this watershed (4 upstream of the project). Site 226 on the Wheatfield Fork is a monitoring reach and is measured every year. Stream Channel Characteristics – Pool depth and frequency have been reported in NCWAP as lacking in almost all of the sub-basins including this one, and it is hoped that installation of large woody debris that GRT has been conducting for several years will accelerate the development of stream bed structure. Preliminary follow-up studies on this large woody debris indicate that logs placed have already had a dramatic impact on increasing pool depth and frequency. Also, tables showing stream habitat for reaches within the watershed have been included in Section V. For the Wheatfield pool depth, although increasing significantly is still lacking in deeper pools (3 feet plus).

The Class II watercourses within the Plan area have channels with a developed pool structure, however the RPF has observed that a vast majority of these pools lack water in the summer months. The factors contributing to sedimentation described above will be addressed in this THP and should have a positive effect on increased pool depths.

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, 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 impact 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 GRT 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 caused mass wasting events and sediment delivery. Vineyard development has occurred within the WAA.
 - 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 temperature of the Gualala River. Located within and adjacent to the plan area is a large mill, that resulted in substantial conversion of forestland to industrial use. This resulted in the clearing of forestland, all the watercourses within the plan area near the mill site have been observed to be reforested.
 - 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 in 2003. 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. Incidental adverse impacts to watershed resources from historic past activity are more likely associated with road maintenance or primary log transport using watercourses rather than harvesting per se. 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 into the future, 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 is currently roaded 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, Group Selection, Transition, and No Harvest. 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 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.

-
- Attached 'Stream Monitoring Reports' in Section V of the THP indicate that the preharvest canopy closure within the riparian zone along the Wheatfield Fork averaged 80% at the time of data collection. See the Wheatfield Fork Inventory Report available in Section V of this THP. An average of 92% canopy cover is considered to be optimal for maintaining lower stream temperatures. It is important to note the Wheatfield Fork of the Gualala has a channel that often extends more than 100 feet.
-
- Within the Class II WLPZ Pre harvest Canopy Closure is estimated to range from 60% to 99%. Following operations, the Inner Core Zone of the Class II WLPZ will remain unchanged excluding areas where new crossings are proposed. Outside of the Inner Core Zone Class II-S WLPZ Canopy Closure is estimated to range from 60% to 70% after operations. Class I and Class II-L WLPZs are estimated to have canopy closures that range from near 100% to 80%.

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 being conducted annually by the Gualala River Watershed Council (GRWC) on GRT's property and within the Gualala River Watershed in order 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 watercourses within/adjacent to the THP have been observed to have a large quantity of vegetation that extends over the bank. This vegetation coupled with inputs from higher order streams has resulted in a ample small organic debris being present. The Class II and III watercourses within the THP area have a high degree of canopy cover and therefore introduces a natural amount of small organic debris into the watercourses. The RPF has observed a healthy degree of leaf litter and needle cast in the Class II and 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, and there are no observed adverse effects regarding organic debris from the most recent harvests that have occurred along these watercourses.
- **Large Woody Debris** – The NCWAP reports a lack of LWD along the Wheatfield Fork. The Wheatfield Fork of the Gualala River has a wide channel width reducing the ability of this watercourse to retain large woody debris. In the past the landowner has engaged in permitted LWD placement projects along the Wheatfield to increase the presence of LWD. The Class II watercourses within 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. These environments could use more of these structures to reach peak health

but are not currently at risk. The high degree of stocking within the riparian buffers will contribute to the recruitment of LWD into these streams 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, similar to 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 reduced the amount of LWD available, and also diverted watercourses to ditches and underground systems, eliminating their natural drainage area. 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 sidecast materials into watercourses.
- Timber Harvesting: Historic past timber harvesting did not take into account 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. Recent past projects did not use many of these legacy facilities and followed the FPR regulations, therefore there is not an impact from these past activities.

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 roaded 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, Group Selection, Transition, and No Harvest. LWD shall be recruited and retained within riparian corridors. The unevenaged 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 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. Minimal large organic debris was noted within the proposed tractor crossings, therefore the loss of organic debris at these sites is expected to be negligible.

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 many regulations, the effects have become less than significant in many aspects. Currently, there is a natural input (not excessive) of small organic debris in watercourses, and the reintroduction of LWD is slowly increasing in the larger watercourses. Future projects are not expected to have an adverse impact to organic debris effects. The proposed THP is not expected to have adverse impacts to 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 to downstream resources can have negative impacts on aquatic organisms, as well as the beneficial uses of water. Most of the project area drains to watercourses that flow to the Pacific Ocean, and only some of the other portions drain to the Gualala River near the mouth. Drainage from the project area to the ASP watersheds is limited.

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. This area has not had timber operations in roughly 20 years within the project boundaries. The most recent use of heavy equipment within the plan area has been associated with road maintenance. In the WAA overall, there have been a number of timber harvest projects in the recent past within the plan submitter's ownership in which no chemical contamination events have occurred, and there are no 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 and timber harvesting. Additional activities include power line maintenance, trespass 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 into the watershed ecosystem. Equipment for these activities may have also been worked on in these areas.
- 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 now closed gravel mine at the western extent of the watershed may have contributed chemical contamination to the watershed, the RPF is unaware of any instances of chemical contamination from this operation. Illegal trash dumping along Annapolis Road may also contribute chemical contamination, again the RPF is unaware of any quantified examples of chemical contamination. Illegal off highway recreation is known to occur along the Wheatfield, this action may also result in chemical contamination. The landowner has installed gates on its ownership, in part, to reduce potential trespass access point.
- 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 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, 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 for 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 much 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

- **Herbicide Usage:** Herbicide use is proposed under this plan. The project proposes to utilize herbicide for the control of hardwood species utilizing “hack and squirt” applications. When utilized, the risk of chemical contamination is low, since frill herbicides are local injections of the minimal amount of chemical needed to kill the tree (likely Imazapyr). For brush species, a foliar spray of Imazapyr or Glyphosate is used in a diluted solution directly onto the leaves of the undesired individual. If herbicides are to be used during the life of the THP, a PCA will be used to obtain a prescription

for treatment. Herbicide is not used within WLPZs or within ELZs for Class III watercourses. *Please see the additional discussion on herbicide below.*

- **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 as a result 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.

Additional Discussion on Herbicide Use within the Proposed THP

CEQA Analysis of the Landowner's Potential Use of Herbicides Associated with THP Reforestation Activities

Herbicides are used to temporarily control the growth of brush and weeds that compete with conifers for nutrients and sunlight while the conifers are young. The landowners use a subclass of pesticides referred to as "herbicides". This is an important distinction, for the methods by which herbicides control vegetation are related to plants and their unique growth mechanisms. Unlike insecticides, herbicides are generally not toxic to animals, because they do not try to disrupt energy pathways or essential vertebrate life processes. It is important to note that the herbicides used, are virtually non-toxic to humans. Forest application of herbicides may occur, on average, once or twice on any given forest acre during the course of stand development. The use of herbicides mimics and accelerates the natural progression of growth in a timber stand. Sometime before and/or after artificial regeneration, often in terms of years, planted trees may be aided by herbicide application designed to suppress competing vegetation until the young conifers can overtop the competition. This creates the association between harvesting and the ultimate application of an herbicide. Potentially significant, adverse, cumulative impacts are not expected from herbicide application with such long intervals between applications on any acre.

Herbicides that might possibly be used in reforestation have been the subjects of extensive testing and research within a certified regulatory program under CEQA administered by the Department of Pesticide Regulation (DPR). The DPR regulatory program is a functional equivalent of an Environmental Impact Report (EIR) certified by the California Secretary of Resources pursuant to PRC Section 21080.5. The DPR regulatory program is designed to study and test pesticides, and to avoid potential environmental effects by the totality of the registration, label, and commercial application control processes. These processes include the US EPA label (which is a binding legal document) that prescribes limitations on use and guidelines for proper use. California may add additional restrictions beyond the EPA label and does so through the classification of an EPA labeled pesticide as a California "Restricted Use" pesticide. California's DPR process also requires additional site-specific analysis, before any commercial application of pesticides (including herbicides). The analysis takes the form of a written recommendation for herbicide use prepared by a licensed Pest Control Advisor (PCA). Finally, this program requires that the application of any pesticides be supervised by licensed Qualified Applicators. The landowners work with all contractors to ensure applications are conducted in a professional manner that strictly follows all regulatory and licensing requirements. Licensed Qualified Applicators (QAL/QAC) are required to attend 20 hours of continuing education every 2 years to maintain their licenses. Pest Control Advisors are required to attend 40 hours of continuing education every 2 years.

When a pesticide is registered in California it has been determined through detailed testing and analysis (building upon the US EPA testing) that if applied according to the label restrictions there will not be significant adverse impacts upon the environment. The term label is misleading since labels are booklets of 30 to 50 pages in length. The testing and research includes evaluation of conditions under which the herbicides may be applied for various uses including forestry, yard & garden, agricultural field crops, orchards, vineyards, pastures and right-of-ways. The active ingredient of a given herbicide can be registered and labeled for use under one or more of these categories. Herbicide use on the landowner's forested property requires a written recommendation by a licensed Pest Control Advisor and application by a licensed Pest Control Operator (PCO).

Pesticides tested for both EPA label and DPR registration undergo a number of tests and evaluations of risk. These analyses and measures were designed to provide protection for human health and the environment and were developed under assumed use in urban and semi-urban/agricultural environments. Each pesticide has a label that describes possible environmental hazards associated with the use of the product. The label prohibits any use that is dangerous to the environment and describes measures to minimize any adverse environmental effects. All pesticide handlers must, by law, undergo annual training in the safe and effective use of all pesticides they utilize. They are required to read those pesticide labels before use. This training also includes the use of personal protective equipment (PPE), and procedures for emergency medical treatment and spill cleanup. A Pest Control Advisor must certify, in a written recommendation, the alternatives and measures that would substantially lessen any significant adverse impact on the environment, have been considered and if feasible, adopted. Licensed Pest Control Operators must also read and follow any additional restrictions and/or measures listed on the PCA recommendation. Both PCAs and PCOs must maintain copies of all recommendations for one year following the date of the recommendation. Contractors must report the agricultural use (which includes timber production) of any restricted use pesticide to the agricultural commissioner within seven days of completion of the application. The PCO must report any pesticide use by the 10th of the month following an application to the county program coordinator.

The DPR registration process establishes how materials may be applied and used (through EPA label restrictions), and whether the label is adequate for human and environmental protection. If DPR finds the label lacking or finds some other issue of concern, it can change the status of the pesticide to a restricted class and add additional measures through that status. Representatives from several state agencies participate in this review to assist DPR. These agencies include Air Quality, Water Quality, Agriculture, Fish and Wildlife, and the Office of Environmental Health Hazard Assessment. Notices of the "Decision to Register" for each pesticide are posted for at least 30 days for public comment before such pesticide is finally licensed for use in the state. After a pesticide is registered for use in this state, DPR has an ongoing obligation to review new information received about the pesticide that might show new problems beyond those identified in the registration process. Where new problems come to light, DPR is required to reopen and reexamine the registration.

The County's agricultural commissioner oversees portions of the DPR's functional equivalent program and is designated as a state agency for the purposes of certification (3 CCR 6100(a)(7)). Detailed records are kept on any pesticide application. This information is tracked by DPR and is available to the public. The labels usually require that non-protected contact with herbicides be avoided until the applied herbicides are dry. Most permitted or adjacent landowner access is by vehicle on company-controlled roads, and thus human contact with herbicides during the 12-24 hour drying period after application is unlikely. Employees and contractors working on the property spend little or no time in areas that are treated during the drying period. Thus, even in the most heavily traveled or accessible areas on the property, the likelihood of such contact is low enough to be considered insignificant in regard to adverse impacts.

Application of herbicides is not intended to eliminate entire populations of the targeted species. The landowner encourage a healthy understory as a beneficial environment for the varied species of plant and animals that utilize our forests. There are fundamental differences in how herbicides are used in reforestation applications that provide added measures of protection and lower risk assessment for its use. Herbicide applications to specific areas within a forested watershed also do not create a substantial or potentially substantial adverse change in the environment. Impacts to target plants are short lived. Site occupancy/re-occupancy by invading vegetation or vegetation on site is rapid.

The properly timed application(s) of site-appropriate herbicide(s) can reduce the competition for light and nutrients from non-desirable or noxious plants, improve forest productivity, increase biodiversity and species richness, and lengthen the interval between fires through reduction in undesirable fuel loading. Additionally, once activated, the persistence of the herbicides in the soil is very short lived. In most cases, such persistence lasts only a few weeks and a few last up to one season. Herbicides used by the landowner break down in sunlight or by soil microbe activity. Thus in 5 years, and especially after 10 years, there is a very low likelihood that any past herbicide use contributes to on-going effects.

Imazapyr is registered for forestry and right-of-way uses. Imazapyr is a non-selective, systemic plant growth inhibitor. This chemical is biologically active in plants at low concentrations. The plant rapidly takes up Imazapyr, where it inhibits an enzyme essential to plant growth. This enzyme is not present in other organisms. In forestry dissipation studies, reported values for the half-life of Imazapyr range from 14 to 44 days in forest litter, 19 to 34 days in forest soils, and 12 to 40 days on plants. Imazapyr is water soluble and does not

readily bind to organic material in soils. Therefore, it is classified as highly mobile and can travel through soil with water and enter groundwater. It can also move with runoff and enter surface water. Its low application rates minimize potential impacts on surface or groundwater. Based on lab and field studies Imazapyr is practically non-toxic to fish, birds and bees on a short term (acute) basis. Imazapyr does not appear to bioaccumulate in animals and is classified as practically non-toxic to mammals on a short-term basis. We have reviewed DPR and EPA's research and testing for impacts pertaining to Imazapyr. Given the scientific and toxicological information in conjunction with the DPR and EPA testing and label restrictions, Imazapyr use would not pose a significant human health hazard nor produce any significant adverse environmental impacts when used in accordance to label or other regulatory restrictions and when used in the typical manner during reforestation.

Triclopyr controls woody plants and broadleaf weeds in forestland, rangeland and permanent grass pastures. It acts by disrupting plant growth and it is absorbed by green bark, leaves and roots and moves throughout the plant. It accumulates in the meristem region of the plant. Triclopyr is active in the soil and is adsorbed by clay particles and organic matter in the soil. Microorganisms degrade Triclopyr rapidly with the average half-life being 46 days. The potential for leaching depends on the soil type, acidity and rainfall. It should not present a leaching problem under normal conditions since it binds to clay and organic matter in the soil. It may leach from light soils if rainfall is very heavy. Sunlight breaks down Triclopyr rapidly in water in less than 24 hours. It is slightly toxic to practically non-toxic to soil microorganisms and it is low in toxicity to fish. Triclopyr does not accumulate in fish and is slightly toxic to practically non-toxic to invertebrates. Triclopyr is slightly toxic to mammals, but most Triclopyr is excreted, unchanged, in the urine. There are no reported long-term or short-term human health effects. It is not to be applied directly to water according to EPA label restrictions (EPA 352-378). Given the scientific and toxicological information in conjunction with the DPR and EPA testing and label restrictions, Triclopyr use would not pose a significant human health hazard nor produce any significant adverse environmental impacts when used in accordance to label or other regulatory restrictions and when used in the typical manner during reforestation.

Glyphosate, the active ingredient in the over the counter herbicide Roundup®, is used to control grasses, herbaceous plants including deep rooted perennial weeds, brush, and some broadleaf trees and shrubs. It is applied to foliage, is absorbed by leaves, and rapidly moves through the plant. It acts by preventing the plant from producing an essential amino acid. Aminomethylphosphonic acid is the main break-down product. It is generally not active in soil and is not usually absorbed from the soil by plants. It remains unchanged in the soil for varying lengths of time, depending on soil texture and organic- matter content. The half-life of Glyphosate can range from 3 to 130 days. The surfactant in roundup has a soil half-life of less than one week. The main breakdown product of the surfactant is carbon dioxide. Glyphosate dissolves easily in water. The potential for leaching into groundwater is low as it is strongly adsorbed by soil particles. It does not evaporate easily. Glyphosate has no known effect on soil microorganisms. It is practically non-toxic to birds and mammals and bees. It is no more than slightly toxic to fish and practically non-toxic to aquatic invertebrate animals. It does not build up in fish. There are no reported cases of long-term health effects in humans due to Glyphosate. According to label restrictions, Glyphosate is not to be applied directly to water or wetlands. Typically, in forestland uses, Glyphosate is applied to individual weed species that are in competition with growing conifers. We have reviewed DPR and EPA's research and testing for impacts pertaining to Glyphosate. Given the scientific and toxicological information in conjunction with the DPR and EPA testing and label restrictions,

Glyphosate use would not pose a significant human health hazard nor produce any significant adverse environmental impacts when used in accordance to label or other regulatory restrictions and when used in the typical manner during reforestation.

Use of herbicides could occur anywhere from pre-harvest to ten years post-harvest. The same can be said for the other methods of vegetation control as well. Prior to application, the following will be obtained:

1. A written recommendation will be made by a state licensed pest control advisor (PCA).
2. Application will be made by a state licensed Pest Control Operator (PCO) contracted and supervised by the RPF of record or PCA if available.
3. Herbicide(s) used will provide both contact and residual control of grasses and woody plants.
4. Site preparation application is normally made in the fall following the completion of logging and mechanical site preparation but may be utilized during the following spring and summer. Herbicide application for release from competing vegetation is normally in the fall or spring. Pre-harvest herbicide applications are normally made in the spring, summer, or fall, depending on the vegetative state of the target species. Hand applied, directed sprays can be applied during the spring, summer and fall. Weather patterns including temperature, wind speed, and rainfall will affect application decisions and PCA prescriptions.
5. If we use herbicides, those herbicides will only be applied from ground-based equipment or by ground crews using backpack sprayers. The factors affecting choice of application method include; the size and continuity of the target vegetation, cost, worker safety, the kind of herbicides to be applied, and regulatory constraints thereof.
6. If present or found by subsequent survey, special interest plants (including listed plant species) are protected from herbicides, by site-specific application of plant protection measures detailed under the biological resources section of this THP.
7. All required buffers near watercourses and wetlands will be carefully avoided.

In addition, "carefully avoided" means no herbicide will be directly applied in these buffers. Therefore, when we say required buffers, we mean those required by either the FPR or pesticide label, and we utilize whichever gives the most protection. In summary, based on the extensive testing by herbicide manufacturers for the US EPA, review and analysis of those tests by the EPA and DPR, the ongoing review of new information by DPR, and the application by a state licensed Pest Control Operator following the recommendations of a state licensed Pest Control Advisor, no significant cumulative impacts are anticipated to occur.

The potential for herbicides to move off-site via leaching or surface movement is a complex function of several variables including; rate and method of application, timing of the application relative to precipitation, soil characteristics, degree of moisture content, slope, surface and subsurface channeling, amount of vegetative or organic materials left on site, and the existence of vegetative buffers around watercourses. Factors that minimized the risk of off-site movement include; targeted application, large woody debris, organic carbon

resulting from prescribed burning, and substantial vegetative buffers retained in watercourse protection zones. In the unlikely event that forest management activities interface with water, in most cases, such water is normally free flowing, and thus any herbicide that does reach such waters would dilute rather than concentrate. While highly improbable, this possibility is only raised to place into context that even in a worst-case scenario, the potential for significant adverse effects, is extremely remote.

Biological effects of herbicide use can vary depending on the number of applications and the timing of the applications, but generally, field observations indicate that none of these above-mentioned herbicides are 100% effective in eliminating brush, forbs or weeds. Site control is usually reached within the first 4 to 5 years after planting, depending on the spacing and survival rate of planted conifers. All the products have labeled target vegetation species against which the material is effective, but even a total elimination of these labeled species is not typically gained, although there may be stunting of the growth of some of these species for a time.

From what is known about the toxicity of the chemicals as discussed above and the proper application methods; the label restrictions as specified above in regard to use around water and wetlands; the fact that these products are not repeatedly used in forest conditions on the same acreage as they might be used in other agricultural or urban settings; the relatively low toxicity as shown in the laboratory testing conducted thus far; and all the other factors discussed herein, it does not appear there is a substantial risk of a significant adverse environmental or other impacts.

Public concerns in the past have raised the issue of additives to herbicides used by other industrial landowners. We have attempted to identify each additive (commonly called adjuvants) added to a spray solution to enhance or modify its performance. A subset of adjuvants is surfactants, which are added by the applicator and mixed with the herbicide at the time of application. Surfactants are specialized additives, formulated to improve the emulsifying, spreading, sticking and absorbing properties of liquids. There are five surfactant classes: nonionic surfactants, crop oil concentrates, nitrogen-surfactant blends, esterified seed oils and organo-silicone surfactants. The use of a surfactant tends to reduce the amount of herbicide needed per square meter of application area, because they allow the herbicide to spread more evenly, with a thinner coat and they also cause the active ingredient to stick to leaf surfaces. We also add dye to mixes when hand applying herbicides to allow applicators to observe areas of application and avoid repeat spraying. Those additives commonly used by in reforestation efforts include: Hasten, Syl-Tac, Rainier EA, MOC/MSO (both methylated, non-ionic, esterified vegetable oils), crop oil concentrate, and Colorfast Purple or Hi-Light Blue (dye). Surfactants and additives are usually inert, detergents, vegetable oils, crop oils or petroleum distillates. The actual quantity of additives that are dispersed into the environment is very low in reforestation herbicide application. These additives break down quickly in the forest environment and repeat applications are minimal. The PCA is required to include any adjuvants used in each prescription and the PCO is required to report to the county agriculture commissioner herbicide application including adjuvants. Since the potential use of herbicides is speculative and removed from the THP in time, both the herbicides used as well as the adjuvants may be different in the future from those commonly used today.

Alternatives Considered

The landowner considers alternatives to the use of herbicides before any such use. In our evaluation of potential use of herbicides, a licensed agricultural Pest Control Adviser is

utilized at the actual time of that potential use to determine if and when to use an herbicide. The advisor also must consider, if feasible, any reasonable, effective and practical protection measure, or use any feasible alternative which would substantially lessen any significant adverse impact on the environment. These typical protection measures include specific restrictions on weather conditions and wind speed that prohibit using herbicides in conditions which might increase risks. They also include specific protections as to mixing, loading herbicides and washing equipment to prevent any accidental releases near watercourses. Each licensed agricultural Pest Control Operator shall have available a copy of a written recommendation covering each agricultural use application of an herbicide and shall operate in accordance with the product label or any pesticide permit issued by the county agriculture commissioner.

GRT, to the extent feasible, may utilize prescribed fire and mechanical methods to prepare a site for planting. Prescribed fire removes the physical barriers created by dead slash and living vegetation but has no effect on controlling re-sprouting of burned plants. The extent to which mechanical methods are effective will be one of the determining factors in whether, how, and when herbicides are used. Mechanical methods include ripping or sub-soiling, brush raking and piling to prepare a planting site.

Manually clearing brush does not have the same effect as herbicide application. Manual treatments temporarily control growth, but do not kill the plant. Pulling the plant out by the roots kills the plant altogether. Cutting most plants temporarily reduces above ground stems, but rapid re-sprouting usually does not result in effective conifer release. Therefore, the effects of manual brush control are less predictable and not as consistent as herbicide application. Manual clearing is not feasible because there is a lack of a large, local work force that would be willing to do very strenuous and logistically challenging work. The rate of injuries is also very high, for the work is tedious, difficult, and it often must be performed during adverse weather conditions. Once mechanical methods have been employed or have become impractical because young trees have been planted or have seeded in, there is no feasible alternative to herbicide application that might achieve a similar result.

It is also important to note that harvesting under the California Forest Practice Act (FPA) requires successful restocking of cleared sites and the maintenance of relative site occupancy by group A species in order to continue to meet the combined objectives of the landowner and the California legislature. These objectives are located in the intent section of the FPA, and Section 4551 as shown below (Emphasis added):

4513. Intent of Legislature. It is the intent of the Legislature to create and maintain an effective and comprehensive system of regulation and use of all timberlands so as to assure that:

- (a) Where feasible, the productivity of timberlands is restored, enhanced, and maintained.
- (b) The goal of maximum sustained production of high-quality timber products is achieved while giving consideration to values relating to recreation, watershed, wildlife, range and forage, fisheries, regional economic vitality, employment, and aesthetic enjoyment.

4551. Adoption of district forest practice rules and regulations. The board shall adopt district forest practice rules and regulations for each district in accordance with the policies set forth in Article 1 (commencing with Section 4511) of this chapter and pursuant to Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code to assure the continuous growing and harvesting of commercial forest tree species and to protect the soil, air, fish and wildlife, and water resources, including, but not limited to, streams lakes and estuaries.

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 in future projects. The THP does propose activities involving chemicals, and they are designed to reduce and avoid chemical contamination in compliance with regulations. The project area mostly drains to the Pacific Ocean and is over 100 feet upslope of major watercourses such as the Gulala River. 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.

e. Peak Flow Effects

The assessment area has a maritime climate with long duration, low intensity storms commonly occurring from October to April. Most storms are small with rates exceeding one centimeter per day with an average of about thirty days per year. Larger storms occasionally occur with rates exceeding five centimeters per day about two to four days per year. Increases in peak flow arising from land management projects generally are associated with rapid runoff resulting from decreased evapotranspiration due to vegetation removal. Furthermore, peak flow has been shown to be directly associated with storm events rather than harvest levels. Studies on the Casper Creek Watershed in Jackson State Demonstration Forest failed to correlate higher peak flows with harvest levels. However, the duration of peak flows was correlated with harvest, as the percentage harvest of a watershed increased the timing and duration of peak flows also increased. Peak flow can also increase further if not only the vegetation is removed, but if the soil and permeable ground is capped and developed.

Within the WAA, approximately 17% of the assessment area has experienced timber operations or has an approved document within the last ten years, which is a minimal impact on vegetation removal overall and the duration of peak flows. None of the harvests have involved evenaged silvicultures. 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:

- **Storm Events** – Since the RPF has begun working on this Plan in 2022, 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 had an effect on peak flows throughout the WAA. Reaches of the Gualala River floods most years, and during these recent storm events flooding and back flooding of areas was pervasive.
- **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 is 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. Only 17% 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 area converted to grassland, orchards, and vineyards may 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 Annapolis and The Sea Ranch has undoubtedly decreased canopy, decreased grassland and vegetation and increased the amount of runoff as the amount of impermeable ground increased. The Annapolis Watershed is sparsely populated. 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, Group Selection, Transition, and No-Harvest 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 (please see discussion of JDSF study above). 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 to reduce peak flows as a result of operations with a combination of FPRs, Best Management Practices and the following proposed management practices:

- Tractor operations limited to existing 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.
- Cable operations: utilized on steep slopes with adequate deflection. Cable corridor widths will be minimum necessary to safely and effectively extract timber within the WLPZ.
- 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 for most of the project area. Slash can also be used to cover skid trails or landings that may need extra coverage.
- Large areas of exposed ground will not occur due to low amounts of repetitive skid trail use and no prescribed burning. Waterbarring after operations will improve drainage by refreshing the drainage facilities.
- Existing, well established mainline roads used for repetitive hauling are concentrated on the ridges and upper to midslopes away from watercourses when feasible.
- Minimal use of Class I WLPZ roads with soil stabilization requirements as stated in Section II, Item 18.
- 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 intensive broadcast burning proposed, there is not expected to be a significant impact from the proposed project or other timber harvest related projects. There may be, however, a continuing increase in total peak flow volumes from the development of land through paving and capping of permeable soils, and this is expected to increase in the WAA as population increases, and more people from the Bay Area retire or work remotely, buying and building homes in the area. 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 cements them into the channel bottom. Embeddedness can prevent the spawning salmon from building their beds. The intrusion of fine sediment into gravel reduces intra-gravel flow of water by reducing 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 NCWAP reports that embeddedness ranges from moderately unsuitable to moderately suitable on the Wheatfield Fork. Note – (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, Group Selection, Transition, and No Harvest silvicultures 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. Steep slopes with adequate deflection from existing roads will be logged utilizing cable systems which will result in lower soil disturbances when logging on steep slopes above 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 several projects after the adoption of the FPRs, and many of these past effects have not been added to in decades. 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 flatwaters 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. Evidence suggests pool filling has occurred on the Gualala River. The Wheatfield Fork of the Gualala River has a mobile gravel/cobble bedload. This bedload tends to move in pulses associated with high flow events. It appears pools fill and reform as the bedload moves downstream, making the location and depth of pools highly dynamic. The thalweg profile of the Wheatfield Fork is generally improving with the general trend in thalweg depth increasing since 2008. The THP as proposed includes the following protections: No harvest within the inner core zones (30 ft for Class I/II-L & 15ft for Class II), increased retention requirements with WLPZs, and Class III protections. The intent of these protections is, in part, to increase large woody debris recruitment in watercourses. LWD presence is often associated with the creation, maintenance, and enhancement of pools.

Pools Filled- Baseline Conditions

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

- **Sedimentation** – Most of the Class II watercourses within the Plan area have channels with a developed pool structure and the RPF has observed minimal amounts of sedimentation filling these pools. The Gualala River is 303d listed for sediment. An action plan is presently being developed for the greater watershed. Some of the larger watercourses, such as the Wheatfield Fork, 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 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.

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, Group Selection, Transition, and No Harvest silviculture 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– This project proposes the utilization of both cable and tractor yarding. Cable yarding will be utilized on steeper slopes when feasible. Use of existing skid trails that are stable and in good condition within the WLPZ are proposed and in lieu practices are explained in Sec III. Operations measures include slash packing and enhanced waterbar spacing designed to protect resources through stabilizing soils after operations.
- 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

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 which causes aggradation, the burial of large woody debris and other structural elements, a loss of the stream's ability to effectively sort gravel, and a potential reduction in the dominant particle sizes.

Aggrading- Baseline Conditions

The THP area contains the following baseline conditions regarding stream aggradation: 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 the Wheatfield Fork at Monitoring Site 226 ranges from approx. 20(2003) to 29(2008).

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 – Group Selection, Selection, Transition, and No Harvest silviculture methods regulate erosion upslope of watercourses through dispersed tree retention, maintain streamside vegetation through WLPZ protections, and prevent sedimentation and pool filling through WLPZ protections.
- 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) – This project proposes the utilization of both cable and tractor yarding. Cable yarding will be utilized on steeper slopes when feasible. Use of existing skid trails that are stable and in good condition within the WLPZ are proposed and in lieu practices are explained in Sec III. 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.
- 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: 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 Baseline Conditions

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

- **Stream Aggradation** – As stated above, the THP area contains some gentle gradient 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 - 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 regards 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 - 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 - 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** – Group Selection, Selection, Transition and No Harvest silviculture methods regulate erosion upslope of watercourses through dispersed tree retention, maintain streamside vegetation through WLPZ protections, and minimize sedimentation and pool filling through WLPZ protections.
- **Road Improvements** – Where appropriate, 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) – Many WLPZ are located within Cable Units where no ground based operations are necessary. Where necessary the plan proposes the use of existing WLPZ skid trails that are stable and in good condition and appropriate waterbarring and slash packing of these skid trails reduces the risk of erosion and sediment delivery to downstream watercourses. There are soil stabilization requirements specific to the WLPZ that are included in the THP. 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– 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 are evident, particularly where there is an undersized, shotgunned or rusted through culvert. 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 after protection measures, there are no significant cumulative impacts.

e. Bank Mass Wasting:

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 Wheatfield 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 south west over the last 30 Mya. The main fault is located along Miller Ridge west of the project. 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 Gualala River appear generally stable along the Wheatfield Fork within the areas assessed for this project. Areas of Inner Gorge geomorphology have been identified by the professional geologists within the project. Operational measures have been developed to avoid impacting these features. 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.

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 mix flat ridgetop seasonal and permanent road and midslope roads. Some appurtenant roads are located within Class I WLPZ. Many of these roads were likely built during historic logging operations on top of existing prehistoric trails and paths. Segments of these roads are lacking adequate drainage features, Sec II of the THP proposes measures to rectify these issues.
- **Yarding** – The majority of 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. Waterbarring of existing skid trails is not consistent with modern day FPRs to a minimal degree, which has resulted in some unrestricted runoff towards watercourses and small scale bank mass wasting events, but nothing significant within the THP area or known to be significant 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** – The RPF and CEG has identified several unstable features within the THP area. Many of these 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. Published geologic maps show confirmed and suspected landslides along much of the length of the Wheatfield Fork. 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 county 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 as a result 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 – – Group Selection, Selection, Transition, and No Harvest silviculture methods regulate erosion upslope of watercourses through dispersed tree retention, maintain streamside vegetation through WLPZ protections, and prevent sedimentation and pool filling through WLPZ protections.
- Unstable areas- The THP shall avoid most of the smaller bank mass wasting events located within the WLPZs and watercourses as “No-Harvest” Inner Core Zone areas.
- Road Improvements – Watercourse crossing upgrades and drainage facility maintenance decreases sedimentation and large-scale bank mass wasting events. This THP includes multiple culvert replacements for metal culverts near the end of their lifetime.
- Yarding Methods (14 CCR 923; 916) – This project proposes the utilization of both cable and tractor yarding. Cable yarding will be utilized on steeper slopes when feasible. Tractor operations within the WLPZ is proposed and in lieu practices are explained in Sec III. 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 is 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. Downcutting Baseline Conditions

Incised Watercourse channels with relatively clean, uncluttered beds cut below the level of former streamside vegetation and with eroded, often undercut or vertical, banks. This process occurs naturally as streams erode banks. Severe bank cutting is often associated with channels that are down cutting, which can lead to over-steepened banks. As described above, aggradation may not be occurring within the Gualala River.

The THP area contains the following baseline conditions regarding downcutting:

- Stream Aggradation – Refer to above discussion on aggregation.

Bank Cutting- Refer to above discussion on Bank Cutting

Downcutting - Past Activities

The assessment area (WAA) has a long history of human utilization. The main anthropogenic activities that could have contributed to past adverse impacts of the Watershed Assessment Area in regard to downcutting includes wildland burning, agriculture/grazing, residential/industrial development, road building, and timber harvesting. As discussed above, watercourses can naturally downcut banks through erosional processes. Timber harvesting and land clearing prior to the FPRs would often remove streamside vegetation, which can increase downcutting by removing vegetation which provides bank stability.

Downcutting - Reasonably Foreseeable Probable Future Projects

The main activities that have been conducted within the Watershed Assessment Area are road building, timber harvesting, and residential/industrial development. To a lesser extent wildland burning, and agriculture occur in the assessment area. Future timber harvesting within the WAA, will be required to provide protection measures to streamside vegetation and will have set backs for heavy equipment which will prohibit the use of equipment along stream banks.

Downcutting - Proposed THP

Landsliding within watercourses, and all mass wasting events within the WAA, may continue to occur as a result of natural erosional processes, and may continue to occur as a result of past management. Localized area of downcutting can be observed on many watercourses within the project area. Some areas of downcutting are observed where legacy skid trails cross watercourses. Other areas of downcutting have been observed that may be the result of natural processes.

The following THP activities are expected to maintain the existing watercourse/watershed condition described in the baseline conditions above:

- Silviculture – Group Selection, Selection, Transition and No Harvest silviculture methods regulate erosion upslope of watercourses through dispersed tree retention, maintain streamside vegetation through WLPZ protections, and minimize sedimentation and pool filling through WLPZ protections.

- Road Improvements – Watercourse crossing upgrades and drainage facility maintenance decreases sedimentation and large-scale bank mass wasting events. The landowner's efforts to improve roads is described above.

- Yarding Methods (14 CCR 923; 916;) – Many WLPZ are located within Cable Units where no ground based operations are necessary. Where necessary the plan proposes the use of existing WLPZ skid trails that are stable and in good condition and appropriate waterbarring and slash

packing of these skid trails reduces the risk of erosion and sediment delivery to downstream watercourses. There are soil stabilization requirements specific to the WLPZ that are included in the THP.

- Soil Stabilization Measures – soil stabilization reduces rates of erosion and sediment delivery to downstream watercourses. These measures are explained in Sec II.
- Winter Period Operating Plan – prevents the use of heavy equipment on saturated soils which prevents erosion and sediment delivery to downstream watercourses. This plan may be found in Sec II.
- 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. An explanation of these proposed practices may be found in Sec III. Heavy equipment will not enter the inner core area of watercourses, except at existing crossings.

Downcutting– Conclusion

There may be an effect from past activities on the WAA in terms of downcutting as discussed above, in which bank mass wasting likely played a role. Further sedimentation from bank mass wasting as the result of post-FPA timber harvesting is not expected to be significant throughout the WAA in the future, and within the project area. 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 after adherence to protection measures, there are no significant cumulative impacts.

g. Scouring:

Scouring is described in the Forest Practice Rules as “Stream channels that have been stripped of gravel and finer bed materials by large flow events or debris torrents. Streamside vegetation has often been swept away, and the channel has a raw, eroded appearance.” Large flow events are described below under the discussion of flooding.

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 had an effect on scouring. No areas of noticeable scouring or downcutting were identified during THP layout as the result of these storms. Channel avulsion has occurred in the past along the Wheatfield as evidenced by abandoned channels in areas adjacent to the current stream channel. These side channels indicated past disturbance but appear to have been stable for over twenty years based on observations by GRT foresters.

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 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.

- 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 area converted to grasslands may have increase 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 and ranching, development. 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 (Selection, Group Selection, Transition, and No Harvest) shall reduce 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 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 as a result 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 on large areas.
 - Slash remaining from operations and or 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.
 - Existing, well established mainline roads used for repetitive hauling are concentrated on the ridges and midslope away from watercourses when feasible.
 - Minimal use of WLPZ roads with mulching requirements as stated in Section II, Item 18.
 - Utilization of cable logging, when feasible, on steeper ground.
 - 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. 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 intensive broadcast

burning proposed, 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.

- i. 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

A botanical assessment of the project area has been completed and may be found in Sec V of this THP.

Canopy Cover – Class I, Class II-Large, Class II-Standard, & Class III WLPZ in the project area largely have dense canopies that are often near 100% canopy closure but can be as low as 50% in some areas. Canopy Cover does not extend across the Wheatfield Fork of the Gualala River, which can be over 120' wide in the project area. There are no areas that are severely lacking in canopy or vegetation within the project. Canopy cover is comprised mainly of mature redwood, Douglas-fir, and tanoak in the overstory with an abundance of huckleberry and other brush in some portions of the understory. Some areas along the Wheatfield Fork have very little brush component, this is likely a function of dense canopies and interment flooding. While historic logging activities may have removed canopy cover adjacent to watercourses, current conditions reveal adequate regeneration, high stocking, and recovered shade canopy. WLPZ roads are mapped on the apparent roads map included at the end of Sec II. 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. An analysis of aerial photos by NCWAP notes that there has generally been a significant increase in stream side canopy in the last thirty years in the Gualala River Watershed in general. NCWAP notes that "overall, watershed-wide riparian shade canopy has improved since the 1960s but still falls short of the 1942 levels ... however riparian zones in the western portion have largely recovered from the first round of logging." Class II watercourses in this THP generally have dense bank vegetation cover.

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 did not take into account 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 – Group Selection, Selection, Transition, and No Harvest silviculture methods regulate erosion upslope of watercourses through dispersed retention of trees, maintain streamside vegetation, and prevent sedimentation and pool filling.
- • Road Improvements – Watercourse crossing upgrades and drainage facility maintenance decreases the amount 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. This plan proposes to utilize cable logging system on steep slopes (where feasible). The use of cable systems will avoid the need to reopen many skid trails and with proper deflection can result in lower soil disturbances than tractor methods previously utilized.
- • Soil Stabilization Measures – soil stabilization reduces rates of erosion and sediment delivery to downstream watercourses, and aids in the effect of streamside vegetation and cover. Soil stabilization methods are discussed in Sec II.
- En 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 any minor decreases in streamside vegetation will be shortly 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 much of the streamside vegetation at once. 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 is 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.

j. Recent Floods:

The Wheatfield Fork of the Gualala River in the Plan area was observed to be flooding its bank during the rain of January 2023, evidence of past flooding in alluvial flats in the Class I inner core were also observed indicating flooding is a common occurrence on this stretch of the Gualala River. The lower reaches of the Gualala River regularly flood its banks. Alluvial flats are assessed for Flood Prone Areas (FPA) as part of the layout and review process. If an FPA is identified than additional protection measures are applied in compliance with the Forest Practice Rules. Much of the project area is located on steep midslope and ridgetops where flooding is unlikely to occur.

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 act 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 of the WAA. There are no floodplains or operations within floodplains within the proposed THP.

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 temporarily 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 2.4 miles from the Pacific Ocean. The assessment area for fog drip includes the planning watersheds associated with the THP (Annapolis).

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 very 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 as a result of this operation. Given the proposed silvicultural prescriptions, 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 are. 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, and less intensive and therefore did not have a significant impact. Additionally, the last entry was prior to the FPRs, and 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 resource subject A. 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 some 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 is no significant cumulative impacts to the watershed resources. All of the watershed effects and watercourse conditions are expected to be maintained, or positively impacted through the implementation of the project.

Identification of Information Sources: A. Watershed Resources

[Brown, L.R., P.B. Moyle, and R.M. Yoshiyama. 1994.](#) Historical Decline and Current Status of Coho Salmon in California. North American Journal of Fisheries Management. 14(2):237-261.

Calfire GIS Data 2023

California Regional Water Quality Control Board (CRWQCB), Technical Support Document for the Total Maximum Daily Load for Sediment and Temperature for the Gualala River Watershed. 2001. Adopted by the Board in 2004.

California Salmonid Stream Habitat Restoration Manual; State of California Resources Agency Department of Fish and Game; Second Edition; October 1994.

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

Porter-Cologne Water Quality Control Act; State Water Resources Control Board, June 1992.

State Water Resources Control Board Resolution No. 98-055. "APPROVAL OF THE 1998 CALIFORNIA SECTION 303(D) LIST AND TOTAL MAXIMUM DAILY LOAD PRIORITY SCHEDULE"

Water Quality Control Plan for the North Coast Region; North Coast Regional Water Quality Control Board; September 21, 1989.

Thalweg profile analysis, Gualala River Watershed Assessment & Cooperative Monitoring Program (O'Connor and Rosser 2006)

Gualala River Watershed Assessment Report. North Coast Watershed Assessment Program, Klimt, Robert R.C. LeDoux-Bloom, J. Clements, M. Fuller, D. Morse, and M. Scruggs (multidisciplinary team leads). 2002. Appendices. California Resources Agency, and California Environmental Protection Agency, Sacramento, California

GRWC Monitoring Plan Report 2000-2005, Kathleen Morgan , 2006

Weaver, W.E., and D.K. Hagans. 2015. Handbook for Forest and Ranch Roads - A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining and Closing Wildland Roads. Prepared for the Mendocino County Resource Conservation District, Ukiah, California. 420 pp.

CDFW, 2003. South Fork Gualala River Stream Inventory Report

Dawson, T. E. 1996. The use of fog precipitation by plants in coastal redwood forests. Pages 90-93 in J. LeBlanc, editor. Proceedings of the conference on coast redwood forest ecology and management. University of California, Cooperative Extension, Forestry.

Keppeler, E. T. 1998. The summer flow and water yield response to timber harvest. In: Proceedings of the Conference on Coastal Watersheds: The Caspar Creek Story. USDA, United States Forest Service Pacific Southwest Research Station Gen. Tech. Rep. PSW-GTR-168. pp 35-44.

Ziemer, R. R. 1998. Flooding and stormflows. Pages 15-24 in R. R. Ziemer, editor. Proceedings of the conference on coastal watersheds: the Caspar Creek story. General Technical Report PSW-GTR-168. USDA Forest Service, Pacific Southwest Research Station, Albany, California.

Richardson, P.W., Seehafer, J. E., Keppeler, E.T., Sutherland, D. G., Wagenbrenner, J. W., Bladon, K.D., Dymond, S.F., Cole, R.P. 2021. Fifty-eight years and counting of watershed science at the Caspar Creek Experimental Watersheds in northern California. California Department of Forestry and Fire Protection; National Science Foundation, Grant/Award Number: NSF-EAR-1807165; USDA Forest Service

Fongers, D. and Fulcher, J. 2002. Hydrologic Impacts Due to Development: The Need for Adequate Runoff Detention and Stream Protection. Water Management Division Michigan Department of Environmental Quality. Revised May 2002

A Study Evaluating the Effectiveness of Riparian Buffers in Minimizing Impacts of Clearcut Timber Harvest Operations on Shade-Producing Canopy Cover, Microclimate, and Water Temperature along a Headwater Stream in Northern California, Cajun Elaine James 2003

Regional Assessment of Stream Temperatures Across Northern California and their Relationship to Various Landscape-Level and Site Specific Attributes, Lewis et al. 2000, Forest Science Project, HSUF Arcata, CA

Lewis, J., S. Mori, E. Keppeler, and R. Ziemer. 2001. Impacts of logging on storm peak flows, flow volumes and suspended sediment loads in Caspar Creek, California. Pages 85-125 in: M. S. Wigmosta and Steven J. Burges editors. Land Use and Watersheds: Human Influence on Hydrology and Geomorphology in Urban and Forest Areas. Water Science and Application Volume 2, American Geophysical Union, Washington, D.C.

James, C. 2003. Southern exposure research project: A study evaluating the effectiveness of riparian buffers in minimizing impacts of clearcut timber harvest operations on shade -producing

canopy cover, microclimate, and water temperature along a headwater stream in northern California. University of California, Berkely.

Dietrich, W. E., Kirchner, J. W., Ikeda, H., & Iseya, F. (1989). Sediment supply and the development of the coarse surface layer in gravel-bedded rivers. *Nature*, 340(6230), 215-217.

Knopp, C. (1993). Testing indices of cold water fish habitat. Unpublished Final Report submitted to the North Coast Regional Water Quality Control Board and the California Department of Forestry under Interagency Agreement No. 8CA16983. Sacramento, CA. 56 p.

Dennis Halligan. GRI Westside THP Fisheries Report. 2000. NRM 1434 Third St. Eureka, CA 95501

Gualala River Watershed Literature Search And Assimilation By Patrick Higgins 791 Eighth Street, Suite N, Arcata, CA 95521 707-822-9428

Gualala Redwoods Inc. Stream Reports For The Years 1995 To 2013

Geo Hazard Maps Created By Tim Best, C.E.G.

USGS 7.5 min map Stewarts Point and McGuire Ridge

Geologic maps and reports, <https://www.conservation.ca.gov/cgs>

Lidar imagery of the Gualala River

Flood Prone Area Considerations in the Coast Redwood Zone. California Department of Forestry and Fire Protection. 2005.

Morse, D. (2002). Land use in the Gualala River watershed. Gualala River Health. <https://grwc.info/Land.html>

Petreshen, J. (2021). Fog Presence and Ecosystem Responses in a Managed Coast Redwood Forest (thesis).

Additional sources of information may be found in Pepper THP, Sec V., Watershed Assessment. [Personal Communications](#)

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

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 inception 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 and CEG have identified several unstable features within 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 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 take into account 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. More recent past harvests do not appear to have resulted in much if any organic matter loss.

- Development: No residential or industrial development is known to have occurred within the assessment area.

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 from the harvests are to be reduced to lower the risk of wildfire, but enough is likely to be retained to not 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, Group Selection, Transition, and No Harvest. 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**:
 - **Tractor Yarding**- 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 also generated at the landings
 - **Cable yarding**-cable yarding will be used in areas with appropriate deflection. These units will be logged from the existing road network. The use of cable systems will avoid the use of ground based operations in many steep areas.
- **Road Construction**: no road construction is proposed on this project.

-in-lieu Practices: The plan proposes to utilize several segments of existing WLPZ skid trails which measure approx. 750', these trails will be slash packed and will likely see an increase in organic matter following operations. The utilization of skid trails on slopes over 65% is limited to existing skid trails, it is likely that slash generated by the harvest will immediately offset any organic matter lost during the reopening of these skid trails. The areas that this practice is proposed were assessed for cable yarding potential but it was determined that it was not feasible.

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 as a result of road and landing construction, skid trail construction, displacement into piles or windrows or mass wasting, and burning. Road and landing construction constitutes a small percentage of the THP area and is, 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, cause minimal impact to 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 and CEG has identified several unstable features within 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 development, road building and timber harvesting.

- Development: none known to occur.
- 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 take into account 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 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.
- **Road Construction:** No road construction is proposed.
 - **In-lieu Practices:** Limitations to the WLPZ and access to areas where surface soil could be lost reduces the impact of surface soil loss. There are only a few short 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. The plan also proposes the limited use of skid trails on slopes over 65%, these operations are limited to pre-flagged stable skid trails. After operations they will be waterbarred to the Extreme EHR standard.

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. 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 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 (tanoak and madrone), needle cast (redwood and Douglas-fir), branches, 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, needlecast, branches, bark, and logs. Forb species (bracken fern, sword fern, and redwood sorrel) and berries from brush species (huckleberry, salal, blackberry, and manzanita) 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 sedimentary rock, sandstone, and alluvium. The amount of course fragments in the soil is moderate to high. An abundance of coarse fragments in the soil makes it less susceptible to compaction.
- **Soil Texture** – The erosion factor (Kw) for the top layers of the soil range from .02-.24. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. The soil is primarily composed of loams .
- **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.

- Development: no development is known to occur within the project area.
- Road/Skid Trail Building: Road building within the project area removed topsoil and compacted soil in its prism.
- Timber Harvesting: Past timber harvesting in general did not take into account 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 amount of new areas being compacted in the project area since those were already converted in the past. One new proposed skid trail represents a very small area of increased soil compaction. Additional skid trail

construction is expected to be minimal.. 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. On steep slopes cable yarding is proposed, which will avoid the need to reuse legacy skid trails.

- Road Construction: no road construction is proposed.
- In-lieu Practices: Limitations to the WLPZ and access to areas where surface soil could be lost reduces the impact of surface soil loss. There are only a few short 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 applied to the skid trails after operations. The one new WLPZ skid trail is small and requires minimal excavation, therefore the impact of this trail on overall soil compaction is negligible. The utilization of skid trails on slopes over 65% on ground is limited to existing stable skid trails and will therefore not have any impact on soil compaction.

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 road, landing, skid trail construction, and/or mass wasting events. The roads to be construction include maximum width specifications which will reduce the amount of road construction and ensure that no unnecessary land be taken out of production. 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 crawler 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:

- **Road Building**– there is an existing road network within the project area designed to facilitate timber harvesting. There are also landings associated with the roads, the landings are typically ¼ acre in size.
- **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.

- **Road Building:** In order to facilitate logging, roads have been constructed in the assessment area. Most of these lands are zoned TPZ, and the harvest or related uses is a legal requirement for this zoning type. Timber Harvesting is also compatible with the Industrial zoned portions of the project area. Roads represent a substantial investment on the part of the landowner and past landowner in order to facilitate logging.
- **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.
- **Development**-The project is located in a remote portion of Sonoma County. No development is known to have occurred within the project area.

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 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 but should require even less growing space loss.

Growing Space Loss - Proposed THP

- **Road Construction:** No road construction is proposed.
- **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 there are an excess amount of trails, and not everyone is needed and many old ones are falling apart near watercourse and in WLPZs that are excluded from heavy equipment. These trails are regrowing vegetation, therefore there will be a net positive for growing space in this regard.
- **En Lieu Practices:** The plan proposes to reuse several segments of legacy skid trails that are located on slopes over 65% or within the WLPZ, these trails already exist therefore no loss in growing space will occur.

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 BMP's 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

Weaver, Jesse D., Registered Professional Forester and Manager, Redwood Empire Sawmills, Cloverdale, CA.

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

C. Biological Resources: Assessment

The Biological Assessment area (BAA) comprises all areas within 0.7 miles of the THP boundaries. The 3629-acre BAA is portrayed on the BAA Maps at the end of this Assessment. The habitat within the BAA is generally densely forested with a large grassy open on Miller Ridge, a portion of vineyard, some residential development. There are no known large rock outcrops, there are small ponds but no substantial bodies of water. The assessment area is generally comprised of steep mountainous terrain. This assessment area as described is large enough to account for any effects that may be caused by this THP.

The Wheatfield Fork of the Gualala River forms the boundary for much of the plan and all watercourses within the THP drain into this river. This project is within 0.7 miles of Northern Spotted Owl Activity Centers.

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 (NDDDB) 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, nine adjacent USGS quadrangles were assessed for plant and animal occurrences. In the case of this THP, only 8 Quad Maps are considered as several quads are primarily ocean and do not appear on CNDDDB. The eight quadrangles search was comprised of Gualala, McGuire Ridge, Gube Mountain, Big Foot Mountain, Stewarts Point, Annapolis, Tombs Creek, Plantation, & Fort Ross.

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. Protections are afforded to three osprey nests (Species of Special Concern).

(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 below the required acreages. 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 and pines 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 three Activity Center within 0.07 miles of the THP: SON0009, Son0043, and Son0110. This AC is over 0.20 miles from the THP Boundary.

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) as a result of timber operations. This determination will be based on the fact that the plan is in conformance with 14CCR 919.9 (e) and current guidelines developed by USF&WS specifically to avoid take of NSO. 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

PART OF PLAN

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 (e). 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 at this time 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 2.85 miles south of the plan with additional observations occurring 2.92 and 2.23 miles from the plan area. The nearest known occupied habitat is 2.97 miles south of the THP area.

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. Coopers 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. During THP Layout, no nest structures nor individual osprey were observed. If a nest is determined to be active the nests will receive protections outlined under the FPR 919.3b(5) for this species. The landowner is aware of several known osprey nests clustered around the mouth of the Gualala River. Should a nest be identified within the plan Sec II of the plan includes protection measures.

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. No bald eagle occurrences occur within the 9-quad assessment.

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 woody 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 occurrence 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 commonly 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 exists 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 a migratory aquatic bird. 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 harvest 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 forest 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. This project is outside of the known range of this species.

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 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 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 continue a policy of leaving at least three wildlife trees per acre across the property. 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 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. marking of two wildlife trees per acre which are those trees that have the characteristics that fishers prefer such as forks, cavities, busted tops, nests, mistletoe brooms or decadent trees with large flat branches; 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 of the best elements needed by fishers are provided for. These elements are contiguous with class II large and standard protection zones which also provide habitat and with 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 be or 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 feed on needles of Douglas-fir and grand fir. 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. According to the CCNDDB a number of red tree vole nests have been observed within and surrounding the biological assessment area. No RTV nests have been observed in the plan area. Timber will be individually marked; thus, each tree can 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 fairly 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 also 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 of 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 protections 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 at 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 roosts 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 feed 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 in 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 goosepens.
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 two observation reported 7 within the BAA, one along Fish Rock Rd and another in the vicinity of Fort Ross. 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 not exist within the THP area as the area is entirely forested. 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, *Platichthys 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, and logs and deep water. Coho typically initiate 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 migrate 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 enter 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 Russian 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. No operations within a Class I WLPZ are proposed.

Chinook (*Oncorhynchus tshawytscha*) (Status: Threatened under the Endangered Species Act). The proposed timber redds near the head of riffles in gravel 6 inches or less in diameter. Ideal temperatures 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 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.

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	<p>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).</p>	<p>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.</p>
1960s	<p>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.</p>	<p>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>

<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>
--------------	--	--

<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>
--------------	--	---

<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>
--------------	---	---

<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>
------------------	---	---

2003 to 2019	The last observed coho were in Dry Creek in 2004.	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.
--------------	---	---

Amphibians

Southern torrent salamander (*Rhyacotriton variegatus*): (Status: Federal Special Concern, 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 the majority of 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:

Two occurrences of CRLF are documented near Gualala Point roughly 7.8 miles northwest of the project.

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 act 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. Class I habitat along the Wheatfield Fork along with some Class II-L habitat provides the best habitat for this species in the plan area. 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 for 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* still 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 Wheatfield Fork of the Gualala River roughly .5 miles upstream from the THP.

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 CNDDDB 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 on 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, 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 watercourses as well as for seeps and springs should avoid any negative impacts to California giant salamander populations. The nearest known occurrence is near Clipper Mill Bridge 3.5 miles upstream 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.

Watercourse Protection 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 . Multiple occurrences are documented along the Wheatfield Fork of the Gualala River. 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*) is listed as a California and Federal Species of Special Concern. The species is also proposed threatened under the FESA. 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 turtle was observed during field preparation activities. Habitat potential is high to moderate within the plan area. The highest potential habitat is the Plans boundary along with the

Wheatfield Fork with aquatic and basking needs being fulfilled. Upland nesting habitat, and upland overwinter/aestivation habitat is marginal at best as the plan area is generally closed canopy. 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 behrensii*): (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., ide 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 are 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 does not identify any occurrences of the western bumble bee within the assessment area.

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. There are a several occurrences documented in the Sea Ranch Area, which is roughly 2.3 miles west of the project . 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 Annapolis and Stewarts Point USGS quadrangle. The 8 quad maps review were Stewarts Point, Annapolis, McGuire Ridge, Gube Mountain, Big Foot Mountain, Tombs Creek, Fort Ross, Plantation, and Gualala . A full description of the scoping process may be found in Sec V of the THP. A total of 71 special status plant species are known to exist within the scoping area. These 71 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. No special status plants were observed during the botanical survey which is included in Sec V of the plan. Based on the Keeler-Wolf classification system, the primary natural communities present within the THP most closely resemble Douglas fir (*Pseudotsuga menziesii*) Forest and Woodland Alliance(G4, S4), Douglas fir - tanoak - madrone (*Pseudotsuga menziesii* - *Notholithocarpus densiflorus* - *Arbutus menziesii*) Forest and Woodland Alliance (G4, S4), Tanoak (*Notholithocarpus densiflorus*) Forest Alliance (S3.2, G4), and the Redwood (*Sequoia sempervirens*) Forest and Woodland Alliance (G3, S3.2)..

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 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 protections 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 floristic survey. This survey may be found in Sec V of the THP. Potential impacts of rare plants is considered below.

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 Pepper THP is located below:

– Special Status Plant Species and Communities Scoping List

June 2023 Stewarts Point, Annapolis, McGuire Ridge, Gube Mountain, Big Foot Mountain, Tombs Creek, Fort Ross, Plantation, and Gualala 7.5' Quadrangle Maps.

<i>Scientific Name</i> Common Name	Fed List	State List	Global Rank	State Rank	CA Rare Plant Rank	Associated Habitat	Bloom Period	Habitat in Plan Area?
<i>Agrostis blasdalei</i> Blasdale's bent grass	None	None	G2G3	S2	1B.2	Coastal bluff scrub, Coastal dunes, Coastal prairie. 0 - 150 meters in elevation.	May-Jul	No
<i>Allium peninsulare</i> subsp. <i>franciscanum</i> Franciscan onion	None	None	G5T2	S2	1B.2	Cismontane woodland, Valley and foothill grassland. Clay, Serpentine (often), Volcanic. 52 - 305 meters in elevation.	(Apr) May-Jun	No
<i>Amorpha californica</i> subsp. <i>napensis</i> Napa false indigo	None	None	G4T2	S2	1B.2	Broadleafed upland forest (openings), Chaparral, Cismontane woodland. 50 - 2000 meters in elevation.	Apr-Jul	Yes
<i>Arctostaphylos bakeri</i> subsp. <i>sublaevis</i> Cedars manzanita	None	CR	G2T2	S2	1B.2	Chaparral, Closed-cone coniferous forest. Seeps, Serpentine. 185 - 760 meters in elevation.	Feb-May	No
<i>Arctostaphylos hispidula</i> Howell's manzanita	None	None	G4	S3	4.2	Chaparral (sandstone, serpentine). 120 - 1250 meters in elevation.	Mar-Apr	No

<i>Asclepias solanoana</i> serpentine milkweed	None	None	G3	S3	4.2	Chaparral, Cismontane woodland, Lower montane coniferous forest. Serpentinite. 230 - 1860 meters in elevation.	May-Jul (Aug)	No
<i>Astragalus agnicidus</i> Humboldt County milk-vetch	None	CE	G2	S2	1B.1	Broadleaved upland forest, North Coast coniferous forest. Disturbed areas, Openings, Roadsides (sometimes). 120 - 800 meters in elevation.	Apr-Sep	Yes
<i>Astragalus rattanii</i> subsp. <i>rattanii</i> Rattan's milk-vetch	None	None	G4T4	S4	4.3	Chaparral, Cismontane woodland, Lower montane coniferous forest. Gravelly, Streambanks. 30 - 825 meters in elevation.	Apr-Jul	Yes
<i>Brasenia schreberi</i> watershield	None	None	G5	S3	2B.3	Marshes and swamps (freshwater). 0 - 2200 meters in elevation.	Jun- Sep	No
<i>Calamagrostis bolanderi</i> Bolander's reed grass	None	None	G4	S4	4.2	Bogs and fens, Broadleaved upland forest, Closed-cone coniferous forest, Coastal scrub, Marshes and swamps (freshwater), Meadows and seeps (mesic), North Coast coniferous forest. Mesic. 0 - 455 meters in elevation.	May- Aug	Yes
<i>Calamagrostis ophitidis</i> serpentine reed grass	None	None	G3	S3	4.3	Chaparral (openings, often north-facing slopes), Lower montane coniferous forest, Meadows and seeps, Valley and foothill grassland. Rocky, Serpentinite. 90 - 1065 meters	Apr-Jul	Yes

						in elevation.		
<i>Calochortus raichei</i> Cedar's fairy-lantern	None	None	G2	S2	1B.2	Chaparral, Closed-cone coniferous forest. Serpentine. 200 - 490 meters in elevation.	May- Aug	No
<i>Calochortus uniflorus</i> pink star-tulip	None	None	G4	S4	4.2	Coastal prairie, Coastal scrub, Meadows and seeps, North Coast coniferous forest. 10 - 1070 meters in elevation.	Apr- Jun	Yes
<i>Calystegia collina</i> subsp. <i>oxyphylla</i> Mt. Saint Helena morning-glory	None	None	G4T3	S3	4.2	Chaparral, Lower montane coniferous forest, Valley and foothill grassland. Serpentine. 279 - 1010 meters in elevation.	Apr- Jun	No
<i>Calystegia purpurata</i> subsp. <i>saxicola</i> coastal bluff morning-glory	None	None	G4T2 T3	S2S3	1B.2	Coastal bluff scrub, Coastal dunes, Coastal scrub, North Coast coniferous forest. 0 - 105 meters in elevation.	(Mar) Apr- Sep	Yes
<i>Carex californica</i> California sedge	None	None	G5	S2	2B.2	Bogs and fens, Closed-cone coniferous forest, Coastal prairie, Marshes and swamps (margins), Meadows and seeps. 90 - 335 meters in elevation.	May- Aug	No

<i>Carex saliniformis</i> deceiving sedge	None	None	G2	S2	1B.2	Coastal prairie, Coastal scrub, Marshes and swamps (coastal salt), Meadows and seeps. Mesic. 3 - 230 meters in elevation.	(May) Jun (Jul)	No
<i>Castilleja ambigua</i> subsp. <i>ambigua</i> johnny-nip	None	None	G4T4	S3S4	4.2	Coastal bluff scrub, Coastal prairie, Coastal scrub, Marshes and swamps, Valley and foothill grassland, Vernal pools (margins). 0 - 435 meters in elevation.	Mar- Aug	No
<i>Castilleja latifolia</i> Monterey Coast paintbrush	None	None	G4	S4	4.3	Cismontane woodland (openings), Closed-cone coniferous forest, Coastal dunes, Coastal scrub. Sandy. 0 - 185 meters in elevation.	Feb- Sep	No
<i>Castilleja mendocinensis</i> Mendocino Coast paintbrush	None	None	G2	S2	1B.2	Closed-cone coniferous forest, Coastal bluff scrub, Coastal dunes, Coastal prairie, Coastal scrub. 0 - 160 meters in elevation.	Apr- Aug	No
<i>Ceanothus gloriosus</i> subsp. <i>exaltatus</i> glory brush	None	None	G4T4	S4	4.3	Chaparral. 30 - 610 meters in elevation.	Mar- Jun (Aug)	No
<i>Ceanothus gloriosus</i> subsp. <i>gloriosus</i> Point Reyes ceanothus	None	None	G4T4	S4	4.3	Closed-cone coniferous forest, Coastal bluff scrub, Coastal dunes, Coastal scrub. Sandy. 5 - 520 meters in elevation.	Mar- May	No

<i>Ceanothus purpureus</i> holly-leaved ceanothus	None	None	G2	S2	1B.2	Chaparral, Cismontane woodland. Rocky, Volcanic. 120 - 640 meters in elevation.	Feb- Jun	No
<i>Chorizanthe cuspidata</i> subsp. <i>villosa</i> woolly-headed spineflower	None	None	G2T2	S2	1B.2	Coastal dunes, Coastal prairie, Coastal scrub. Sandy. 3 - 60 meters in elevation.	May- Jul (Aug)	No
<i>Chorizanthe valida</i> Sonoma spineflower	FE	CE	G1	S1	1B.1	Coastal prairie (sandy). 10 - 305 meters in elevation.	Jun- Aug	No
<i>Cuscuta pacifica</i> subsp. <i>papillata</i> Mendocino dodder	None	None	G5T1	S1	1B.2	Coastal dunes (interdune depressions). 0 - 50 meters in elevation.	(Jun) Jul- Oct	No
<i>Cypripedium californicum</i> California lady's-slipper	None	None	G3	S4	4.2	Bogs and fens, Lower montane coniferous forest. Seeps, Serpentine (usually), Streambanks. 30 - 2750 meters in elevation.	Apr- Aug (Sep)	Yes
<i>Eastwoodiella californica</i> swamp harebell	None	None	G3	S3	1B.2	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	Yes

<i>Erigeron biolettii</i> streamside daisy	None	None	G3?	S3?	3	Broadleaved upland forest, Cismontane woodland, North Coast coniferous forest. Mesic, Rocky. 30 - 1100 meters in elevation.	Jun- Oct	Yes
<i>Erigeron serpentinus</i> serpentine daisy	None	None	G2	S2	1B.3	Chaparral (seeps, serpentinite). 60 - 670 meters in elevation.	May- Aug	No
<i>Erigeron supplex</i> supple daisy	None	None	G2	S2	1B.2	Coastal bluff scrub, Coastal prairie. 10 - 50 meters in elevation.	May- Jul	No
<i>Eriogonum cedrorum</i> Cedar's buckwheat	None	None	G1	S1	1B.3	Closed-cone coniferous forest. Serpentinite. 365 - 550 meters in elevation.	Jun- Sep	No
<i>Eriogonum ternatum</i> ternate buckwheat	None	None	G4	S4	4.3	Lower montane coniferous forest (serpentinite). 305 - 2225 meters in elevation.	Jun- Aug	No
<i>Erysimum concinnum</i> bluff wallflower	None	None	G3	S2	1B.2	Coastal bluff scrub, Coastal dunes, Coastal prairie. 0 - 185 meters in elevation.	Feb-Jul	No

<i>Fritillaria roderickii</i> Roderick's fritillary	None	CE	G1Q	S1	1B.1	Coastal bluff scrub, Coastal prairie, Valley and foothill grassland. 15 - 400 meters in elevation.	Mar- May	No
<i>Gilia capitata</i> subsp. <i>pacifica</i> Pacific gilia	None	None	G5T3	S2	1B.2	Chaparral (openings), Coastal bluff scrub, Coastal prairie, Valley and foothill grassland. 5 - 1665 meters in elevation.	Apr- Aug	No
<i>Gilia capitata</i> subsp. <i>tomentosa</i> woolly-headed gilia	None	None	G5T2	S2	1B.1	Coastal bluff scrub, Valley and foothill grassland. Outcrops. Rocky, Serpentinite. 10 - 220 meters in elevation.	May- Jul	No
<i>Glehnia littoralis</i> subsp. <i>leiocarpa</i> American glehnia	None	None	G5T5	S2S3	4.2	Coastal dunes. 0 - 20 meters in elevation.	May- Aug	No
<i>Hesperevax sparsiflora</i> subsp. <i>brevifolia</i> short-leaved evax	None	None	G4T3	S3	1B.2	Coastal bluff scrub (sandy), Coastal dunes, Coastal prairie. 0 - 215 meters in elevation.	Mar- Jun	No
<i>Hesperocyparis pygmaea</i> pygmy cypress	None	None	G1	S1	1B.2	Closed-cone coniferous forest (usually podzol-like soil). 30 - 600 meters in elevation.	NA	Yes

<i>Horkelia marinensis</i> Point Reyes horkelia	None	None	G2	S2	1B.2	Coastal dunes, Coastal prairie, Coastal scrub. Sandy. 5 - 755 meters in elevation.	May- Sep	No
<i>Horkelia tenuiloba</i> thin-lobed horkelia	None	None	G2	S2	1B.2	Broadleafed upland forest, Chaparral, Valley and foothill grassland. Mesic, Openings, Sandy. 50 - 500 meters in elevation.	May- Jul (Aug)	Yes
<i>Hosackia gracilis</i> harlequin lotus	None	None	G3G4	S3	4.2	Broadleafed upland forest, Cismontane woodland, Closed-cone coniferous forest, Coastal bluff scrub, Coastal prairie, Coastal scrub, Marshes and swamps, Meadows and seeps, North Coast coniferous forest, Valley and foothill grassland. Wetlands. Roadsides. 0 - 700 meters in elevation.	Mar- Jul	Yes
<i>Iris longipetala</i> coast iris	None	None	G3	S3	4.2	Coastal prairie, Lower montane coniferous forest, Meadows and seeps. Mesic. 0 - 600 meters in elevation.	Mar- May (Jun)	Yes
<i>Kopsiopsis hookeri</i> small groundcone	None	None	G4?	S1S2	2B.3	North Coast coniferous forest. 90 - 885 meters in elevation.	Apr- Aug	Yes

<i>Lasthenia californica</i> subsp. <i>bakeri</i> Baker's goldfields	None	None	G3T1	S1	1B.2	Closed-cone coniferous forest (openings), Coastal scrub, Marshes and swamps, Meadows and seeps. 60 - 520 meters in elevation.	Apr- Oct	Yes
<i>Lasthenia californica</i> subsp. <i>macrantha</i> perennial goldfields	None	None	G3T2	S2	1B.2	Coastal bluff scrub, Coastal dunes, Coastal scrub. 5 - 520 meters in elevation.	Jan- Nov	No
<i>Lathyrus palustris</i> marsh pea	None	None	G5	S2	2B.2	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	Yes
<i>Leptosiphon aureus</i> bristly leptosiphon	None	None	G4?	S4?	4.2	Chaparral, Cismontane woodland, Coastal prairie, Valley and foothill grassland. 55 - 1500 meters in elevation.	Apr-Jul	Yes
<i>Leptosiphon latisectus</i> broad-lobed leptosiphon	None	None	G4	S4	4.3	Broadleafed upland forest, Cismontane woodland. 170 - 1500 meters in elevation.	Apr- Jun	Yes
<i>Leptosiphon rosaceus</i> rose leptosiphon	None	None	G1	S1	1B.1	Coastal bluff scrub. 0 - 100 meters in elevation.	Apr-Jul	No

<i>Lilium maritimum</i> coast lily	None	None	G2	S2	1B.1	Broadleafed upland forest, Closed-cone coniferous forest, Coastal prairie, Coastal scrub, Marshes and swamps (freshwater), North Coast coniferous forest. Roadsides (sometimes). 5 - 475 meters in elevation.	May- Aug	Yes
<i>Lupinus sericatus</i> Cobb Mountain lupine	None	None	G2?	S2?	1B.2	Broadleafed upland forest, Chaparral, Cismontane woodland, Lower montane coniferous forest. 275 - 1525 meters in elevation.	Mar- Jun	No
<i>Lycopodium clavatum</i> running-pine	None	None	G5	S3	4.1	Lower montane coniferous forest (mesic), Marshes and swamps, North Coast coniferous forest (mesic). Edges (often), Openings, Roadsides. 45 - 1225 meters in elevation.	Jun- Aug (Sep)	Yes
<i>Monardella viridis</i> green monardella	None	None	G3	S3	4.3	Broadleafed upland forest, Chaparral, Cismontane woodland. 100 - 1010 meters in elevation.	Jun- Sep	No
<i>Perideridia gairdneri</i> subsp. <i>gairdneri</i> Gairdner's yampah	None	None	G5T3 T4	S3S4	4.2	Broadleafed upland forest, Chaparral, Coastal prairie, Valley and foothill grassland, Vernal pools. Vernal Mesic. 0 - 610 meters in elevation.	Jun- Oct	No

<i>Piperia candida</i> white-flowered rein orchid	None	None	G3?	S3	1B.2	Broadleaved upland forest, Lower montane coniferous forest, North Coast coniferous forest. Serpentine (sometimes). 30 - 1310 meters in elevation.	(Mar-Apr) May- Sep	Yes
<i>Piperia leptopetala</i> narrow-petaled rein orchid	None	None	G4	S4	4.3	Cismontane woodland, Lower montane coniferous forest, Upper montane coniferous forest. 380 - 2225 meters in elevation.	May- Jul	No
<i>Pleuropogon hooverianus</i> North Coast semaphore grass	None	Threatened	G2	S2	1B.1	Broadleaved upland forest, Meadows and seeps, North Coast coniferous forest. Mesic and openings. 10-671 meters in elevation.	Apr- Jun	Yes
<i>Ramalina thrausta</i> angel's hair lichen	None	None	G5?	S2S3	2B.1	North Coast coniferous forest. On dead twigs and other lichens. 75 - 430 meters in elevation.	NA	Yes
<i>Sidalcea calycosa</i> subsp. <i>rhizomata</i> Point Reyes checkerbloom	None	None	G5T2	S2	1B.2	Marshes and swamps (freshwater, near coast). 3 - 75 meters in elevation.	Apr- Sep	No
<i>Sidalcea malachroides</i> maple-leaved checkerbloom	None	None	G3	S3	4.2	Broadleaved upland forest, Coastal prairie, Coastal scrub, North Coast coniferous forest, Riparian woodland. Disturbed areas (often). 0 - 730 meters in elevation.	(Mar) Apr- Aug	Yes

<i>Sidalcea malviflora</i> subsp. <i>purpurea</i> purple-stemmed checkerbloom	None	None	G5T1	S1	1B.2	Broadleaved upland forest, Coastal prairie. 15 - 85 meters in elevation.	May- Jun	Yes
<i>Streptanthus barbiger</i> bearded jewelflower	None	None	G3	S3	4.2	Chaparral (serpentinite). 150 - 1070 meters in elevation.	May- Jul	No
<i>Streptanthus glandulosus</i> subsp. <i>hoffmanii</i> Hoffman's bristly jewelflower	None	None	G4T2	S2	1B.3	Chaparral, Cismontane woodland, Valley and foothill grassland (often serpentinite). Rocky. 120 - 475 meters in elevation.	Mar- Jul	Yes
<i>Streptanthus morrisonii</i> subsp. <i>morrisonii</i> Morrison's jewelflower	None	None	G2T1 ?	S1?	1B.2	Chaparral (rocky, serpentinite, talus). 120 - 585 meters in elevation.	May- Sep	No
<i>Sulcaria spiralifera</i> twisted horsehair lichen	None	None	G3G4	S2	1B.2	Coastal dunes (SLO Co.), North Coast coniferous forest (immediate coast). Usually on conifers. 0 - 90 meters in elevation.	NA	Yes
<i>Tracyina rostrata</i> beaked tracyina	None	None	G2	S2	1B.2	Chaparral, Cismontane woodland, Valley and foothill grassland. 90 - 1270 meters in elevation.	May- Jun	Yes

<i>Trichostema ovatum</i> San Joaquin bluecurls	None	None	G3	S3	4.2	Chenopod scrub, Valley and foothill grassland. 65 - 320 meters in elevation.	(Apr-Jun) Jul-Oct	No
<i>Trifolium buckwestiorum</i> Santa Cruz clover	None	None	G2	S2	1B.1	Broadleafed upland forest, Cismontane woodland, Coastal prairie. Margins. Gravelly. 35 - 610 meters in elevation.	Apr- Oct	Yes
<i>Usnea longissima</i> Methuselah's beard lichen	None	None	G4	S4	4.2	Broadleafed upland forest, North Coast coniferous forest. On tree branches; usually on old growth hardwoods and conifers. 50 - 1460 meters in elevation.	NA	Yes
<i>Veratrum fimbriatum</i> fringed false-hellebore	None	None	G3	S3	4.3	Bogs and fens, Coastal scrub, Meadows and seeps, North Coast coniferous forest. Mesic. 3 - 300 meters in elevation.	Jul-Sep	Yes

Of the above listed species, the followings 31 rare plants have the potential to occur in the project area:

<i>Scientific Name</i> Common Name	Fed List	State List	Global Rank	State Rank	CA Rare Plant Rank	Associated Habitat	Bloom Period	Habitat in Plan Area?
<i>Amorpha californica</i> subsp. <i>napensis</i> Napa false indigo	None	None	G4T2	S2	1B.2	Broadleafed upland forest (openings), Chaparral, Cismontane woodland. 50 - 2000 meters in elevation.	Apr-Jul	Yes
<i>Astragalus agnicidus</i> Humboldt County milk-vetch	None	CE	G2	S2	1B.1	Broadleafed upland forest, North Coast coniferous forest. Disturbed areas, Openings, Roadsides (sometimes). 120 - 800 meters in elevation.	Apr-Sep	Yes
<i>Calystegia purpurata</i> subsp. <i>saxicola</i> coastal bluff morning-glory	None	None	G4T2 T3	S2S3	1B.2	Coastal bluff scrub, Coastal dunes, Coastal scrub, North Coast coniferous forest. 0 - 105 meters in elevation.	(Mar) Apr- Sep	Yes
<i>Eastwoodiella californica</i> swamp harebell	None	None	G3	S3	1B.2	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	Yes

<i>Hesperocyparis pygmaea</i> pygmy cypress	None	None	G1	S1	1B.2	Closed-cone coniferous forest (usually podzol-like soil). 30 - 600 meters in elevation.	NA	Yes
<i>Horkelia tenuiloba</i> thin-lobed horkelia	None	None	G2	S2	1B.2	Broadleaved upland forest, Chaparral, Valley and foothill grassland. Mesic, Openings, Sandy. 50 - 500 meters in elevation.	May- Jul (Aug)	Yes
<i>Kopsiopsis hookeri</i> small groundcone	None	None	G4?	S1S2	2B.3	North Coast coniferous forest. 90 - 885 meters in elevation.	Apr- Aug	Yes
<i>Lasthenia californica</i> subsp. <i>bakeri</i> Baker's goldfields	None	None	G3T1	S1	1B.2	Closed-cone coniferous forest (openings), Coastal scrub, Marshes and swamps, Meadows and seeps. 60 - 520 meters in elevation.	Apr- Oct	Yes
<i>Lathyrus palustris</i> marsh pea	None	None	G5	S2	2B.2	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	Yes
<i>Lilium maritimum</i> coast lily	None	None	G2	S2	1B.1	Broadleaved upland forest, Closed-cone coniferous forest, Coastal prairie, Coastal scrub, Marshes and swamps (freshwater), North Coast coniferous forest. Roadsides (sometimes). 5 - 475 meters in	May- Aug	Yes

						elevation.		
<i>Piperia candida</i> white-flowered rein orchid	None	None	G3?	S3	1B.2	Broadleaved upland forest, Lower montane coniferous forest, North Coast coniferous forest. Serpentinite (sometimes). 30 - 1310 meters in elevation.	(Mar-Apr) May- Sep	Yes
<i>Pleuropogon hooverianus</i> North Coast semaphore grass	None	Threatened	G2	S2	1B.1	Broadleaved upland forest, Meadows and seeps, North Coast coniferous forest. Mesic and openings. 10-671 meters in elevation.	Apr- Jun	Yes
<i>Ramalina thrausta</i> angel's hair lichen	None	None	G5?	S2S3	2B.1	North Coast coniferous forest. On dead twigs and other lichens. 75 - 430 meters in elevation.	NA	Yes
<i>Sidalcea malviflora</i> subsp. <i>purpurea</i> purple-stemmed checkerbloom	None	None	G5T1	S1	1B.2	Broadleaved upland forest, Coastal prairie. 15 - 85 meters in elevation.	May- Jun	Yes
<i>Streptanthus glandulosus</i> subsp. <i>hoffmanii</i> Hoffman's bristly jewelflower	None	None	G4T2	S2	1B.3	Chaparral, Cismontane woodland, Valley and foothill grassland (often serpentinite). Rocky. 120 - 475 meters in elevation.	Mar- Jul	Yes

<i>Sulcaria spiralifera</i> twisted horsehair lichen	None	None	G3G4	S2	1B.2	Coastal dunes (SLO Co.), North Coast coniferous forest (immediate coast). Usually on conifers. 0 - 90 meters in elevation.	NA	Yes
<i>Tracyina rostrata</i> beaked tracyina	None	None	G2	S2	1B.2	Chaparral, Cismontane woodland, Valley and foothill grassland. 90 - 1270 meters in elevation.	May- Jun	Yes
<i>Trifolium buckwestiorum</i> Santa Cruz clover	None	None	G2	S2	1B.1	Broadleaved upland forest, Cismontane woodland, Coastal prairie. Margins. Gravelly. 35 - 610 meters in elevation.	Apr- Oct	Yes

2 plant species occur in riparian or aquatic environments. Riparian habitats are present within and adjacent to the proposed project. The de minimis 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 this THP will not cause a significant adverse impact on these species.

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>Lasthenia macrantha</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	y
<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	y

16 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:

Scientific Name	Common Name	Range	Natural communities	Blooming periods	Habitat in the THP
					n=no p=possible y=yes
<i>Amorpha californica</i> subsp. <i>napensis</i>	Napa false indigo	High North Coast Ranges, Inner North Coast Ranges, Outer North Coast Ranges, San Fransico Bay Area. (Sonoma, Napa, Lake, and Marin Counties)	Broadleaved upland forest (openings), Chaparral, Cismontane woodland. 50 - 2000 meters in elevation.	Apr-Jul	Yes
<p>Napa False Indigo has 3 known CNDDDB occurrences within the assessment area, none of these occurrences are within the Annapolis or Stewarts Point Quads. The CDFW profile of this species lists land development and geothermal projects as threats to this species. The three CNDDDB occurrences within the assessment area are all along roads, The THP area contains a number of lightly used roads providing ample potential habitat. 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>					
<i>Astragalus agnicidus</i>	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 to disturbances and populations are observed to be more robust on uncompacted soils (Sholar 2007). 4 occurrences are known to exist within the assessment area, none of these occurrences are within the Annapolis or Stewarts Points Quads. Much of the soil within the project area along Miller Ridge 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. The botanical survey did not identify any individuals of this species.</p>					

Scientific Name	Common Name	Range	Natural communities	Blooming periods	Habitat in the THP
<i>Calystegia purpurata</i> subsp. <i>saxicola</i>	coastal bluff morning-glory	North Coast, Central Coast, San Francisco Bay Area	Coastal bluff scrub, Coastal dunes, Coastal scrub, North Coast coniferous forest. 0 - 105 meters in elevation.	(Mar) Apr-Sep	y
<p>The coastal bluff morning glory is species that primarily occurs along rocky scrub(Brummit 2012). CNDDDB reports 12 occurrences of this species within the assessment area. All of these occurrences are near the ocean. The nearest occurrences are in the community of Sea Ranch. This project does not contain any coast bluff habitat. 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>					
Eastwoodiella californica	swamp harebell	northern Central Coast and the southern North Coast	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

Scientific Name	Common Name	Range	Natural communities	Blooming periods	Habitat in the THP
<p>Swamp harebell has 57 occurrences within the assessment area. Many of these occurrences have robust populations of 100+ individuals. The species requires full to partial sunlight and is tolerant to soil disturbances but not soil compaction. (Sholar 2007). Gualala Redwood staff have monitored existing populations of swamp harebell on the ownership and have found that the species persists after timber operations provided the species does not become shaded out. 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 past timber operations. This species is considered to be a wet site obligate species (Golec 2007). Protection measures are in place to protect wet areas and watercourses throughout the project area. 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>					
Hesperocyparis pygmaea	pygmy cypress	Coastal terraces of Mendocino and Sonoma Counties	Closed-cone coniferous forest (usually podzol-like soil).30-600 meters in elevation.	NA	y
<p>The pygmy cypress is not known by Gualala Redwood staff to occur within the project vicinity. No pygmy forest habit is known to occur in the project area. The pygmy cypress is not limited to pygmy habit and habitat that could support this species is known to exist within the project area. For this project the RPF or supervised designees have covered the entire plan area and no cypress of any type are known to exist within the project area. 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>					
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	Broadleafed upland forest, Chaparral, Valley and foothill grassland/mesic openings, sandy. 50-500 meters in elevation	May-Jul	p

Scientific Name	Common Name	Range	Natural communities	Blooming periods	Habitat in the THP
<p>The thin-lobed horkelia is found in forest openings and requires xeric to seasonal seasonally 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. Many of the 13 CNNDDB occurrence of this species are associated with disturbed sites. 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 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. CNDDDB reports 1 occurrence of this species in the assessment area. 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

Scientific Name	Common Name	Range	Natural communities	Blooming periods	Habitat in the THP
<p>Habitat for the coast lily exists within the project area, particularly near Miller Ridge. The CNPS rare plant inventory lists roadside as a microhabitat condition of this plant. 26 occurrences of this species occur in CNDDDB in the 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>					
<i>Piperia Candida</i>	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 orchard is a perennial herb with habitat in the project area. This species is generally found in areas of shade and has been observed growing 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>					
<i>Pleuropogon hooverianus</i>	North Coast semaphore grass	Mendocino, Marin, and Sonoma Counties	Broadleafed upland forest, Meadows and seeps, North Coast coniferous forest. Mesic and openings. 10-671 meters in elevation.	April-June	y
<p>The North Coast semaphore grass is a tall perennial bunchgrass. This species is associated with wet or seasonally wet openings in the redwood forest and require full to partial light. The species is sensitive to soil disturbance, herbicides, mowing, herbicides, and conifer encroachment and this bunchgrass does not have a large persistent seed bank(Sholar 2007). The project has protection</p>					

Scientific Name	Common Name	Range	Natural communities	Blooming periods	Habitat in the THP
measures in place for wet area and will result in the maintenance and creation of new forest openings. Proposed herbicide application will be targeted applications on hardwood species and most soil disturbances will occur in areas that were previously disturbed. This project has the potential to impact this species. The botanical survey, located in Sec V, did not identify any individuals of this species.					
<i>Ramalina thrausta</i>	angel's hair lichen	Found throughout North America	North Coast coniferous forest. On dead twigs and other lichens. 75 - 430 meters in elevation.	NA	y
Angel's hair lichen is typically found in moist low elevation conifer stands that contain a hardwood component. This species grows on the boles and branches of both conifers and branches. This projects proposes silvicultres that will retain both hardwoods and conifers following harvest. The WLPZ protections will result in substantially reduced harvest in many of the low elevation moist sites within this project. 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.					
<i>Sidalcea malviflora subsp. purpurea</i>	purple-stemmed checkerbloom	central North Coast and the northern Central Coast	Broadleaved upland forest, Coastal prairie. 15 - 85 meters in elevation.	May-Jun	Yes
In the redwood forest this species is typically found on the interface between forest and grasslands(Golec 2007). This project area is entirely forested. CalFlora lists that this species typically occurs in wetlands, this project includes protection measures for wetlands. 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.					
<i>Streptanthus</i>	Hoffman's bristly		Chaparral, Cismontane woodland, Valley and	Mar-	

Scientific Name	Common Name	Range	Natural communities	Blooming periods	Habitat in the THP
<i>glandulosus</i> <i>subsp.</i> <i>hoffmanii</i>	jewelflower		foothill grassland (often serpentinite). Rocky. 120 - 475 meters in elevation.	Jul	Yes
<p>This species is typically associated with serpentine soils and chaparral. Neither of these condition occur within the project area. One poorly mapped CNDDDB from 1938 describes a population occurring “at the edge of sequoia grove[.] in moist soil of steep rocky non-serpentinized bank” . Based on that instance it is unlikely but feasible the species may occur within the project area. 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>					
<i>Sulcaria</i> <i>spiralifera</i>	twisted horsehair lichen	Washington, Oregon, California	Coastal dunes (SLO Co.), North Coast coniferous forest (immediate coast). Usually on conifers. 0 - 90 meters in elevation.	NA	Yes
<p>This species requires hyper-marine conditions and the habitat is described as limited to sand dune forests. (McMullin 2021). Most CNDDDB results describe sand dune habitats, primarily chaparral, which do not occur within or adjacent to the project area. This coastal lichen is rarely found on <i>Pseudotsuga menziesii</i> and <i>Abies grandis</i> which are abundant in the project area. One CNDDDB recorded location is described as two miles east of Stewarts Point. This is based off one unmapped observation of the species in 1988 with minimal other information provided. Based on this one outlier that is located nearby, it seems possible that habitat may exist throughout the project location. Threats listed by the IUCN include climate change, air pollution, and coastal development. The plan includes an analysis of impacts on GHG emissions and the TPZ zoning of much of this project restricts coastal development. 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>					
<i>Tracyina</i>	beaked tracyina	Inland Sonoma, Mendocino, and Humboldt Counties	Chaparral, Cismontane woodland, Valley and	May- Jun	

Scientific Name	Common Name	Range	Natural communities	Blooming periods	Habitat in the THP
<i>rostrata</i>			foothill grassland. 90 - 1270 meters in elevation.		Yes
<p>The beaked tracyina is associated with habitats typically found further inland from the project such as range and chaparral. The nearest known occurrence is on the Cooley Ranch near Cloverdale, CA. Threats to this species include grazing and mowing. Some mowing of roads may occur. 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>					
<i>Trifolium buckwestiorum</i>	Santa Cruz clover		Broadleaved upland forest, Cismontane woodland, Coastal prairie. Margins. Gravelly. 35 - 610 meters in elevation.	Apr-Oct	Yes
<p>There are 11 CNDDDB occurrences of Santa Cruz clover within the assessment area. Many of these occurrences are associated with logging roads, including recently graded roads. This project will result in soil disturbances to logging roads and the thinning of road side trees will result in more light being on the road surface. These actions may be beneficial to the species. 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>					

Plant Species Identified During Botanical Surveys

Family	Scientific Name	Common Name
Blechnaceae - Deer Fern Family		
	<i>Struthiopteris spicant (Blechnum s.)</i>	deer fern
	<i>Woodwardia fimbriata</i>	giant chain fern
Dennstaedtiaceae - Bracken Fern Family		
	<i>Pteridium aquilinum</i> subsp. <i>pubescens</i>	bracken fern
Dryopteridaceae - Wood Fern Family		
	<i>Dryopteris arguta</i>	California wood fern
	<i>Polystichum munitum</i>	western swordf fern
Equisetaceae - Horsetail Family		
	<i>Equisetum hyemale</i> subsp. <i>affine</i>	common scouring rush
	<i>Equisetum telmateia</i> subsp. <i>braunii</i>	giant horsetail
	<i>Pilularia americana</i>	American pillwort
Polypodiaceae - Polypody Family		
	<i>Polypodium calirhiza</i>	nested polypody
Pteridaceae - Brake Fern Family		
	<i>Adiantum aleuticum</i>	five-finger fern
	<i>Pentagramma triangularis</i>	goldenback fern
GYMNOSPERMS		
Cupressaceae - Cypress Family		
	<i>Sequoia sempervirens</i>	coast redwood
Pinaceae - Pine Family		
	<i>Abies grandis</i>	grand fir
	<i>Pseudotsuga menziesii</i>	Douglas fir
Taxaceae - Yew Family		
	<i>Torreya californica</i>	California nut-meg
MAGNOLIIDS		
Aristolochiaceae - Pipevine Family		

	<i>Asarum caudatum</i>	wild-ginger
Lauraceae - Laurel Family		
	<i>Umbellularia californica</i>	California bay
EUDICOTS		
Anacardiaceae - Sumac Family		
	<i>Toxicodendron diversilobum</i>	poison oak
Apiaceae - Carrot Family		
	<i>Conium maculatum</i>	poison hemlock
	<i>Daucus pusillus</i>	rattlesnake weed
	<i>Osmorhiza berteroi (O. chilensis)</i>	sweet cicely
	<i>Sanicula crassicaulis</i>	gamble weed
	<i>Torilis arvensis</i>	japanese hedge parsley
Araliaceae - Ginseng Family		

	<i>Aralia californica</i>	elk clover
Asteraceae - Aster Family		
	<i>Adenocaulon bicolor</i>	trail plant, silver arrow
	<i>Anisocarpus madioides (Madia madioides)</i>	woodland tarweed
	<i>Baccharis pilularis</i>	coyote brush
	<i>Bellis perennis</i>	English daisy
	<i>Carduus pycnocephalus</i>	italian thistle
	<i>Cirsium brevistylum</i>	
	<i>Cirsium vulgare</i>	bull thistle
	<i>Gamochaeta ustulata (Gnaphalium purpureum)</i>	featherweed
	<i>Hieracium albiflorum</i>	hawkweed
	<i>Hypochaeris glabra</i>	smooth cat's ear
	<i>Hypochaeris radicata</i>	hairy cat's ear
	<i>Logfia gallica (Filago gallica)</i>	
	<i>Madia gracilis</i>	slender tarweed
	<i>Petasites frigidus subsp. palmatus</i>	coltsfoot
	<i>Senecio minimus (Erechtites minima)</i>	coastal burnweed
	<i>Taraxacum officinale</i>	common dandelion
Berberidaceae - Barberry Family		
	<i>Achlys californica</i>	vanilla leaf
	<i>Vancouveria planipetala</i>	redwood ivy
Betulaceae - Birch Family		
	<i>Alnus rubra</i>	red alder
Boraginaceae - Borage Family		
	<i>Adelina grande (Cynglossum grande)</i>	hound's tongue
	<i>Myosotis discolor</i>	blue scorpion grass
Brassicaceae - Mustard Family		
	<i>Cardamine californica</i>	milk maids
	<i>Cardamine oligosperma</i>	
Caprifoliaceae - Honeysuckle Family		
	<i>Lonicera hispidula</i>	honeysuckle
Caryophyllaceae - Pink Family		
	<i>Cerastium glomeratum</i>	mouse-ear chickweed
Cucurbitaceae - Gourd Family		
	<i>Marah oreganus</i>	coast manroot
Ericaceae - Heath Family		
	<i>Gaultheria shallon</i>	salal
	<i>Pyrola picta</i>	white-veined wintergreen
	<i>Vaccinium ovatum</i>	California huckleberry
	<i>Vaccinium parvifolium</i>	red huckleberry
Fabaceae - Pea Family		
	<i>Genista monspessulana</i>	french broom
	<i>Hosackia rosea</i>	

	<i>Lathyrus latifolius</i>	
	<i>Lathyrus hirsutus</i>	Caley pea
	<i>Lathyrus vestitus</i> subsp. <i>vestitus</i>	hillside pea
	<i>Trifolium dubium</i>	little hop clover
	<i>Trifolium microcephalum</i>	maiden clover
	<i>Trifolium repens</i>	white clover
	<i>Trifolium subterraneum</i>	subterranean clover
	<i>Vicia hirsuta</i>	
	<i>Vicia sativa</i> subsp. <i>sativa</i>	spring vetch
Fagaceae - Beech Family		
	<i>Notholithocarpus densiflorus</i>	tan oak
Geraniaceae - Geranium Family		
	<i>Geranium molle</i>	dove-foot geranium
Grossulariaceae - Gooseberry Family		
	<i>Ribes sanguineum</i> subsp. <i>glutinosum</i>	red-flowering currant
Hydrophyllaceae - Waterleaf Family		
	<i>Nemophila parviflora</i>	
	<i>Phacelia</i> sp.	
Lamiaceae - Mint Family		
	<i>Clinopodium douglasii</i> (<i>Satureja d.</i>)	yerba buena
	<i>Stachys ajugoides</i>	hedge nettle
	<i>Stachys rigida</i> subsp. <i>quercetorum</i>	hedge nettle
Linaceae - Flax Family		
	<i>Linum bienne</i>	common flax
Montiaceae - Montia Family		
	<i>Claytonia parviflora</i>	streamside spring beauty
	<i>Claytonia perfoliata</i>	miner's lettuce
Myricaceae - Wax Myrtle Family		
	<i>Morella californica</i> (<i>Myrica California</i>)	California wax myrtle
Myrsinaceae - Myrsine Family		
	<i>Lysimachia arvensis</i> (<i>Anagallis a.</i>)	scarlet pimpernel
	<i>Lysimachia latifolia</i> (<i>Trientalis l.</i>)	star flower
Onagraceae - Evening Primrose Family		

	<i>Epilobium brachycarpum</i>	
Oxalidaceae - Oxalis Family		
	<i>Oxalis oregana</i>	redwood sorrel
Philadelphaceae - Mock Orange Family		
	<i>Whipplea modesta</i>	yerba de selva, modesty
Phrymaceae - Lopseed Family		
	<i>Diplacus aurantiacus</i>	sticky monkey-flower
Plantaginaceae - Plantain Family		
	<i>Digitalis purpurea</i>	foxglove
	<i>Plantago lanceolata</i>	English plantain
Polemoniaceae - Phlox Family		

	<i>Collomia heterophylla</i>	subsp.ied-leaf collomia
	<i>Leptosiphon minimus</i>	
Polygalaceae - Milkwort Family		
	<i>Polygala californica</i>	California milkwort
Polygonaceae - Buckwheat Family		
	<i>Rumex acetosella</i>	sheep sorrel
	<i>Rumex</i> sp.	curly dock
Ranunculaceae - Buttercup Family		
	<i>Ranunculus uncinatus</i>	
Rhamnaceae - Buckthorn Family		
	<i>Frangula californica</i>	California coffeeberry
Rosaceae - Rose Family		
	<i>Fragaria vesca</i>	wood strawberry
	<i>Heteromeles arbutifolia</i>	toyon
	<i>Rosa gymnocarpa</i>	wood rose
	<i>Rubus armeniacus (R. discolor)</i>	himalayan blackberry
	<i>Rubus leucodermis</i>	western raspberry
	<i>Rubus parviflorus</i>	thimbleberry
	<i>Rubus ursinus</i>	California blackberry
Rubiaceae - Madder Family		
	<i>Galium aparine</i>	goose grass
Sapindaceae - Soapberry Family		
	<i>Acer macrophyllum</i>	big leaf maple
Saxifragaceae - Saxifrage Family		
	<i>Tellima grandiflora</i>	fringe cups
	<i>Tiarella trifoliata</i> subsp. <i>unifoliata</i>	lace flower
Solanaceae - Nightshade Family		
	<i>Solanum xanti</i>	nightshade
	<i>Urtica dioica</i> subsp. <i>gracilis</i>	american stinging nettle
Violaceae - Violet Family		
	<i>Viola sempervirens</i>	evergreen violet
MONOCOTS		
Cyperaceae - Sedge Family		
	<i>Carex pellita</i>	
	<i>Cyperus eragrostis</i>	nutsedge
	<i>Scirpus microcarpus</i>	
Iridaceae - Iris Family		
	<i>Iris douglasiana</i>	douglas iris
	<i>Sisyrinchium bellum</i>	blue-eyed grass
Juncaceae - Rush Family		
	<i>Juncus effusus</i>	
	<i>Juncus patens</i>	common rush
	<i>Luzula comosa</i> subsp. <i>laxa</i>	wood rush
Liliaceae - Lily Family		
	<i>Clintonia andrewsiana</i>	clintonia

	<i>Prosartes hookeri</i> (<i>Disporum h.</i>)	hooker's fairybell
	<i>Scoliopus bigelovii</i>	fetid adders tongue
Melanthiaceae - False-Hellebore Family		
	<i>Trillium ovatum</i>	western trillium
Orchidaceae - Orchid family		
	<i>Calypso bulbosa</i> subsp. <i>occidentalis</i>	calypso orchid
	<i>Corallorhiza mertensiana</i>	western coralroot
Poaceae - Grass Family		
	<i>Aira caryophyllea</i>	silver european hairgrass
	<i>Anthoxanthum occidentale</i>	sweet grass
	<i>Anthoxanthum ordoratum</i>	sweet vernal grass
	<i>Bromus catharticus</i> subsp. <i>elatus</i>	California brome
	<i>Bromus sitchensis</i> subsp. <i>carinatus</i>	California brome
	<i>Cortaderia jubata</i>	jubata grass
	<i>Cynosurus echinatus</i>	hedgehog dogtail
	<i>Deschampsia elongata</i>	slender hairgrass
	<i>Elymus glaucus</i> subsp. <i>glaucus</i>	blue wildrye
	<i>Festuca bromoides</i>	brome fescue
	<i>Holcus lanatus</i>	common velvet grass
Ruscaceae - Buthcher's-Broom Family		
	<i>Maianthemum racemosum</i>	branched false solomon's seal

Findings

No significant adverse impact to special status plant species will occur. The analysis contained herein identified 40 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. 2 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. 31 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. A botanical survey has been conducted and results may be in Sec V of this 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 65% 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 tree 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 and grand fir were observed during plan layout and these will be protected as wildlife trees. A large amount of tanoak snags that are generally >20" dbh are located in the plan area, particularly near Miller Ridge. 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. Large snags with high biological value within the harvest units will be retained, and if screen trees are needed to provide protection for the snag, those may also be retained. The 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 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 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 the last harvest. 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 356 acre harvest area there are 6.3 miles of roads(which is roughly 12 acres), a majority of these roads see very little road usage as they occur within the lands of GRT and have restricted access. The sparsely traveled private roads in the assessment area have signs(scats, 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 anticipated to cause any adverse impacts to 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 an important food item 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, 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. Areas adjacent to the THP have substantial hardwood components. The control of hardwoods proposed in this plan does not seek to eliminate hardwoods throughout the harvest area. Rather, the intent is to reduce the density in areas of very high tanoak stocking to lower competition to enable conifer growth and regeneration. Many areas of the plan such as WLPZ and slides will not have any reduction in tanoak densities.

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 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 as a result 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 get 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 and old 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 strips 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 similar to those discussed within the A. Watershed Resources Assessment section above. The total BAA acreage is approximately 3629 acres. Over the past 10 years, the BAA has had timber harvest permits filed on 143.5 acres (approximately 3.9%). Harvest permits considered in this analysis are THPs and NTO. Of the permitted acres 112.4 acres has been Unevenaged silviculture while the remaining 31.1 acres has been Special Prescriptions and Other Management.

Biological Assessment Area-Past Plans

THP Number	Landowner	Timber Owner	Acres in BAA	Silviculture	Yarding Method
1-15-042-SON	Gualala Redwood Timber LLC	Gualala Redwood Timber LLC	0.91	Selection	Tractor or Skidder
1-15-042-SON	Gualala Redwood Timber LLC	Gualala Redwood Timber LLC	1.88	Selection	Tractor or Skidder
1-19-00051-SON	Gualala Redwood Timber LLC	Gualala Redwood Timber LLC	1.99	Selection	Tractor or Skidder
1-20-00144-SON	Gualala Redwood Timber LLC	Gualala Redwood Timber LLC	22.02	Group Selection	Tractor or Skidder
1-20-00144-SON	Gualala Redwood Timber LLC	Gualala Redwood Timber LLC	1.29	Group Selection	Tractor or Skidder
1-22-00097-SON	Mendocino Redwood Co	Mendocino Forest Products Co	0.26	Selection	Cable System
1-22-00097-SON	Mendocino Redwood Co	Mendocino Forest Products Co	13.66	Variable Retention	Cable System
1-22-00097-SON	Mendocino Redwood Co	Mendocino Forest Products Co	7.20	Selection	Cable System
1-01NTMP-048-SON-NTO4	Alice Garrett	Alice Garrett	64.51	Transition/Selection	Tractor or Skidder
1-05NTMP-017-SON-NTO4	Lester Gray	Lester Gray	7.99	Group Selection	Tractor or Skidder
1-05NTMP-017-SON-NTO4	Lester Gray	Lester Gray	5.61	Rehabilitation of Understocked	Tractor or Skidder
1-05NTMP-017-SON-NTO4	Lester Gray	Lester Gray	2.09	Rehabilitation of Understocked	Tractor or Skidder

PART OF PLAN

1-05NTMP-017-SON-NTO4	Lester Gray	Lester Gray	3.96	Rehabilitation of Understocked	Tractor or Skidder
1-05NTMP-017-SON-NTO4	Lester Gray	Lester Gray	4.43	Group Selection	Tractor or Skidder
1-05NTMP-017-SON-NTO4	Lester Gray	Lester Gray	5.77	Rehabilitation of Understocked	Tractor or Skidder

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 NTMPs listed below can be considered a future project as NTOs may be filed at any point during the life of the NTMP. It is unlikely that The RPF is unaware of any future NTOs actively being planned on any of these NTMPs. The landowner intends to submit another THP, Salt THP, to the east of this THP. This plan is actively being developed, and is expected to be submit in the 4th quarter of 2025. Given the proximity of the two plans, concurrent operations are likely to occur on these projects. Both plans will contain protection measures for biological resources so impacts between concurrent operations are expected to be less than significant. This plan will utilize unevenaged silviculture. This THP will undergo agency review and be required to incorporate biological protection measures.

The THP includes required protection measures for listed species, considerations for habitat, and multiple practices that will result in a net positive effect on Biological Resources in the THP area:

- 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, II-S, II-L core zones. In addition, an Erosion Control Plan will be 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 provides for canopy retention, protection for springs, protection for wet areas, LWD recruitment and sedimentation prevention. In addition, an Erosion Control Plan will be 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, an EEZ shall be flagged around the area and 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 watercourses may provide LWD in the future.

- Measures to benefit canopy: Timber harvesting within all WLPZs will be limited to maintain required canopy closure levels. 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: Any den located during operations or layout 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.
- 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 watercourses may provide LWD in the future.
- Silviculture: The silvicultural methods and management techniques to be utilized during this harvest will retain all ages and sizes of trees, including larger and older trees and will result in more of a multistory canopy structure in the future. Within the BAA, where un-evenaged management is applied, multistoried stands will be maintained or developed.
- Road Construction: Road construction ,if proposed, will be subject to agency review to avoid impacts to slope stability or watercourses. After operations the road will be stabilized.
- 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, especially those with rotten cavities.

Increased levels of rural residential and agricultural development are expected to occur in the assessment area in the future.

PART OF PLAN

Biological Assessment Area-Future Plans(NTMP)

NTMP Number	Landowner	Timber Owner	Acres in BAA	Silviculture	Yarding Method
1-05NTMP-017-SON	Lester Gray	Lester Gray	123.97	Unevenaged Management	Unknown
1-01NTMP-048-SON	Alice Garrett	Alice Garrett	143.80	Selection	Tractor or Skidder
1-01NTMP-048-SON	Alice Garrett	Alice Garrett	12.17	Transition	Tractor or Skidder
1-04NTMP-001-SON	Jim Ragle, Cindy Ragle et al	Jim Ragle, Cindy Ragle et al	27.15	Selection	Tractor or Skidder
1-04NTMP-001-SON	Jim Ragle, Cindy Ragle et al	Jim Ragle, Cindy Ragle et al	8.90	Selection	Cable System
1-04NTMP-001-SON	Jim Ragle, Cindy Ragle et al	Jim Ragle, Cindy Ragle et al	35.37	Selection	Tractor or Skidder

Biological Assessment Area-Future Plans(THP)

THP Name	Landowner	Timber Owner	Acres in BAA	Silviculture	Yarding Method
Salt	GRT	GRT	282	Selection, Transition	Tractor and Cable

Biological Resources- Proposed THP

Biological Assessment Area-Present Plans(NTMP)

NTMP Number	Landowner	Timber Owner	Acres in BAA	Silviculture	Yarding Method
1-05NTMP-017-SON	Lester Gray	Lester Gray	123.97	Unevenaged Management	Unknown
1-01NTMP-048-SON	Alice Garrett	Alice Garrett	143.80	Selection	Tractor or Skidder
1-01NTMP-048-SON	Alice Garrett	Alice Garrett	12.17	Transition	Tractor or Skidder
1-	Jim Ragle,	Jim Ragle,	27.15	Selection	Tractor or

04NTMP-001-SON	Cindy Ragle et al	Cindy Ragle et al			Skidder
1-04NTMP-001-SON	Jim Ragle, Cindy Ragle et al	Jim Ragle, Cindy Ragle et al	8.90	Selection	Cable System
1-04NTMP-001-SON	Jim Ragle, Cindy Ragle et al	Jim Ragle, Cindy Ragle et al	35.37	Selection	Tractor or Skidder

There are no known present projects within the BAA. The above listed NTMPs may be considered to be present projects are they are currently approved documents. Prior to harvesting an NTO would need to be filed by the Landowner.

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.

Identification of Information Sources: C. Biological Resources

U.S. Fish and Wildlife Service. 2002. Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon. viii + 173 pp.

California Red Legged Frog Movement and Habitat Use , Dr. Gary Fellers, Western Ecology Research Center, July 2007

CNPS Inventory web site, <http://www.rareplants.cnps.org/>

California Department of Fish and Wildlife web site (public and subscription based data) <https://www.wildlife.ca.gov/>

Raptors of California, Hans and Pam Peeters, 2005 University of California Press

The Audubon Society Field Guide to North American Bird, John Whitaker, Alfred Knopf Inc 1992

The Audubon Society Field Guide to North American Bird, Bebler and King, Alfred Knopf Inc 1992

California Mammals, E.W. Jameson and Hans Peeters, University of California Press, Berkeley, 1988.

California's Wildlife, Vol. I - Amphibians and Reptiles, California Statewide Wildlife Habitat Relationships System, May 2, 1988.

California's Wildlife, Vol. II - Birds, California Statewide Wildlife Habitat Relationships System, November, 1990.

California's Wildlife, Vol. III - Mammals, California Statewide Wildlife Habitat Relationships System, April, 1990.

CWHRs Townsends Big Eared Bat J. Harris updated 2000

Petition to List COTO Center for Biological Diversity 2013.

Field Guide to the Birds of North America, National Geographic Society, 1987.

Scats and Tracks of the Pacific Coast, James Halfpenny, 1999 Falcon Publish

The Jepson Manual: Higher Plants of California, James C. Hickman, editor. University of California Press, Berkeley, 1993.

FRAP Multi-source Land Cover Data v02_2 (FVEG02_2, 2002)

CA Resources Agency Ownership Data (GOVLANDS, July 2002)

NCWAP North Coast Watershed Assessment Program, March 2003

Gualala Redwoods Inc. Stream Reports For The Years 1995 To 2013

Gualala River Watershed Technical Support Document by North Coast Regional Water Quality Control Board 2001

Environmental Protection Agency. Guidelines for Reviewing TMDLs under Existing Regulations issued in 1992. 2002.

Dennis Halligan. GRI Westside THP Fisheries Report. 2000. NRM 1434 Third St. Eureka, CA 95501

Holloway G.L., Caspersen J.P., Vanderwel M.C., Naylor B.J. (2007): Cavity tree occurrence in hardwood forests of central Ontario. *Forest Ecology and Management*, 239: 191–199.

Gualala River Watershed Literature Search And Assimilation By Patrick Higgins 791 Eighth Street, Suite N, Arcata, CA 95521 707-822-9428

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

GRI property wide Rare Plant Assessment by Clare Golec, updated 2001

Nest Site Selection And Breeding Status Of Ospreys In The Gualala Redwoods, HJW

Wildlife Species With Special Status That May Be Present On Gualala Redwoods Or Other HJW Managed Properties By Lawrence Kobernus 1995 Updated By Troy Leopardo 1999

CDF Guidelines For Species Surveys. RPF Mass Mailing July 1999

Northwest Weeds, Ronald Taylor, Mountain Press Publishing 1990

Pacific Coast Berry Finder, Gleen Keator, Natural Study Guild 1978

McMullin, T., Stone, D., Lendemer, J. & Allen, J. 2021. *Sulcaria spiralifera*. The IUCN Red List of Threatened Species 2021: e.T80703106A80703113. <https://dx.doi.org/10.2305/IUCN.UK.2021-1.RLTS.T80703106A80703113.en>

Golec, C., LaBanca, T., & Leppig, G. (2007). The Conservation of Sensitive Plants on Private Redwood Timberlands in Northern California. https://www.fs.usda.gov/psw/publications/documents/psw_gtr194/psw_gtr194_25.pdf

Sholars, Teresa & Golec, Clare. (2007). Rare Plants of the Redwood Forest and Forest Management Effects.

R.K. Brummitt 2012, *Calystegia purpurata* subsp. *saxicola*, in Jepson Flora Project (eds.) Jepson eFlora, https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=49561, accessed on October 23, 2024.

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 near the county road Annapolis Road, trespass is difficult to control. The Wheatfield Fork of the Gualala River is located adjacent to the plan and may see light recreational usage. No recreators were observed during the time spent during the time laying out this THP. Adherence to WLPZ/ASP protections will avoid any potential impacts to recreation by avoiding impacts to the channel and creating a buffer of retained trees adjacent to the Wheatfield Fork. Conventional logging operations are not known to have caused any significant adverse impacts to recreation resources in the area in the past, therefore, none are anticipated from this THP, neither singly nor cumulatively.

Recreation- Past Projects

In the past, private land ownership within the assessment area have reduced recreation activities or opportunities but did not affect or impact any known recreation areas or STAs, as there are none in the assessment area.. The Gualala River watershed has had a long and on going history of timber harvest.

Recreation Reasonably Foreseeable Probable Future Projects

Future projects within the assessment area on GRT property will likely continue to lack recreation opportunities. Adjacent landowners within 300' are mostly small landowners that can recreate at all of the public land available in coastal Sonoma and Mendocino counties, Tourists and travelers will continue to use the public beaches and parks outside of the assessment area. 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 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 river users. These impacts are largely expected to be in the form of visual and noise. The visual impacts assessment is included below.

Recreation Resource Conclusion

The existing conditions within the Recreation Assessment Area indicate that the Gualala River is a publicly accessible recreational resource. Conventional logging operations are not known to have caused any significant adverse impacts to recreation resources in the area in the past, therefore, none are anticipated from this THP, neither singly nor 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

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.

Petreshen, J. (2021). Fog Presence and Ecosystem Responses in a Managed Coast Redwood; Forest; (thesis).

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

Similar to the scoping process for CNDDB species occurrence by quadrangle, the list of possible visual source locations is numerous within the assessment area. 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. This scenario does not occur within the assessment area. Additionally, this plan is not visible from any Scenic Highways.

Visual- Past Projects

Past projects within the assessment area have resulted in the current stands of dense trees with some pockets that are brushed dominated that comprise the project area. The previous silvicultural practices resulted in an aesthetic alteration to the forest canopy by removing a substantial portion of trees disrupting the canopy intactness. Reforestation efforts and natural regeneration have since resulted in a canopy that is generally intact with some gaps. 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 landowner is aware of public perception and the selected uneven-aged silvicultures, in part, reflect that concern. The silvicultural prescriptions proposed in this plan provide for significant retention as a visual objective. Form, texture and color will not be significantly altered in portions of the plan area where road, skid trail, or harvest management is proposed. Management activities will be visually subordinate to the characteristic landscape. In the middle ground view, small unconnected areas (gaps in canopy, skid trails opened during operations, etc.) will be visible from available vantage points, due to the steep mountainous characteristics, bisecting draws, and viewing angles. In the foreground the retention of eye level vegetation and tall trees will obstruct the view of harvesting activities. Uneven-aged management will provide sufficient residual trees and vegetation that will not be visually displeasing.

This plan is not known to be visible from any publicly traveled road. Although uncommon near this project, recreationists are possible along the gravel bars of the Gualala River or in the active channel. The WLPZ retention requirements will create a view blockage when viewed from this angle, making the project difficult to discern.

Logging slash is a byproduct of timber harvesting that is generally considered to be unsightly. A study of post thinning slash depth in the redwood region found that slash depth decreased by 50-66% over a 4 year period(O'Hara 2010) . Assuming similar rates of slash depth decay, the visual impacts of slash are expected to be short lived and difficult to discern. Minimal slash will be visible from the Wheatfield Fork of the Gualala River, the nearest public viewing point, owing to WLPZ harvest restrictions.

Visual Resource Conclusion

The existing conditions within the Visual Assessment Area indicate that there are no 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 shall 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.

Cal. Board of Forestry & Ascent Environmental, California Vegetation Treatment Program Final Program Environmental Report, November 2019

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

National Agriculture Imagery Program (NAIP). 2010, 2012 and 2014 Imagery

.

Identification of Information Sources: E. Visual 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.

National Agriculture Imagery Program (NAIP). 2010, 2012 and 2014 Imagery

O'Hara, K. L., Nesmith, J. C. B., Leonard, L., & Porter, D. J. (2010). Restoration of Old Forest Features in Coast Redwood Forests Using Early-stage Variable-density Thinning. *Restoration Ecology*, 18(s1), 125–135. <https://doi.org/10.1111/j.1526-100X.2010.00655.x>

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 Skaggs Spring Road. After leaving this first order roads log traffic is expected to head west to HWY 1 or east to Skaggs Springs Road. All the routes from the project area to the delivery destinations are commonly utilized by logging traffic. Line of sight distance for merging safely onto Annapolis Road at the one encroachment point 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 off 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. The Sonoma County Roads Division maps list the pavement condition for Annapolis Road as ranging from Poor to Excellent and the relevant portion of Skaggs Springs Road as Excellent to Good.

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 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. The Sonoma County Roads Division does not show any proposed paving projects on the assessed portions of roads.

Traffic- Proposed THP

Timber from this project will be hauled via private logging roads to Annapolis Road. This road is 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. Roughly 4.6 road miles from the project access point is Horicon Elementary School, which is a small elementary school. Pick up and drop off occurs primarily within the school's parking lot which is located away from Annapolis Road. Increases in traffic as a result of this project are expected to be minor, and there 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 greenhouse gases 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 16 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 due to the fact that 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, with the 2019 atmospheric CO₂ concentration reaching 409.8 parts per million. This is a higher concentration of atmospheric CO₂ than has been observed in the past 800,000 years. 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 time 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 increase 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, GARB 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 non-forest 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 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, Selection and Group Selection areas are promptly replanted and regenerated with healthy seedlings 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

PART OF PLAN

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 **36,166 metric tons of CO₂ over the 105-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.

Pepper THP – GHG Summary Estimate

Selection (33 Acres)

PART OF PLAN

Emissions Source/Sink/Reservoir	Total Tons CO2 Sequestered/Emitted
Live Trees	366.76
Wood Products	21.08
Site Prep Emissions	0.00
Non-Bio Harvest Emissions	-3.55
Non-Bio Milling Emissions	-0.38
Total Sequestration	5,269
Years to Recoup	4 years

Transition (16 Acres)

Emissions Source/Sink/Reservoir	Total Tons CO2 Sequestered/Emitted
Live Trees	205.35
Wood Products	91.45
Site Prep Emissions	0
Non-Bio Harvest Emissions	-31.20
Non-Bio Milling Emissions	-1.70
Total Sequestration	2,019
Years to Recoup	10 years

Group Selection (269 Acres)

Emissions Source/Sink/Reservoir	Total Tons CO2 Sequestered/Emitted
Live Trees	212.03
Wood Products	92.58
Site Prep Emissions	0
Non-Bio Harvest Emissions	-62.93
Non-Bio Milling Emissions	-1.82
Total Sequestration	28,878
Years to Recoup	9 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 3-10 years depending on silviculture 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

Bast, J. and Taylor, J., 2007. Scientific Consensus on Global Warming. Results of an international survey of climate scientists. Second Edition. The Heartland Institute, Chicago Illinois, c. 2007

Battles, John J., et al. 2006 Climate Change Impact on Forest Resources: A Report From: California Climate Change Center.

Bemis, G., 2006. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004. Staff Final Report. California Energy Commission, December 2006. CEC-600-2006-013-SF. 117 pages.

Board of Forestry and Fire Protection (2008); Report (Draft) to ARB on Meeting AB 32 Targets. California Environmental Protection Agency - Air Board, (2008): News Release 08-103, December 12, 2008 "ARB adopts landmark rules to clean up pollution from 'big rigs'."

California Energy Commission. 2004. Baseline Greenhouse Gas Emissions for Forest, Range, and Agricultural Lands in California. <http://www.energy.ca.gov/reports/CEC-500-2004-069/CEC-500-2004-069F.PDF>

Ferguson, R. 2006. Issues in the Current State of Climate Science. A Guide for Policy Makers and Opinion Leaders. The Center for Science and Public Policy. Washington, D. C. March 2006.

Governor Arnold Schwarzenegger, State of California Executive Order S-3-05, Greenhouse gas emission reduction targets, June 1, 2005.

Joyce and Nungesser, 2000. Ecosystem Productivity and the Impact of Climate Change. USDA Forest Service Gen. Tech. Rep. RMRS-GTR-59. (pgs. 46-68) 2000.

James, C; B. Krumland, and P. Eckert. 2007. Carbon Sequestration in California Forests; Two Case Studies in Managed Watersheds. [http://www.spi-ind.com/html/pdf/forests/CARBONSEQUESTRATION .pdf](http://www.spi-ind.com/html/pdf/forests/CARBONSEQUESTRATION.pdf)

Lippke, B.; J. Perez-Garcia, J. Bowyer, J. Meil. 2004. CORRIM: Life Cycle Environmental Performance of Renewable Building Materials. *Forest Products Journal* 54(6): 8-19

Mader, S. 2007. Climate Project: Carbon Sequestration and Storage by California Forests and Forest Products.

<http://www.foresthealth.org/pdf/CH2M%20Hill%20Forest%20Carbon%20Study.pdf>

Robert F. Powers, Mcfarlane, Karris J, Stephen H Schoenholtz, Steven S. Perakis (in review); Soil Organic Matter Quality in Intensively Managed Ponderosa Pine Stands in California. 2005.

National Energy Technology Laboratory, 2000. Terrestrial Sequestration Program, Capture and Storage of Carbon in Terrestrial Ecosystems. Program Facts. U.S. Department of Energy, National Energy Technology Laboratory, November 2000, 4 pages.

Stern, N. 2006. The Economics of Climate Change: the Stern Review. http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm

United Nations Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. <http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter9.pdf>

U.S. Department of Agriculture, Forest Service. 2007. Forest Inventory and Analysis 2007. <http://www.fs.fed.us/pnw fia>

U.S. Department of Energy. 2005. 1605(b) Tables. <http://www.eia.doe.gov/oiaf/1605/index.html>

U.E. Environmental Protection Agency (U.S.E.P.A.). 2005. Greenhouse Gas Mitigation Potential in U.S. Forestry and Agriculture. <http://www.epa.gov/sequestration/pdf.greenhousegas2005.Pdf>

U.S. Fish & Wildlife Service and National Marine Fisheries Service (FEIS). 2006. Final Environmental Impact Statement for Authorization for Incidental Take and Implementation of a Multiple Species Aquatic Habitat Conservation Plan and Candidate Conservation Agreement with Assurances: Green Diamond Resource Company, Del Norte and Humboldt Counties, California.

U.S. Senate, Environment and Public Works committee. 2008. Minority Report: More than 650 International Scientists Dissent Over Man-Made Global Warming Claims.

<http://epw.senate.gov/public/index.cfm?FuseAction=Minority.Blogs&ContentRecordid-2158072e-802a-23ad-4 5tD-274616db87e6>

California Forest Carbon Plan, California Department of Forestry and Fire Protection, California Natural Resources Agency, California Environmental Protection Agency, May 2018.

CARB. (2008). Climate Change Scoping Plan - a framework for change. Sacramento, CA: California Air Resources Board.

CARB. (2018). An Inventory of Ecosystem Carbon in California's Natural and Working Lands. Sacramento, CA: California Air Resources Board.

CARB. (2020). An Inventory of Ecosystem Carbon in California's Natural & Working Lands. California Air Resources Board.

CARB 2022, California Greenhouse Gas Emissions for 2000 to 2020: California Air Resources Board, October 26, 2022.

CARB 2022, 2022 Scoping Plan for Achieving Carbon Neutrality. California Air Resources Board, November 16, 2022.

Christensen, G., Gray, A., Kuegler, O., Tase, N., & M, R. (2021). California Forest Ecosystem and Harvested Wood Product Carbon Inventory: 2019 Reporting Period Update. Sacramento: California Department of Forestry and Fire Protection and California Board of Forestry.

EPA. (2020). Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2018. U.S. Environmental Protection Agency.

Forest Climate Action Team. (2018). California Forest Carbon Plan - Managing our Forest Landscapes in a Changing Climate. Sacramento.

H. Wildfire Risk and Hazard: Assessment

Fire is an integral part of California's forested ecosystems, and as such is always a factor that must be considered while managing California forestlands. This analysis seeks to assess the fire risk of the Plan area both before and after harvest operations and characterize the fire risk going forward into the future. The assessment area includes the project boundary plus 300 feet and any known residential homes and dwellings within the vicinity of the project. Based on field assessments and a review of satellite imagery no structures occur within this assessment area.

Wildfire Risk and Hazard Baseline Conditions

The plan area fire fuel conditions are typical of Western Sonoma County timberlands of the redwood forest, and other associated natural communities 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 a High zone. The Sonoma County General

Plan 2020, Sonoma County Hazard Mitigation Plans (April 2017), and DRAFT Sonoma County Community Wildfire Protection Plan (2023) were also reviewed. County mapping of fire hazard severity defers to CAL FIREs maps particularly in the wildland and wildland urban interface areas. The County identifies the plan area located within the High and Very High zones of the SRA.

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.

Through management of the stand, 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. A review of satellite images along with on the ground inspection show that the forest canopy is generally homogenous with almost the entire plan area having crown continuity. The selective removal of trees will result in crown separation reducing vertical and horizontal continuity within the stand. Although no particular prescriptive condition is proposed for postharvest crown spacing, the separating of crowns is expected to occur as the result of the reopening/creation of skid trails, cable corridors, roads, and the removal of trees. Given the heterogenous nature of redwood forests, patches of crown continuity will exist post harvest but the general trend will be towards a more spaced out canopy following operations. 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.

PART OF PLAN

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.

Timber harvesting maintains, reuses, and creates skid trails, cable corridors and truck roads. These features create linear breaks in crown continuity in an area that generally has a contagious forest canopy. Fuel hazard reduction and slash treatment, where the condition or location exists, is addressed in Section II of the plan. 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 Sea Ranch CAL FIRE station is approximately 1 mile from the plan access gate. Access to the plan area is gained from the Annapolis Road. The majority of 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. An externality of this is that these same roads can readily facilitate safe and rapid access for fire suppression vehicles and landing present an opportunity to safely stage vehicles and unload firefighting equipment (Moghaddas 2007). Unsurprisingly, roads are actually among the greatest predictor 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 a mix of silvicultures. This has resulted in areas with a large number of small diameter trees and high amount of crown continuity along with a dense brushy understory. 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. Past projects and the lack of management have had an impact on fuel loading.

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, Group Selection, No Harvest, and Transition) will not significantly increase the risk of increased horizontal and/or vertical continuity or forest fuel loading. The dispersed retention requirements of the selected silvicultures(excluding No Harvest) will result in a reduction of stems per acre that will generally reduce crown continuity through the thinning of trees. Crown continuity will further be reduced by opening up of skid trails and roads, road daylighting, and the creation of cable corridors. The intention of the plan submitter 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 use of unevenaged silviculture will release less of an understory brush component than evenaged silvicultures. The reopening of skid trails periodically also helps to maintain disrupt surface fuels throughout the stands.

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 on site, 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

Johnston, Kilbride, J. B., Meigs, G. W., Dunn, C. J., ; Kennedy, R. E. (2021). Supplemental Online Material For: Does conserving roadless wildland increase wildfire activity in western US national forests? Environmental Research Letters, 16(8), 84040-. <https://doi.org/10.1088/1748-9326/ac13ee>

Moghaddas, & Craggs, L. (2007). A fuel treatment reduces fire severity and increases suppression efficiency in a mixed conifer forest. International Journal of Wildland Fire, 16(6), 673–678. <https://doi.org/10.1071/WF06066>

Narayananaraj, & Wimberly, M. C. (2011). Influences of forest roads on the spatial pattern of wildfire boundaries. International Journal of Wildland Fire, 20(6), 792–803. <https://doi.org/10.1071/WF10032>

O'Hara, K. L., Nesmith, J. C. B., Leonard, L., & Porter, D. J. (2010). Restoration of Old Forest Features in Coast Redwood Forests Using Early-stage Variable-density Thinning. Restoration Ecology, 18(s1), 125–135. <https://doi.org/10.1111/j.1526-100X.2010.00655.x>

Sonoma County General Plan, 2020

Sonoma County Hazard Mitigation Plan, 2023

Sonoma County Community Wildfire Protection Plan DRAFT, 2023

CALFIRE FRAP GIS Data, 2023

PART OF PLAN

CALFIRE Fuels Reduction Map, Accessed 11/8/2023, <https://www.fire.ca.gov/what-we-do/natural-resource-management/fuels-reduction>

Other: Noise Assessment

The production of noise is an inherent part of timber operations and has the potential to negatively impact noise sensitive organisms. The noise assessment area involves that area within 0.5 miles of the project area. This is the greater-known distance for noise disturbance from timber operations for some listed wildlife species. (California Forest Practice Rules 2023, 14CCR 919.3(e)). For people, this distance should be equally acceptable. Minimal research is known by the RPF on the effects of noise from timber operations over long distances on humans, in the absence of existing research the use of animals as a proxy is an approach that is utilized (Poje 2010). At a distance of ½ mile there will be substantial vegetation and topographic barriers that are expected to act as sound barrier. Aircraft, trains, buses, automobiles, and other forms of transportation produce noise pollution that can lower the quality of life. At extreme levels, or at high levels over a long period of time, noise can permanently damage hearing (U.S. Department of Transportation, 2000). Sound is usually measured in decibels. The A-weighted scale, measuring the sound frequencies that humans can most easily hear, is the common reference point. As with the Richter Scale, which measures earthquakes, the measurements of decibels are non-linear; a 10-decibel increase in sound on a scale of A-weighted decibels (dBA) represents a perceived doubling of sound. A vacuum cleaner operating 10 feet away is audible at 70 to 75 dBA. Noise becomes annoying at 65 dBA and painful at 128 dBA (U.S. Department of Transportation, 2000).

The EIR for the JDSF Management Plan identified noise levels for traditional tractor logging ranging from 68 to 83 dBA at a distance of approximately 50 feet. Traditional tractor logging generates sounds from many sources throughout the harvest area, and usually for the duration of the harvest period. However, the noise from heavy equipment operating on the ground in a forested setting are often dampened or attenuated by the surrounding trees and soft ground surface. The noise level is inversely proportional to the receptor's distance from the source. Meaning the closer you are, the louder the sound. Noise level is also influenced by air density, wind, and obstructions (trees and natural landscape features).

All of the parcels within the project is zoned for timber production (TPZ), and such lands are exclusively dedicated to the growing and harvesting of timber for commercial purposes and compatible uses (Government Code Section 51115). Pursuant to the California Timberland Productivity Act (Government Code Section 51104(h)), "compatible uses" are limited to those which do not significantly detract from use of the property for, or inhibit, growing and harvesting timber. Under 14 CCR 897(a) (and Big Creek Lumber Co. v. County of San Mateo (1995) 31 Cal. App. 4th 418, 425, citing Gov. Code, §§ 51104, subd. (g), 51112, 51113), there is a legal presumption that "timber harvesting is expected to and will occur on such lands.". The project as proposed utilizes standard harvesting techniques and equipment in the implementation of the project, therefore the noise generated on this project is expected to be no greater than any of the other timber harvests that have occurred in the project assessment area.

The noise generated from this plan will be of short duration and will not be measurably additive with other ongoing projects that may be occurring in the area. Harvesting and truck noise is not anticipated to be any more prevalent than what has occurred in past years (refer to above section to see recent past timber harvest plans in the area). No significant and/or cumulative impacts related to noise will occur as a result of this operation.

Noise Baseline Conditions

The project area is located in a Rural Sonoma County. A review of satellite imagery has identified only a few structures and mobile homes within or adjacent to this ½ mile buffer. A total of 20 parcels(excluding the lands of GRT) are located within the ½ mile assessment area in Sonoma Counties. Of these 20 parcels, an additional 5 parcels are under the ownership of Mendocino Redwood Company another industrial timberland owner. Additionally, a northern spotted owl Activity Center (SON0009) is located within the noise assessment area. No sensitive receptors are known to exist within the assessment area.

For sensitive species as well as humans, the variety of aspects, topography, and forested conditions will likely reduce noise levels generated from the project area related to timber operations at those receptor points below the standards for noise which may affect noise sensitive land uses and species survival or behavior. It limits the distance that noise can travel or be heard. There is no marbled murrelet habitat within the project area

Noise Past Projects

Past projects likely had a similar impact as the area has been sparsely populated for the past century and logging has been a common occurrence in the area. Noise likely had a much larger impact on certain species that may be present within the BAA (0.7 miles of the project area) from past projects. Most of the major past projects that would have generated the noise that timber operations can produce was prior to the FPRs, however the Migratory Bird Treaty Act of 1918 would have already been in place for decades. Therefore, the impacts of past projects on noise for birds and sensitive animal species and humans was not significant from the project area.

As discussed above in the Biological Assessment , this area routinely sees some level of timber harvesting. Timber operations on 1-22-0097SON overlapped partially within the noise assessment area. This project incorporated projection measures for Northern Spotted Owls and other sensitives. 1-22-0097SON and this project propose seasonal restrictions on harvesting within buffers around Northern Spotted Owls to avoid noise impacts during the critical period for this species. No known deleterious effects from noise generated from 1-22-0097SON is known to exist.

Noise Future Projects

Again, because of the aspect, topography, relative size of the project, and forest types, future project impacts are limited and will be similar to the proposed THP impacts. The proposed Salt THP on the lands of GRT is entirely within a rural area similar in character to this project. Interactions between noise generated on both of these projects, should concurrent operations occur, are expected to be less than significant as the noise will occur in a largely undeveloped area. There are no known significant impacts to sound from other future projects.

Noise Proposed THP

The noise generated from this plan will be of short duration (probably 2 logging season; during the morning and afternoon hours and will not be measurably additive with ongoing projects that may be occurring in the area. Harvesting and truck noise is not anticipated to be more prevalent than what has occurred in past years from this ownership and other neighboring properties. The presence of timberlands yields significant aesthetic and economic benefits to the health and welfare of the residents of the county. People who purchase property near such agricultural lands are notified that they may be subject to inconvenience or discomfort from operations on agricultural lands. These inconveniences or discomfort are recognized as a normal aspect of living in a county with a strong rural character. The parcel where operations are proposed is zoned TPZ. The landowner and past landowner have conducted timber operations within and surrounding the project area over the past decades.

If operations from 1-22-097SON, an approved THP, occur at the same time as operations from this project, there may be a cumulative increase to noise levels in the areas of intersection between the two projects 0.5 mile noise assessment area. A majority of the noise buffer intersection falls within lands owned by Gualala Redwood Timber and Mendocino Redwood Co. The areas outside the landowner's control have been observed, based on satellite imagery review, to be unpopulated.

No sensitive receptors are known to exist in the area. The Wheatfield Fork of the Gualala River occurs within this noise assessment area. As discussed above, this stretch of river is not known to be frequently utilized for recreation.

No significant and/or cumulative impacts related to noise will occur as a result of this operation.

Noise Conclusion

The baseline conditions for noise impacts include the setting of the project area. The variety of aspects, topography, and forested conditions will likely reduce noise levels generated from the project area related to timber operations at those receptor points below the standards for noise which may affect noise sensitive land uses and species survival or behavior. This applies to past projects, the proposed THP and future projects. An evaluation of interactions of proposed project activities with the impacts of Past Projects and Reasonably Foreseeable Probable Future Projects on noise is that there is no significant cumulative impact, and that current conditions will be maintained through the project implementation.

Identification of Information Sources- I. Other (Noise)

The California Department of Forestry and Fire Protection Resource Management, Forest Practice Program. California Forest Practice Rules. 2023. 14 CCR 919.3 (e).

Google Earth

Hammer, MS. Swinburn, TK. Neitzel, RL. 2014 Environmental noise pollution in the United States: developing an effective public health response. Environ Health Perspectives. Feb;122(2):115-9. doi: 10.1289/ehp.1307272. Epub 2013 Dec 5. PMID: 24311120; PMCID: PMC3915267.

PART OF PLAN

Chepesiuk, R. 2005. Decibel hell: the effects of living in a noisy world. *Environ Health Perspectives*. Jan;113(1):A34-41. doi: 10.1289/ehp.113-a34. PMID: 15631958; PMCID: PMC1253729.

The Changing Face of Transportation. 2000. United States: U.S. Department of Transportation, Bureau of Transportation Statistics.

Draft Environmental Impact Report for Jackson State Demonstration Forest, 2005

ParcelQuest

Anton Poje, & Igor Potočnik. (2010). Noise Pollution in Forest Environment Due to Forest Operations Noise Pollution in Forest Environment Due to Forest Operations. *Croatian Journal of Forest Engineering*, 31(2), 137–148.

Pepper THP

BAA Past Plans Category Map

Legend

Silviculture Category

 Special Prescriptions & Other Management

 Unevenaged Management

 Biological Assessment Area

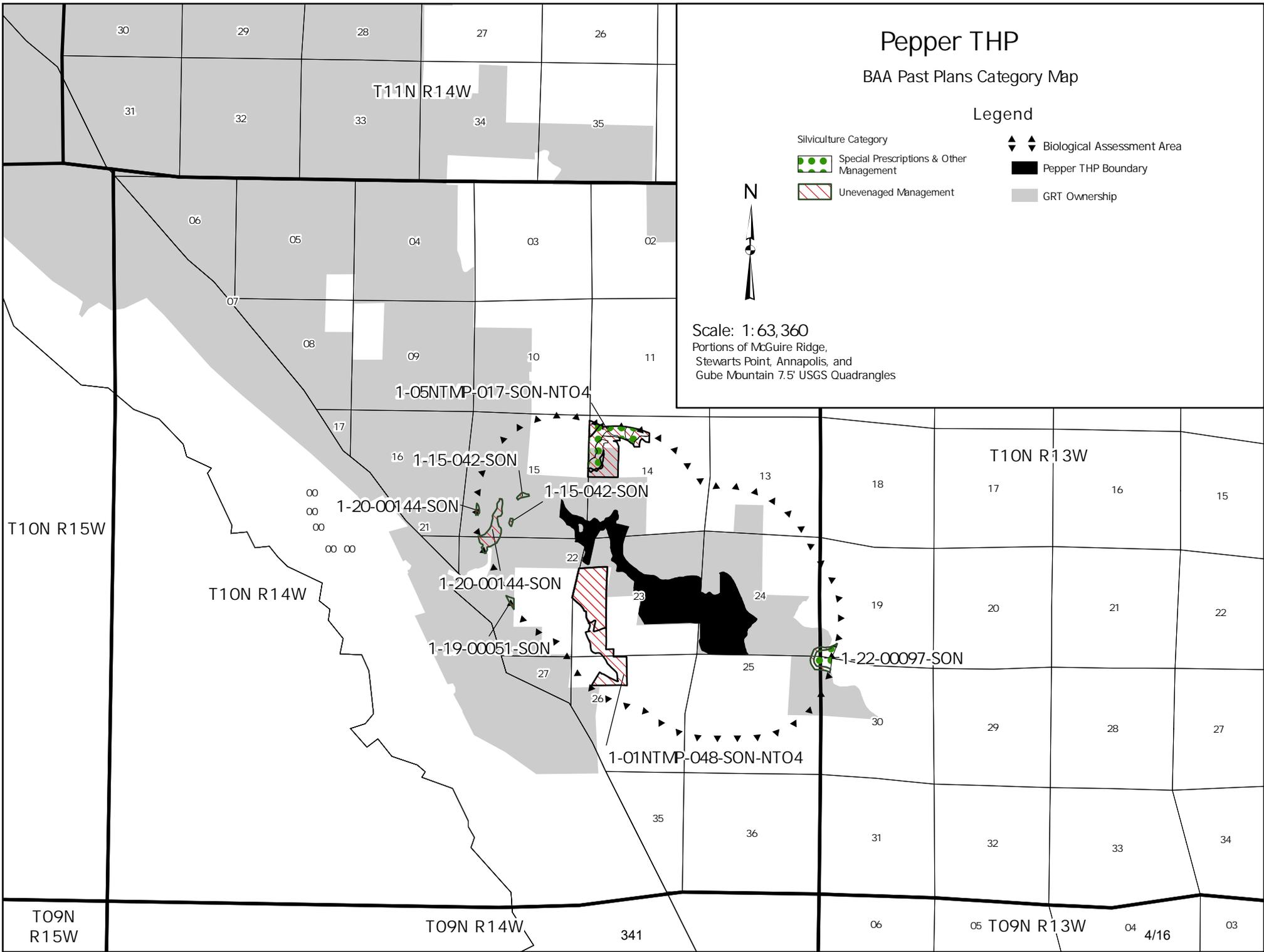
 Pepper THP Boundary

 GRT Ownership



Scale: 1:63,360

Portions of McGuire Ridge,
Stewarts Point, Annapolis, and
Gube Mountain 7.5' USGS Quadrangles



T10N R15W

T10N R14W

T11N R14W

T10N R13W

T09N
R15W

T09N R14W

05 T09N R13W

04 4/16

341

06

03

Pepper THP

BAA Past Plans Silviculture Map

Silviculture:

-  Selection
-  Group Selection

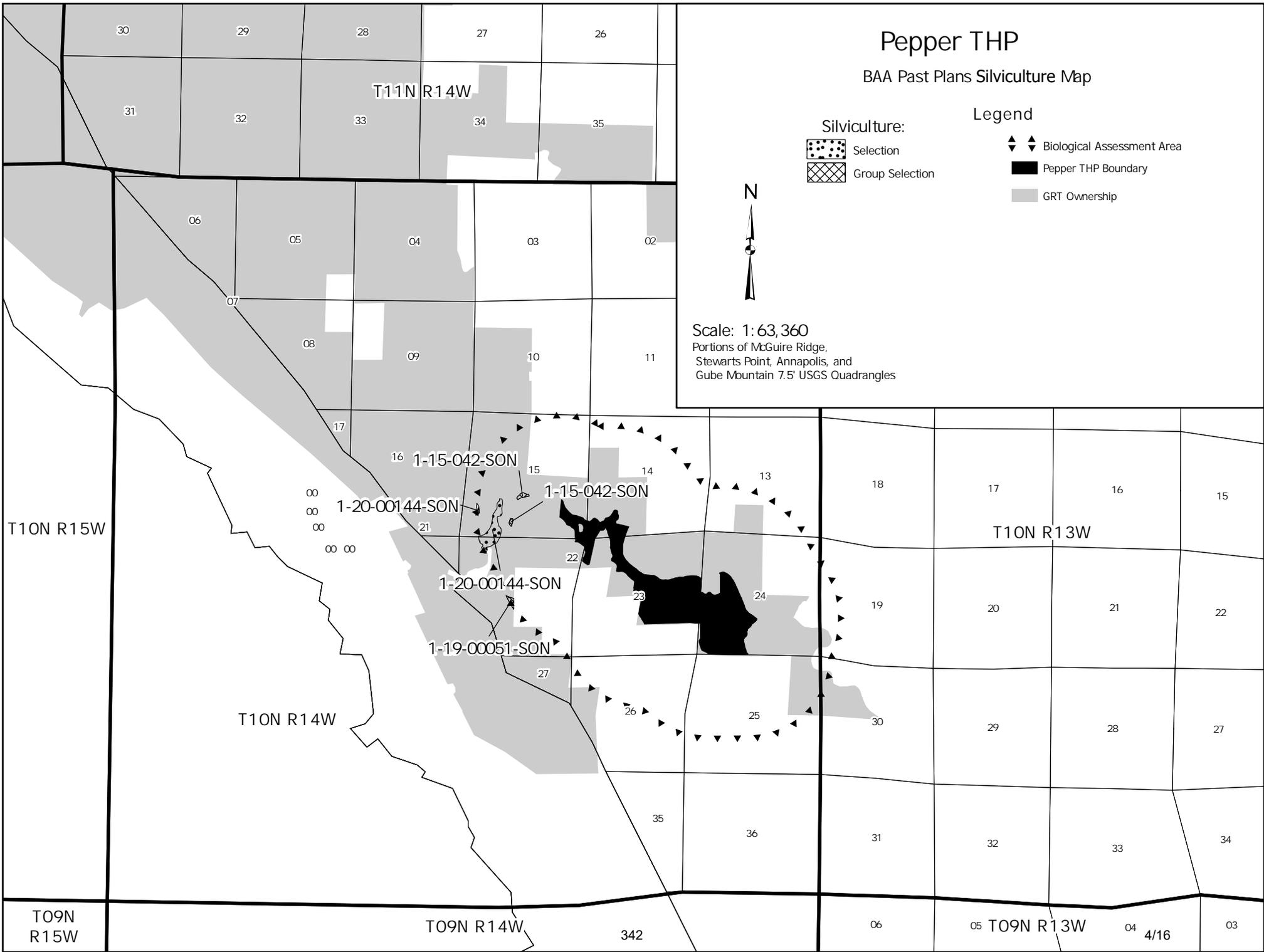
Legend

-  Biological Assessment Area
-  Pepper THP Boundary
-  GRT Ownership



Scale: 1: 63,360

Portions of McGuire Ridge,
Stewarts Point, Annapolis, and
Gube Mountain 7.5' USGS Quadrangles



PART OF PLAN

Pepper THP

BAA Future Plans Map

Legend

 Salt THP

 Biological Assessment Area

 Pepper THP Boundary

 GRT Ownership



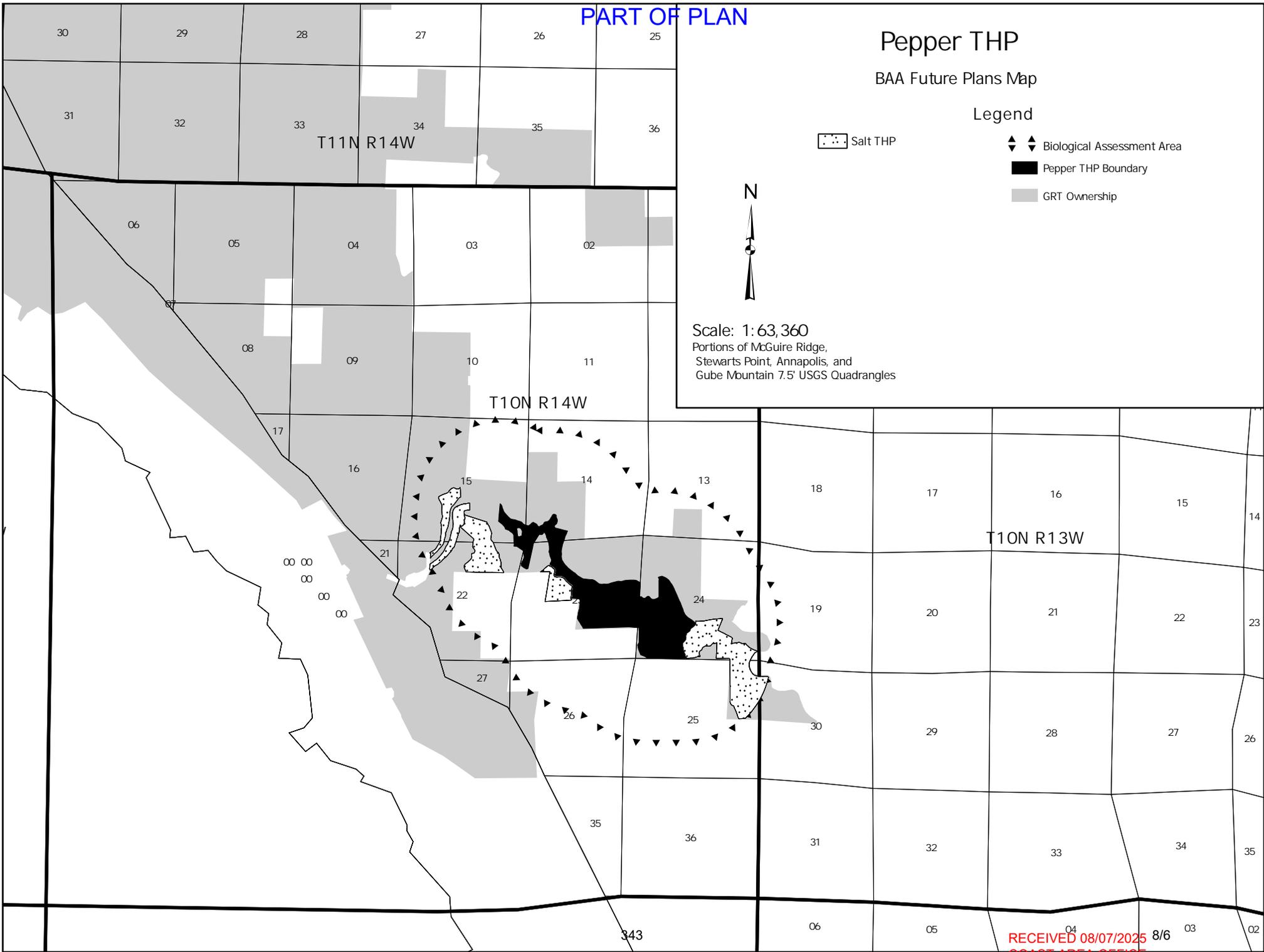
Scale: 1:63,360

Portions of McGuire Ridge,
Stewarts Point, Annapolis, and
Gube Mountain 7.5' USGS Quadrangles

T11N R14W

T10N R14W

T10N R13W



Pepper THP

WAA 10-Year Harvest History Map

Legend

Silviculture:

Selection

Group Selection

●●● Planning Watershed Boundary

■ Pepper THP Boundary

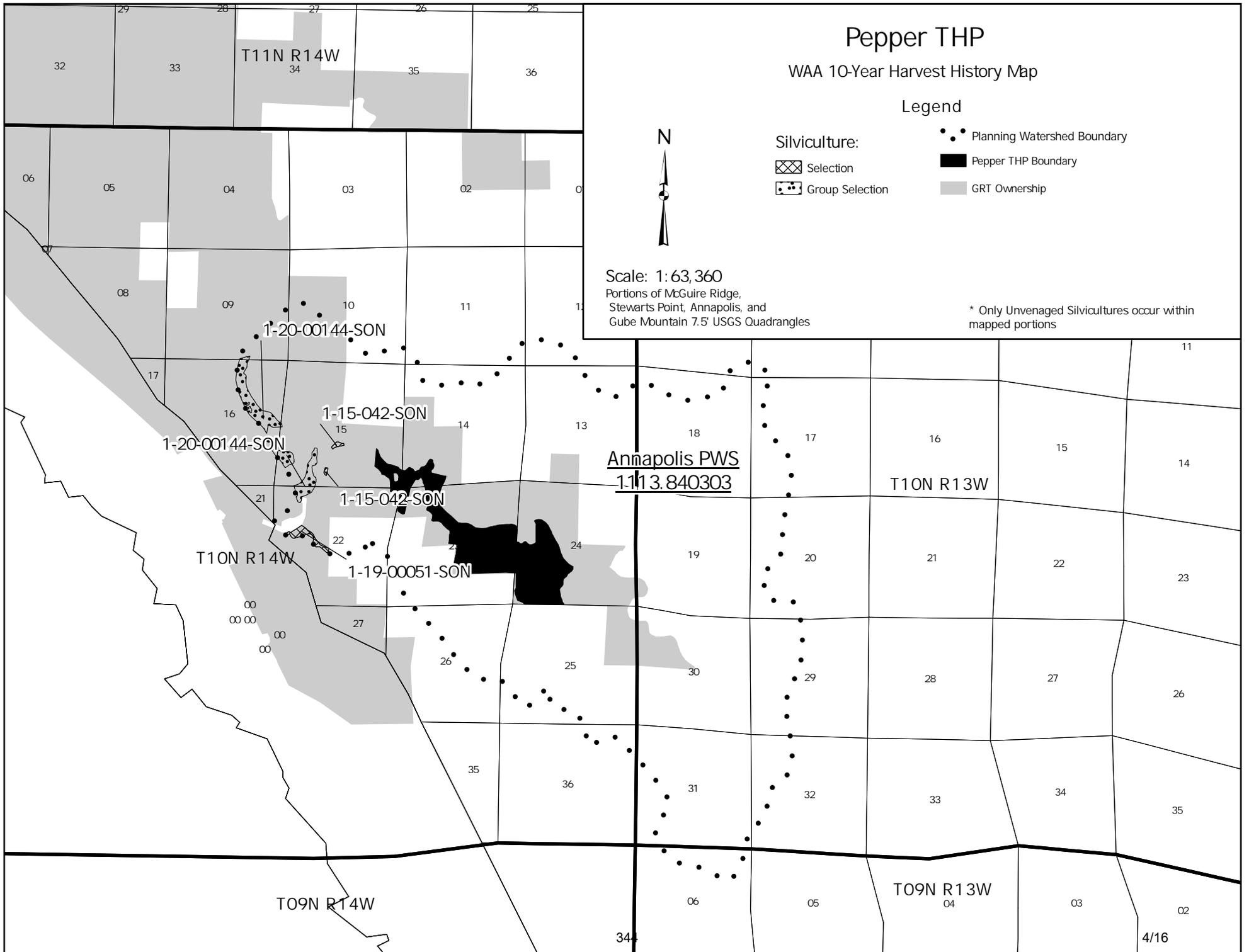
■ GRT Ownership



Scale: 1:63,360

Portions of McGuire Ridge,
Stewarts Point, Annapolis, and
Gube Mountain 7.5' USGS Quadrangles

* Only Unvenaged Silvicultures occur within
mapped portions



PART OF PLAN

Pepper THP

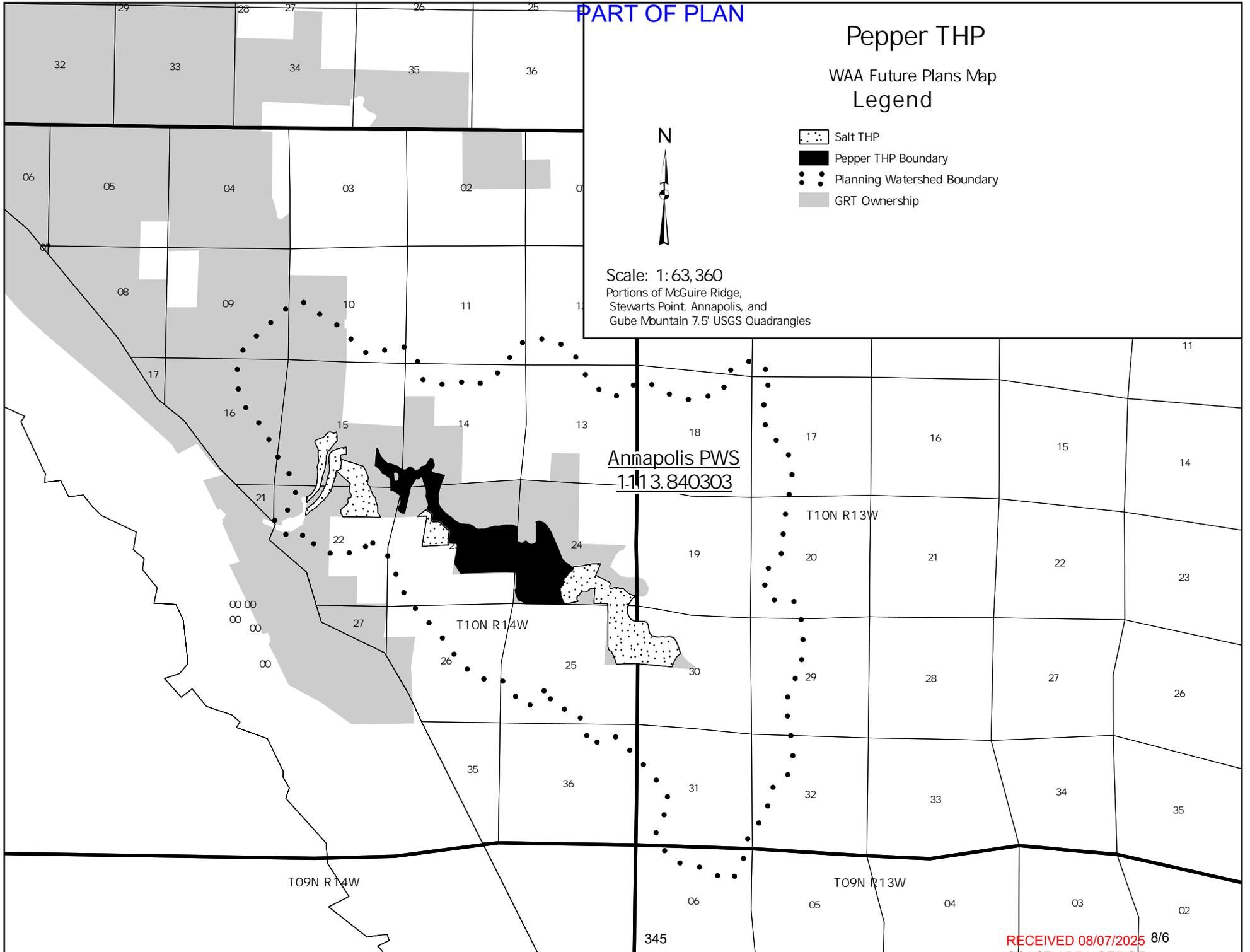
WAA Future Plans Map Legend

-  Salt THP
-  Pepper THP Boundary
-  Planning Watershed Boundary
-  GRT Ownership



Scale: 1: 63,360

Portions of McGuire Ridge,
Stewarts Point, Annapolis, and
Gube Mountain 7.5' USGS Quadrangles



Project Carbon Accounting: Harvesting Emissions: Group 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	
			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)	Steps 13 and 14 below
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))*3,67 (conversion to metric tonnes carbon dioxide equivalent)	
	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.									Computed. Landing Saws CO2 equivalent per Acre Harvested (metric tonnes)		
0	(0.02)	2	2	-0.36	-1.93	2	-0.56	-3.03	0	0.00	0.00	-0.01	-0.089926531
15	(0.01)	2	2	-0.36	-1.93	2	-0.56	-3.03	0	0.00	0.00	-0.01	-0.089926531
30	(0.02)	2	2	-0.36	-3.21	2	-0.56	-5.04	0	0.00	0.00	-0.01	-0.149877551
45	(0.03)	2	2	-0.36	-3.21	2	-0.56	-5.04	0	0.00	0.00	-0.02	-0.149877551
60	(0.02)	2	2	-0.36	-3.39	2	0.00	0.00	0	0.00	0.00	-0.01	-0.158204082
75	(0.02)	2	2	-0.36	-3.39	2	-0.56	-5.32	0	0.00	0.00	-0.01	-0.158204082
90	(0.03)	2	2	-0.36	-3.57	2	-0.56	-5.60	0	0.00	0.00	-0.02	-0.166530612
105	(0.03)	2	2	-0.36	-5.35	2	-0.56	-8.40	0	0.00	0.00	-0.02	-0.249795918
0	-	2	2	-0.36	0.00	2	-0.56	0.00	0	0.00	0.00	0.00	0
0	-	2	2	-0.36	0.00	2	-0.56	0.00	0	0.00	0.00	0.00	0
Sum Emissions	-0.18				-25.95			-35.46			0.00	-0.12	-1.21

PART OF PLAN

Received 07/14/2025
Coast Area Office
Resource Management

Project Carbon Accounting: Harvested Wood Products and Processing Emissions: Group Selection

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	90%	0%	20.51	0.00	-0.14	13.74	0.00	10.46	0.00
15	90%	0%	20.51	0.00	-0.14	13.74	0.00	10.46	0.00
30	90%	0%	34.19	0.00	-0.23	22.91	0.00	17.43	0.00
45	90%	0%	34.19	0.00	-0.23	22.91	0.00	17.43	0.00
60	95%	0%	36.09	0.00	-0.24	24.18	0.00	18.40	0.00
75	95%	0%	36.09	0.00	-0.24	24.18	0.00	18.40	0.00
90	100%	0%	37.99	0.00	-0.25	25.45	0.00	19.37	0.00
105	100%	0%	56.98	0.00	-0.38	38.18	0.00	29.05	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					-1.82	Sum of CO2 equivalent in wood products		92.58	0.00

Received 07/14/2025
Coast Area Office
Resource Management

Summary: Group Selection			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		9 Years
Live Trees (Conifers and Hardwoods)	143,92	212,03	63819,65457
Wood Products		92,58	27867,7167
Site Preparation Emissions		0,00	0
Non-biological emissions associated with harvesting		-62,93	-18941,13685
Non-biological emissions associated with milling		-1,82	-547,82
Sum of Net Emissions/Sequestration over Identified Harvest Cycles (CO2 metric tonnes)		95,94	28878,16314
Project Summary			
Project Acres	Step 17- Insert the acres that are part of the harvest area.		301
Total Project Sequestration over defined Harvesting Periods (CO2 metric tonnes)			28,878

Project Carbon Accounting: Inventory, Growth, and Harvest: Selection

This worksheet addresses the sequestration and emissions associated with the project area's balance of harvest, inventory, and growth plus any emissions associated with site preparation. Complete the input for Steps 0- 8 on this worksheet.

Forest Type				Harvest Periods		Inventory		Growth Rates		Harvest Volume		
Multipliers to Estimate Carbon Tonnes per MBF (Sampson, 2002)				Time of Harvest (years from project approval)		Conifer Live Tree Volume (MBF/Acre) - Prior to Harvest	Hardwood Live Tree Volume (BA square feet/Acre) - Prior to Harvest	Conifer Growth Rate BF/Acre/Year	Hardwood Growth Rate BA/Acre/Year	Conifer Harvest Volume (MBF/acre)	Hardwood Harvested / Treated Basal Area (BA/Acre)	
Forest Type	Step 0. Identify the approximate percentage of conifers by volume within the harvest plan. Must sum to 100%	Multiplier from Cubic Feet (merchantable) to Total Biomass	Pounds Carbon per Cubic Foot	Step 1. Enter the anticipated future harvest entries. The re-entry cycles should be supported by management plan, if available.	Step 2. Enter the estimated conifer inventory (mbf/acre) present in project area prior to harvest.	Step 3. Enter the estimated hardwood inventory (basal area per acre) present in project area prior to harvest.	Step 4. Enter the average annual periodic growth of conifers between harvests based on estimated growth in management plan, if available. Must be entered for each harvest cycle identified in Step 1.	Step 5. Insert average annual periodic growth of hardwoods between harvests based on estimated growth in management plan, if available.	Step 6. Enter the estimated conifer harvested per acre at current and future entries. The estimate should be based on projections from the management plan, if available.	Step 7. Enter estimated hardwood basal area harvested/treated per acre		
Douglas-fir	41%	1.675	14.38	User must enter harvest cycles to 100 years and/or at least three entry cycles.	0	30	60	400	0.2	2	0	
Redwood	53%	1.675	13.42		15	34	63	400	0.2	2	0	
Pines	0%	2.254	12.14		30	38	66	300	0.2	2	0	
True firs	6%	2.254	11.18		45	40.5	69	300	0.2	2	0	
Hardwoods		2.214	11.76		60	43	72	300	0.2	2	0	
Conversion of Board Feet to Cubic Feet	0.165	Pounds per Metric Tonne	2.204		75	45.5	75	300	0.2	2	0	
					90	48	78	300	0.2	2	0	
Multipliers to Estimate Total Carbon Tonnes per MBF	Conifer	1.74			105	50.5	81	300	0.2	2	0	
	Hardwoods	1.95			0	0	0	0	0	0	0	
Multipliers to Estimate Merchantable Carbon Tonnes per MBF	Conifer	1.02			0	0	0	0	0	0	0	
	Hardwoods	0.88			0	0	0	0	0	0	0	
				Harvest Periods	Inventory Conversion to Carbon (prior to harvest)		Inventory Conversion to Carbon Dioxide Equivalent (prior to harvest)		Site Preparation			
				from above (Time of Harvest as years from project approval)	Conifer Live Tree Tonnes (C/acre)	Hardwood Live Trees Tonnes (C/acre)	Conifer Live Tree Tonnes (CO ₂ equivalent/acre)	Hardwood Live Tree Tonnes (CO ₂ equivalent/acre)	Step 8. Enter the value (in bold) for each harvest cycle that best reflects the site preparation activities, as averaged across the project area:			
					Computed: MBF * Conifer Multiplier from Step 0.	Computed: BA*Volume/Basal Area Ratio (to convert to MBF) * Hardwood Multiplier from Step 0.	Computed: Conversion of carbon to CO ₂ (3.67 tonnes CO ₂ per 1 tonne Carbon)	Computed: Conversion of carbon to CO ₂ (3.67 tonnes CO ₂ per 1 tonne Carbon)	Heavy - 50% or more of the project area is covered with brush and removed as part of site preparation or stumps are removed (mobile emissions estimated at .429 metric tonnes CO ₂ e per acre, biological emissions estimated at 2 metric tonnes CO ₂ e per acre) Medium - >25% <50% of the project area is covered with brush and removed as part of site preparation (mobile emissions estimated at .202 metric tonnes CO ₂ e per acre, biological emissions estimated at 1 metric tonne per acre). Light - 25% or less of the project area is covered with brush and is removed as part of site preparation (mobile emissions estimated at .09 metric tonnes CO ₂ e per acre, biological emissions estimated at .5 metric tonnes per acre). None - No site preparation is conducted.			
					0	52	9	192	32	None		
					15	59	9	218	34	None		
					30	66	10	243	35	None		
					45	71	10	259	37	None		
					60	75	11	275	39	None		
					75	79	11	291	40	None		
					90	84	11	307	42	None		
					105	88	12	323	43	None		
					0	0	0	0	0	None		
				Difference between ending stocks and beginning stocks			131	11.27	Sum of emissions (Metric Tonnes CO ₂ e) per acre			

Project Carbon Accounting: Harvesting Emissions: 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))*3.67 (conversion to metric tonnes carbon dioxide equivalent)			
	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	(0.0044)	2	2	-0.36	-0.64	0	0.00	0.00	0	0.00	0.00	-0.0028	4.5	-0.02997551	
15	(0.0044)	2	2	-0.36	-0.64	0	0.00	0.00	0	0.00	0.00	-0.0028	4.5	-0.02997551	
30	(0.0044)	2	2	-0.36	-0.64	0	0.00	0.00	0	0.00	0.00	-0.0028	4.5	-0.02997551	
45	(0.0044)	2	2	-0.36	-0.64	0	0.00	0.00	0	0.00	0.00	-0.0028	4.5	-0.02997551	
60	(0.0044)	2	2	-0.36	-0.68	0	0.00	0.00	0	0.00	0.00	-0.0028	4.5	-0.031640816	
75	(0.0044)	0	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	-0.0028	4.5	-0.031640816	
90	(0.0044)	0	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	-0.0028	4.5	-0.033306122	
105	(0.0044)	0	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	-0.0028	4.5	-0.033306122	
0	-	0	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.0000	4.5	0	
0	-	0	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.0000	4.5	0	
Sum Emissions	-0.04			-3.24			0.00					-0.02			-0.25

Project Carbon Accounting: Harvested Wood Products and Processing Emissions: Selection

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	90%	0%	6.77	0.00	-0.05	4.53	0.00	3.45	0.00
15	90%	0%	6.77	0.00	-0.05	4.53	0.00	3.45	0.00
30	90%	0%	6.77	0.00	-0.05	4.53	0.00	3.45	0.00
45	90%	0%	6.77	0.00	-0.05	4.53	0.00	3.45	0.00
60	95%	0%	7.14	0.00	-0.05	4.78	0.00	3.64	0.00
75	95%	0%	7.14	0.00	-0.05	4.78	0.00	3.64	0.00
90	100%	0%	7.52	0.00	-0.05	5.04	0.00	3.83	0.00
105	100%	0%	7.52	0.00	-0.05	5.04	0.00	3.83	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				-0.38	Sum of CO2 equivalent in wood products		21.08	0.00

Summary: Selection			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		4 Years
Live Trees (Conifers and Hardwoods)	224.25	366.76	11002.73174
Wood Products		21.08	632.3718323
Site Preparation Emissions		0.00	0
Non-biological emissions associated with harvesting		-3.55	-106.5681394
Non-biological emissions associated with milling		-0.38	-11.25
Sum of Net Emissions/Sequestration over Identified Harvest Cycles (CO2 metric tonnes)		159.66	4789.774872
Project Summary			
Project Acres	Step 17- Insert the acres that are part of the harvest area.		30
Total Project Sequestration over defined Harvesting Periods (CO2 metric tonnes)			4,790

Project Carbon Accounting: Harvesting Emissions: Transition

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	
			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)	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)		Step 13. Enter Estimated Load Average: Mbf/Truck	Computed. Estimated Metric Tonnes CO2e per harvested acre for each harvesting period.
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))*3,67 (conversion to metric tonnes carbon dioxide equivalent)
	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.									Computed. Landing Saws CO2 equivalent per Acre Harvested (metric tonnes)		Steps 13 and 14 below
0	(0.02)	2	2	-0.36	-1.93	2	-0.56	-3.03	0	0.00	0.00	-0.01	-0.089926531
15	(0.02)	2	2	-0.36	-1.93	2	-0.56	-3.03	0	0.00	0.00	-0.01	-0.089926531
30	(0.02)	2	2	-0.36	-3.21	2	-0.56	-5.04	0	0.00	0.00	-0.02	-0.149877551
45	(0.02)	2	2	-0.36	-3.21	2	-0.56	-5.04	0	0.00	0.00	-0.01	-0.149877551
60	(0.02)	2	2	-0.36	-3.39	2	0.00	0.00	0	0.00	0.00	-0.01	-0.158204082
75	(0.02)	0	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	-0.01	-0.158204082
90	(0.02)	0	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	-0.01	-0.166530612
105	(0.02)	0	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	-0.01	-0.166530612
0	-	0	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0
0	-	0	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0
Sum Emissions	-0.17				-13.65			-16.13			0.00	-0.11	-1.13

Received 07/14/2025
Coast Area Office
Resource Management

Project Carbon Accounting: Harvested Wood Products and Processing Emissions: Transition

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	90%	0%	20.26	0.00	-0.14	13.58	0.00	10.33	0.00
15	90%	0%	20.26	0.00	-0.14	13.58	0.00	10.33	0.00
30	90%	0%	33.77	0.00	-0.23	22.63	0.00	17.22	0.00
45	90%	0%	33.77	0.00	-0.23	22.63	0.00	17.22	0.00
60	95%	0%	35.65	0.00	-0.24	23.88	0.00	18.17	0.00
75	95%	0%	35.65	0.00	-0.24	23.88	0.00	18.17	0.00
90	100%	0%	37.52	0.00	-0.25	25.14	0.00	19.13	0.00
105	100%	0%	37.52	0.00	-0.25	25.14	0.00	19.13	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				-1.70	Sum of CO2 equivalent in wood products		91.45	0.00

Received 07/14/2025
Coast Area Office
Resource Management

Summary: Transition			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		10 Years
Live Trees (Conifers and Hardwoods)	137.73	205.35	3285,529597
Wood Products		91.45	1463,169725
Site Preparation Emissions		0.00	0
Non-biological emissions associated with harvesting		-31.20	-499,1680535
Non-biological emissions associated with milling		-1.70	-27.12
Sum of Net Emissions/Sequestration over Identified Harvest Cycles (CO2 metric tonnes)		126.17	2018,734499
Project Summary			
Project Acres	Step 17- Insert the acres that are part of the harvest area.		16
Total Project Sequestration over defined Harvesting Periods (CO2 metric tonnes)			2,019