GUALALA RIVER FOREST

INTEGRATED RESOURCE MANAGEMENT PLAN

THE CONSERVATION FUND

in partnership with the California Wildlife Conservation Board and
The Nature Conservancy

August 2014

Cover photograph: Coast redwood tree in the Gualala River Forest.
Courtesy of John Pearson.

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List of Acronyms and Abbreviations

Basin Plan	Water Quality Control Plan for the North Coast Region
BMP	Best Management Practice
BRSC	Big River and Salmon Creek
CAL FIRE	California Department of Forestry and Fire Protection
Cal-IPC	California Invasive Plant Council
CalVeg	California Vegetation
CAR	Climate Action Reserve
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CE	conservation easement
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CHRIS	California Historic Resources Information System
CMZ	channel migration zone
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRT	Climate Reserve Tonne
CWA	Clean Water Act
DBH	diameter at breast height
DO	dissolved oxygen
EHR	erosion hazard rating
ELZ	Equipment Limitation Zone
EMAP	Environmental Monitoring and Assessment Program
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FIP	Functionally Independent Population
FMU	Forest Management Unit
FPR	Forest Practices Rules
FPS	Forest Planning and Project System
FSC	Forest Stewardship Council
GIS	geographic information system
GLO	General Land Office
GPS	Global Positioning System
GRF	Garcia River Forest
GRI	Gualala Redwoods, Inc.
GRSP	Gualala River Steelhead Project
GRWC	Gualala River Watershed Council
GuRF	Gualala River Forest
GWDR	General Waste Discharge Requirement
IFM	Improved Forest Management
IP	Intrinsic Potential

IPCC	Intergovernmental Panel on Climate Change
IRMP	Integrated Resource Management Plan
LiDAR	light detection and ranging
LWD	large woody debris
mmbf	million board-feet
MRC	Mendocino Redwood Company
MWAT	Maximum Weekly Average Temperature
NAD	North American Datum
NCRM	North Coast Resource Management
NCRWQCB	North Coast Regional Water Quality Control Board
NCWAP	North Coast Watershed Assessment Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	Nonpoint Source Program
NRCS	Natural Resource Conservation Service
NSO	northern spotted owl
NWIC	Northwest Information Center
PIA	Permitted Improvement Area
PRI	Program-Related Investment
PWS	Planning Watershed
QMD	quadratic mean diameter
RPF	Registered Professional Forester
SCC	State Coastal Conservancy
SCS	Scientific Certification Systems
SFI	Sustainable Forestry Initiative
SOD	Sudden Oak Death
SPWS	Super Planning Watershed
SRF	State Revolving Fund
Strategy	Strategy for Implementing State Revolving Fund for Expanding Use Projects
SWB	State Water Board
SWRCB	State Water Resources Control Board
the Fund	The Conservation Fund
THP	timber harvest plan
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WCB	California Wildlife Conservation Board
WLPZ	Watercourse and Lake Protection Zone
WTL	watercourse transition line

1. Executive Summary

1.1 Project Description

The Gualala River Forest was acquired in December 2011 by The Conservation Fund, in partnership with the California Wildlife Conservation Board and The Nature Conservancy. The project is part of The Conservation Fund's North Coast Forest Conservation Initiative that seeks to demonstrate that large, under-stocked tracts of coastal forest can be returned to ecological and economic viability through patient, adaptive management by a non-profit organization in partnership with private and public entities and community stakeholders.

As part of the sustainable management of the working forest, the Fund conveyed a conservation easement to The Nature Conservancy to maintain the conservation values inherent in the Gualala River Forest in perpetuity. The conservation easement describes the Gualala River Forest as "of great importance" to The Conservation Fund, The Nature Conservancy, residents of Mendocino County, and the State of California and a natural area which qualifies as a "relatively natural habitat of fish, wildlife, or plants, or similar ecosystem". One of the requirements under the conservation easement is to "achieve certification as a 'well managed forest' by the Forest Stewardship Council within two years of initiating harvest activities". The Conservation Fund prepared this Integrated Resource Management Plan to document the sustainable management of the forest. The Plan follows requirements established in the Forest Stewardship Council U.S. Forest Management Standard (version 1.0), and as further specified during The Conservation Fund's 2012 Forest Stewardship Council audit.

The preparation of the Plan has been aided significantly by work previously done by the Fund and its partners to prepare the Garcia River Forest and Big River and Salmon Creek Integrated Resource Management Plans (August 2006 and 2009, respectively). While there are significant differences between the current condition of the Gualala River Forest and the Garcia River Forest or Big River and Salmon Creek, including stocking levels and the financial obligations incurred in acquiring the various Forests, there is also much in common with the ultimate management objectives. Consequently, many of the principles and strategies contained in the Garcia River Forest and Big River and Salmon Creek plans have therefore been adapted for this Plan.

1.2 Overview of Forest Characteristics and Conditions

The Gualala River Forest encompasses 13,913 acres of redwood timberland in the Gualala River watershed. Adjacent watersheds include the Garcia River to the north, Middle Russian River to the east and Lower Russian River to the south. Primary tributaries to the Gualala River on the property include the North Fork Gualala River and Rockpile Creek.

The Gualala River is a high-priority refugia watersheds identified in the 2004 "Recovery Strategy for California Coho Salmon." The Forest includes 34 miles of Class I watercourse, 41 miles of Class II watercourse, associated riparian habitats, four major sub-basins currently supporting coho, and an array of

additional sensitive species. The size and location of the Forest provide significant contributions to the integrity and ecological viability of their respective watersheds and the larger ecoregion.

The Forest is typical of the north coast of California, dominated by native conifers (primarily redwood and Douglas-fir) and adapted to the steep slopes and heavy rainfall common to the region. The Forest is richly productive and supports significant wildlife, including many imperiled species, such as coho salmon, steelhead trout, and northern spotted owls. The majority of the Forest has been harvested at least twice since the arrival of European settlers around the turn of the 20th century. Some of the forest stands are 80 years old, but most are much younger—the result of significant harvesting beginning in the 1950s through the current day. Historic logging activities have also contributed to an influx and higher percentage of tanoak and other hardwood species than desired. The timber inventory on the Forest is depleted compared to historic levels and will be confirmed via timber cruising.

1.3 Streams and Roads

Extensive logging and road building practices in this fragile and highly erosive landscape have contributed to erosion and subsequent stream sedimentation, producing a legacy of increased sediment loads severely impacting aquatic habitat in the Gualala River and its tributaries. Data collected in stream channels throughout the watershed show channel aggrading and simplification due to amplified sediment inputs.

Large scale tractor logging in the 1950s and early 1960s created a network of unstable truck and tractor roads. Logging practices at the time also removed over-story shade canopy from primary anadromous spawning grounds. The removal of the overstory in the riparian corridors has resulted in a lack of large trees necessary for woody debris recruitment and thus a lack of deep pools with shelter needed for salmon and steelhead summer rearing habitat (GRWC, 2013).

1.4 Forest Management

The forest management policies and strategies described in this Plan are derived in part from the GRF and BRSC IRMPs. The specific management goals identified and described in this Plan are to:

- Improve ecological conditions by protecting and enhancing water quality.
- Improve ecological conditions by protecting and enhancing terrestrial and aquatic habitat on the Forest.
- Generate sufficient revenue to cover Program-Related Investment and Revolving Loan Fund payments, property taxes, on-site maintenance, management, and restoration projects.
- Develop and implement improved forest management greenhouse gas reduction projects under the Climate Action Reserve’s Forest Project Protocol version 3.2.
- Practice continual improvement through adaptive management based on monitoring of water quality and forest health against specific objectives described in the Plan.
- Support the local business community by utilizing local contractors and suppliers.

- Involve the local community by seeking input on management of the Forest, including review of this Plan and timber harvest plans implemented under the Plan, and providing compatible public access, educational, and recreational opportunities where possible.

1.5 Community Use and Involvement: Public Access

The Fund will provide a range of opportunities for community use and involvement consistent with the protection of natural resources, long-term restoration and enhancement, and active forest management. These opportunities range from research, education, and demonstration to participation in restoration projects and unsupervised pedestrian access.

To foster community involvement and support, the Fund provides guided tours of areas intended for timber harvests, road improvement and restoration projects, and native plants, as well as tours tailored for youth education. These programs familiarize the public with sustainable management methods and goals and build community partnerships. In addition, the Fund is evaluating the potential to allow unsupervised pedestrian public access on designated roads, while emphasizing the public's role as stewards of the Gualala River Forest.

2. Project Introduction

2.1 Project Rationale

2.1.1 Background

The Redwood Region of California's North Coast is one of the richest and rarest ecosystems in the world. It is home to keystone species such as the northern spotted owl, marbled murrelet, mountain lion, coho salmon and steelhead trout. For decades, timber harvesting has been the predominant land use in the region and much of the coastal watersheds in Mendocino and Humboldt counties continue to be held in large blocks of industrial timberland. Until recently, the economic value of these smaller parcels and alternative uses has not been competitive with the value of continued timber production, and they were largely ignored. But timber inventory depletion, the regulatory environment in California and the increasing value of land for "higher and better uses" has led some forestland owners to sell or look to "higher and better uses" yielding greater financial return. As a result, rural residential and recreational use subdivisions and vineyard conversions are increasingly common on the North Coast.

The conversion and subdivision of coastal forests in Mendocino County presents a serious threat to the ecological integrity of these coastal watersheds and the aquatic and terrestrial habitat they provide for a rich suite of natural communities and sensitive species. The fragmentation of these large forest tracts also threatens the future viability of a sustainable timber economy in the region. More than 40 percent of California's annual timber revenue comes from Mendocino and Humboldt counties. Based on crop reports for 2011, the value of harvests in these two counties totaled nearly $125 million. The forest products industry is "extremely important" to many local economies in the Northern California "timber counties," generating about 13 percent of the personal income and 16 percent of the jobs (Laaksonen-Craig et al., 2003).

Several State resource agencies have recognized the importance of preventing fragmentation of large forest tracts in the region. The California Department of Fish and Wildlife (CDFW) Recovery Strategy for Coho Salmon specifically recommends "encouraging continued economically sustainable management of forest and agricultural lands in the range of coho salmon to reduce the potential for conversion to residential or commercial development." (CDFG, 2004). California Department of Forestry and Fire Protection (CAL FIRE) has underscored the need to "recognize the continued importance of large scale, unfragmented ownerships in the working landscape … and examine if state policies can be improved to assure both private and public benefits of large unfragmented holdings" (CAL FIRE, 2003). Finally, the State Water Resources Control Board's (SWRCB) Nonpoint Source Program Strategy and Implementation Plan, 1998 – 2013 identifies several management measures related to silvicultural and agricultural activities that can enhance water quality.

While the benefits of protecting large tracts of forestland are clear, the means of achieving their protection is less obvious. The traditional approach of public acquisition and preservation of forestlands cannot alone get the job done. There is not nearly enough public money to purchase or manage such large tracts of forestland. Further, local communities are increasingly resistant to the effects of such large public purchases on the local economy and tax base; intrusion of large government and wasteful spending are common themes in the current political and economic climate.

In response to this dilemma, The Conservation Fund (the Fund) launched its North Coast Forest Conservation Initiative in 2004 with the acquisition of the 23,780-acre Garcia River Forest (GRF) in Mendocino County. With this purchase, the Fund sought to test a unique hypothesis: large tracts of depleted coastal forest can be protected from fragmentation and conversion, returned to sustainable timber production and ecological vitality through use of innovative financing and patient management by a nonprofit organization, in partnership with private and public agencies and community stakeholders. In November 2006, the Fund used innovative funding through a loan from the State Revolving Fund (SRF) to help purchase the Big River and Salmon Creek (BRSC) tracts, totaling roughly 16,097 acres, in partnership with the State Water Board (SWB), the State Coastal Conservancy (SCC), California Wildlife Conservation Board (WCB), and the David and Lucile Packard Foundation.

2.1.2 Gualala River Forest Acquisition

The Fund, along with our conservation partners the WCB, the Nature Conservancy (TNC), Keith Campbell Foundation, and the Mellon Foundation, seeks to extend this innovative approach to protect and restore an additional 13,913-acre contiguous commercial forest tract in the North Fork Gualala River watershed. The Fund has also conveyed a working forest conservation easement (CE) to TNC. While our broad goals for the Gualala River Forest (GuRF) are similar in many respects to those reflected in the GRF and BRSC Integrated Resource Management Plans (IRMPs), there are important differences as well: the BRSC forests were acquired using SRF loan dollars (the repayment of which is intended to come from timber harvest revenues); each Forest has different timber stocking and age class distributions of merchantable timber, with higher production from BRSC than GRF or GuRF; and higher density of residential development in the vicinity of the BRSC forests. In addition, the emergence of a robust market for greenhouse gas emission reductions associated with improved forest management has significantly improved the means and rate of attainment of our principal management objectives. The Fund continues to be a leader in sales of forest carbon offset credits from its North Coast properties.

2.2 Principal Management Goals

As with the Fund's work on the GRF and BRSC, the GuRF project seeks to balance the ecological needs of coastal forests with the economic imperatives of ownership, management and restoration. This IRMP presents our vision of what this balance looks like and how we will attain it over the coming decades.

This Plan identifies and describes in detail the following specific management goals:

- Improve ecological conditions by protecting and enhancing water quality.
- Improve ecological conditions by protecting and enhancing terrestrial and aquatic habitat on the Forest.
- Generate sufficient revenue to cover Program-Related Investment (PRI) and Revolving Loan Fund payments, property taxes, on-site maintenance, management, and restoration projects.
- Continue to implement improved forest management greenhouse gas reduction project registered under the Climate Action Reserve (CAR) Forest Project Protocol version 3.2. Practice continual

improvement through adaptive management based on monitoring of water quality and forest health against specific objectives described in the Plan.

- Support the local business community by utilizing local contractors and suppliers.
- Involve the local community by seeking input on management of the Forest, including review of this Plan and timber harvest plans implemented under the Plan, and providing compatible public access, educational, and recreational opportunities.

As with the GRF and BRSC, particular emphasis will be placed on achieving water quality enhancement and anti-degradation objectives by: a) permanently protecting the GuRF from subdivision, residential and commercial development, forestland conversion and agricultural intensification; and b) implementing remediation, protection and restoration measures to address sediment pollution problems and associated impacts resulting from historic and current forest management in the North Coast Region, including measures identified in the Strategy for Implementing State Revolving Fund for Expanding Use Projects (Strategy), the Nonpoint Source Program Strategy and Implementation Plan, 1998 – 2013 (NPS Implementation Plan) and the Gualala River Total Maximum Daily Load for Sediment developed by the U.S. Environmental Protection Agency (EPA), Region IX in December 2001 (Gualala River TMDL), as adopted by the North Coast Water Board in November 2004 in Resolution No. R1-2004-0087; Total Maximum Daily Load Implementation Policy Statement for Sediment-Impaired Receiving Waters in the North Coast Region (TMDL Implementation Policy). Successful implementation of these measures will also achieve important state objectives related to recovery of coho salmon and steelhead trout (CDFG, 2004).

2.3 Project Financing

The Fund purchased the GuRF for $30 million on December 23, 2011 with funds from the following sources:

• California Wildlife Conservation Board grant	$19,000,000
• The Nature Conservancy grant	$750,000
• Keith Campbell Foundation Program-Related Investment (PRI)	$4,750,000
• Keith Campbell and Maltz National Revolving Funds	$2,500,000
• Mellon Foundation PRI	$3,000,000
Total	$30,000,000

The previous owner had begun the process of registering the GuRF as an Improved Forest Management (IFM) project with CAR under Forest Project Protocol Version 3.1. The carbon project was registered once the Fund has assumed ownership. The project was registered as an Improved Forest Management carbon project under Protocol Version 3.2, with verification performed by Scientific Certification Systems (SCS). Based on our experience on the GRF, and a thorough analysis of the GuRF's stand data, we project that the GuRF will generate approximately 40,000 to 80,000 saleable tons/year for the first two decades (estimated value of $10-13/ton).

In 2012, the Fund's three forests (GRF, BRSC, and GuRF) produced 960,881 metric tons of verified emission reductions. As of May, 2014, the Fund's projects are now responsible for more than 71 percent of the total emissions reductions (called "Climate Reserve Tonnes" or "CRTs") issued to forestry projects

registered under the CAR protocols. To date, the Fund has sold, or has contracts to sell, more than 3,318,269 CRTs. Sale of these offsets has provided significant additional financial support for the forests, enabling us to accelerate restoration activities and defer harvests when log prices are low.

2.4 Conservation Easement Requirements

As part of the sustainable management of the working forest, the Fund conveyed a CE to TNC to maintain the conservation values inherent in the GuRF in perpetuity. The CE describes the GuRF as "of great importance" to the Fund, TNC, residents of Mendocino County, and the State of California and a natural area which qualifies as a "relatively natural habitat of fish, wildlife, or plants, or similar ecosystem".

Additional requirements stipulated in the CE include the following:

- Aggregated development of less than 10,000 square feet allowed within the designated 5-acre Permitted Improvement Area (PIA). Within the PIA, one single-family residence, one guesthouse, and one employee house plus additional outbuildings (i.e., garages, sheds, greenhouses) may be constructed, repaired, improved and replaced. Outbuildings shall not include dwelling spaces nor be used for human habitation. The PIA will not be located to include watercourse and lake protection zones (WLPZ), wetlands, true oak (*Quercus*) woodlands and grasslands.
- In order to achieve better mix of conifers and hardwoods within the GuRF, an even-age management regime is permitted within tanoak-dominated areas with tanoak basal area exceeding 40 percent of the average stand basal area, prior to the fourth decade of holding. After 40 years, even-age stand management is permitted in future rotations only with approval by TNC and WCB. Even-age management is prohibited outside tanoak-dominated zones.
- Achieve certification as a "well managed forest" by the Forest Stewardship Council (FSC) within two years of initiating harvest activities.
- Plowing, cultivation, and/or farming are permitted only within the Permitted Improvement Area and are limited to a maximum of 20 acres, of which no more than 10 acres may be in perennial crops.
- Limited livestock watering troughs are allowed more than 100 feet from Sensitive Water Bodies or with prior TNC approval, and the Grazing Management Plan must be consistent with the requirements in Appendix D of the CE.
- Limited hunting is allowed by the Fund and its guests for non-commercial purposes only. Hunting of mountain lion, coyote, bear, or bobcat, is prohibited except through express TNC written approval.

3. Purpose of Plan

3.1 Plan Requirements

The Plan follows requirements established in the FSC U.S. Forest Management Standard (version 1.0), and as further specified during the Fund's 2012 FSC audit. The GuRF IRMP will generally contain the same information as the Plans prepared for GRF and BRSC for continuity.

From FSC Principle 7: Management Plan: "This Principle is intended to ensure that management of the [Forest Management Unit] FMU is described in a comprehensive management plan. The plan should be developed with expertise and public input appropriate to the scale of the operation. The management plan, and the process of its development, should embody and consider all of the Principles and Criteria in this Standard…The management plan may consist of a variety of documents or an umbrella document that describes how a collection of management documents relate to an integrated strategy for managing the forest. This may include a combination of ownership level plans, unit plans, site level plans (e.g., harvest plans), [Geographic Information Systems] GIS, published guidelines (e.g., regional silviculture or [Best Management Practice] BMP guides), landowner policies, and other information…Guidance on scale and intensity of operations: All management plans regardless of the scale and intensity of operations must address the Indicators of Criterion 7.1 unless otherwise noted in the guidance below."

The intent of Criterion 7.1 is to "ensure that a written management plan, as described in the Principle-level intent and guidance above, exists for the property within the scope of the certificate. The actions and objectives detailed in the plan are specific, achievable, measurable and adaptive. They are also sufficient to meet the requirements of this Standard…Whenever the term "management plan" is used, it refers to any combination of documents and systems that meet the intent of the Indicator." Per Criterion 7.1, the following Indicators must be included in the Plan:

a) Management objectives;
b) Description of the forest resources to be managed, environmental limitations, land use and ownership status, socio-economic conditions, and a profile of adjacent lands;
c) Description of silvicultural and/or other management systems, based on the ecology of the forest in question and information gathered through resource inventories;
d) Rationale for rate of annual harvest and species selection;
e) Provisions for monitoring of forest growth and dynamics;
f) Environmental safeguards based on environmental assessments;
g) Plans for the identification and protection of rare, threatened and endangered species;
h) Maps describing the forest resource base including protected areas, planned management activities and land ownership; and
i) Description and justification of harvesting techniques and equipment to be used.

3.2 Plan Revisions

Consistent with the principles of an adaptive management approach, the Plan will be updated periodically, not less than every ten years, to reflect the condition of the Forest as it changes over time and as management activities are implemented. Local experts, advisors, agency staff, and community members

will be included in the revision process. Revisions and/or amendments will be provided to the WCB and TNC for review prior to adoption.

3.3 Adaptive Management

Adaptive management is the process of continually adjusting management in response to new information, knowledge or technologies (Walters and Holling, 1990). Adaptive management recognizes that unknowns and uncertainty exist in the course of achieving any natural resource management goals.

The complexity and interconnectedness of ecological systems, combined with technological and financial limitations, make a complete understanding of all the components and linkages virtually impossible. In addition, the systems themselves are constantly changing through both natural and human caused mechanisms, making the effort to comprehend ecosystem dynamics and foretell their trajectories even more challenging (Gunderson et al, 1995).

Uncertainty will always be a part of the management of ecosystems, and adaptive management provides a mechanism by which uncertainty can become, “the currency of decision making instead of a barrier to it” (Walters, 1986). Sound implementation and the ultimate attainment of the project will depend in part on the commitment made to adaptive management, where research and monitoring are given a high priority, and new information is gathered to feed back into the basic data management system and all future plans.

This Plan identifies two information streams for adaptive management: 1) monitoring of implementation benchmarks established for Streams and Roads, Forest Management, and Community Involvement described in this Plan; and 2) monitoring the effectiveness of achieving the implementation benchmarks on selected ecological conditions (principally water quality and forest inventory and structure). Each of the proposed indicators for monitoring viability of conservation and restoration effectiveness will need to be evaluated by the following criteria:

- Cost efficiency – getting the most information for the least cost;
- Quality control – data collection and compilation has accepted quality control standards and can be applied consistently and effectively across all data collection points and efforts;
- Scientific defensibility and credibility – designs for data collection, quality control efforts, and data analysis techniques meet standards commonly used by the relevant regulatory agencies; and
- Timely yield of information – the monitoring program must yield information for management in a timely manner.

4. Property Setting and Current Conditions

4.1 Property Orientation

4.1.1 Property Location

The GuRF is comprised of 13,913 acres of timberland in California's North Coast Range mountains. Located in southwestern Mendocino County adjacent to and north of the Mendocino-Sonoma county line, the property lies approximately 15 miles east of the city of Point Arena and 7 miles northeast of the town of Gualala. The main waterbodies within the GuRF are: 1) the North Fork Gualala River and its major tributaries: Dry Creek, Stewart Creek, Hayfield Creek, and Bear Creek; 2) Rockpile Creek and its major tributaries: Horsethief Canyon and Red Rock Creek. Primary access to the GuRF is via Fish Rock Road on the northern boundary of the property (Figure 4-2).

4.1.2 Neighbors and Adjacent Lands

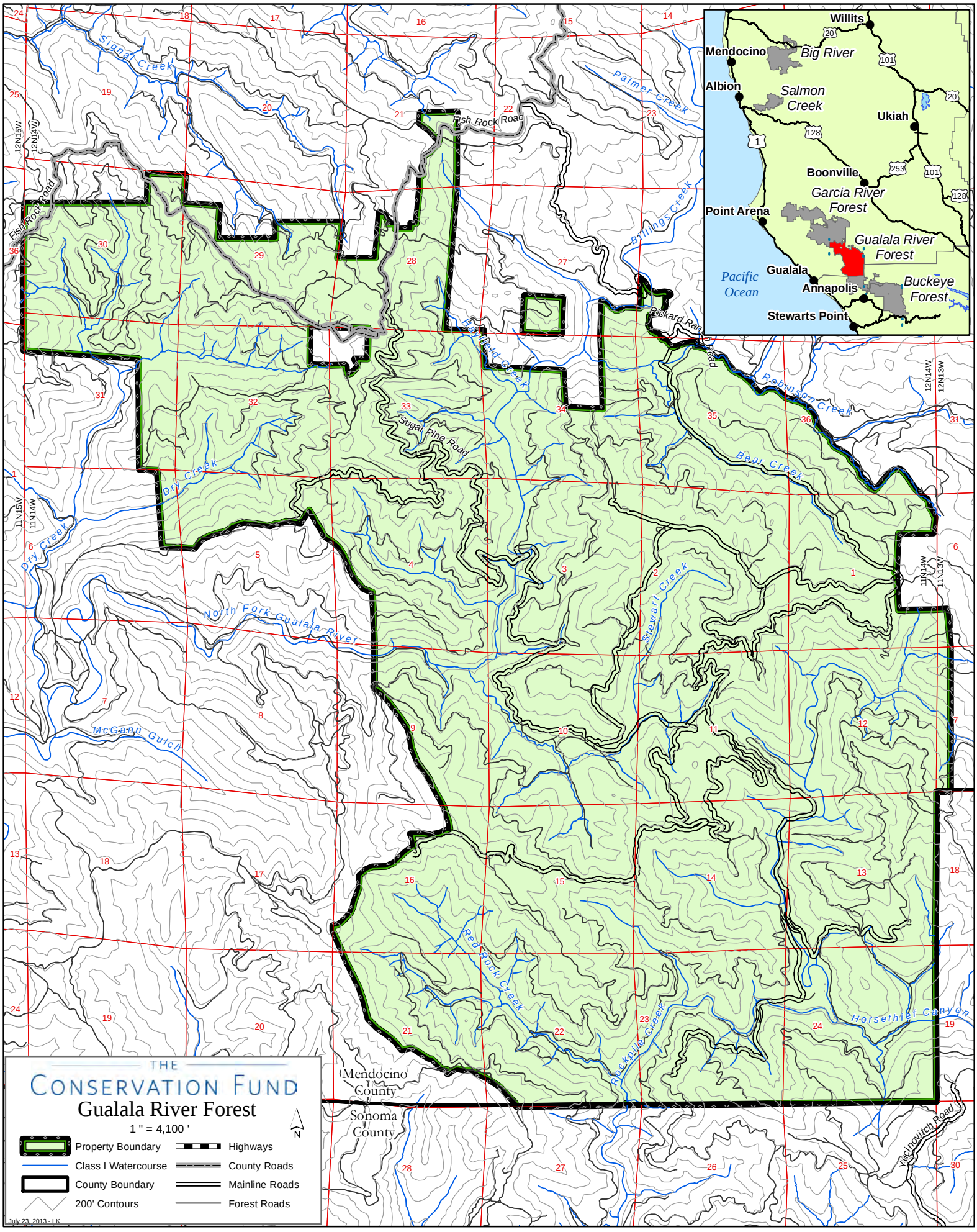
Adjacent to two other Fund timberland holdings, the GuRF is located southeast of the GRF and north of the recently acquired Buckeye Forest (formerly Preservation Ranch). Although the surrounding land use is primarily timber production, there are also five premium wine grape vineyards and numerous rural residential properties in the vicinity. The GuRF watershed is almost entirely privately owned, with approximately 53 percent in industrial timberland and the remaining 47 percent in small to large size ownership. Other large neighboring timberland owners include Gualala Redwoods Inc., Mendocino Redwood Company (MRC) and the Buckeye Forest (Figure 4-3).

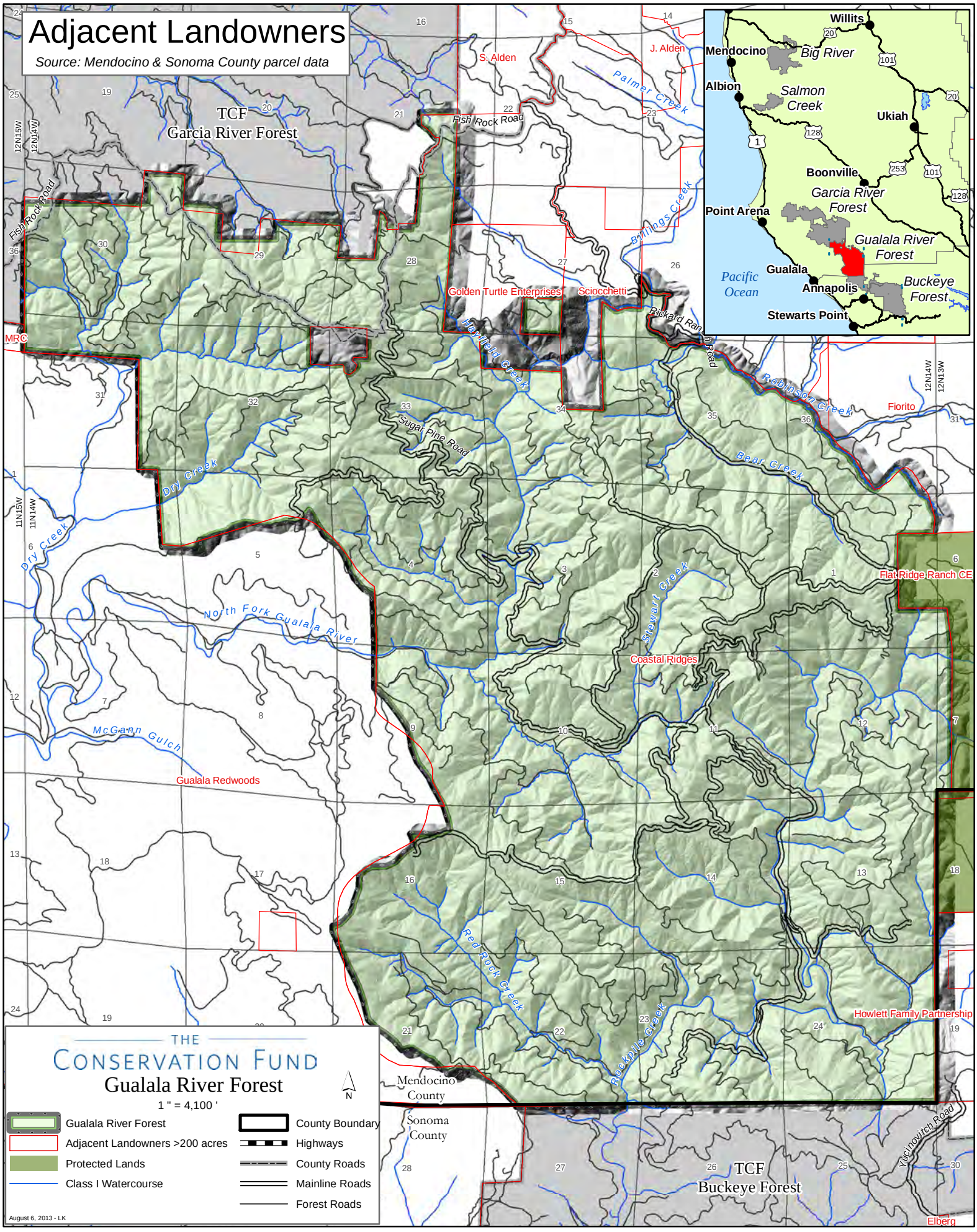
4.1.3 Physiographic Setting

4.1.3.1 Description of Watershed

The Gualala River drains a 191,000-acre (298 square mile) watershed within the northern California Coast Range of southern Mendocino and northern Sonoma counties, with a total mainstem and tributary distance of roughly 685 miles. Neighboring watersheds include the Garcia River to the north, Middle Russian River to the east and Lower Russian River to the south. The North and South Forks of the Gualala River flow together for 20 miles along the San Andreas Fault before flowing west to empty into the Pacific Ocean near the town of Gualala.

Figure 4-1: Mouth of the Gualala River, Mendocino County, California. Photo by Herman Turnip, Flickr.


Willits
Mendocino
Big River
Albion
Salmon Creek
Ukiah
Boonville
Garcia River Forest
Point Arena
Gualala River Forest
Gualala
Pacific Ocean
Annapolis
Buckeye Forest
Stewarts Point
Signal Creek
Palmer Creek
Fish Rock Road
Billings Creek
Rockard Ranch Road
Robinson Creek
Bear Creek
Sugar Pine Road
Dry Creek
North Fork Gualala River
Stewart Creek
McGann Gulch
Red Rock Creek
Rockpile Creek
Horsethief Canyon
Mendocino County
Sonoma County
Ignovich Road
THE CONSERVATION FUND
Gualala River Forest
1 " = 4,100 '
N
Property Boundary
Class I Watercourse
County Boundary
200' Contours
Highways
County Roads
Mainline Roads
Forest Roads
July 23, 2013 - LK


Adjacent Landowners
Source: Mendocino & Sonoma County parcel data
TCF
Garcia River Forest
S. Alden
J. Alden
Palmer Creek
Fish Rock Road
Billings Creek
Golden Turtle Enterprises
Sciocchetti
Rickard Ranch Road
Hayfield Creek
MRC
Robinson Creek
Fiorito
Sugar Pine Road
Bear Creek
Dry Creek
North Fork Gualala River
Stewart Creek
Coastal Ridges
Flat Ridge Ranch CE
McGann Gulch
Gualala Redwoods
Red Rock Creek
Blackpipe Creek
Howlett Family Partnership
Mendocino County
Sonoma County
TCF
Buckeye Forest
Yuconovitch Road
Elberg
Willits
Mendocino
Big River
Albion
Salmon Creek
Ukiah
Boonville
Garcia River Forest
Point Arena
Gualala River Forest
Pacific Ocean
Gualala
Annapolis
Buckeye Forest
Stewarts Point
THE CONSERVATION FUND
Gualala River Forest
1 " = 4,100 '
N
Gualala River Forest
Adjacent Landowners >200 acres
Protected Lands
Class I Watercourse
County Boundary
Highways
County Roads
Mainline Roads
Forest Roads
August 6, 2013 - LK

The five principal Gualala sub-basins in order of size are the Wheatfield Fork (37% of drainage), South Fork and Gualala main-stem (21%), North Fork (16%), Buckeye Creek (14%), and Rockpile Creek (12%). The main-stem extends only from the convergence of the North Fork and South Fork to the ocean, with much of this reach comprising the estuary or lagoon. This stretch of the Gualala River was designated "Wild & Scenic" by the State of California in 2003 (GRWC, 2013). The GuRF is located primarily within the North Fork Gualala River and Rockpile Creek watersheds, with the forest encompassing nearly 25 percent of these two subbasins (NCRM, 2011). The Gualala River watershed ranges in elevation from 150 feet to 1,860 feet above sea level. Topography within the watershed varies from moderate to steep slopes, moving from west to east towards the town of Yorkville and Highway 128 (NCRM, 2011).

4.1.3.2 Climate

Climate within the GuRF is coastally influenced Mediterranean, with low-intensity precipitation in the winter and cool, dry summers with coastal fog. The watershed is located within the Oregonian Biotic Province. Mean annual rainfall ranges from a low of 30 inches at the town of Gualala to nearly 100 inches on the inland coastal peaks. Most of the precipitation (roughly 90 percent) occurs between October and April, with the highest average rainfall during the month of January (NCRM, 2011).

4.1.3.3 Geology

The regional geologic landscape of the GuRF was shaped by the tectonic collision of the Farallon and North American plates during the Mesozoic and early to middle Tertiary, and subsequent deformation by extensive shearing along the San Andreas Fault System. As subduction continued, subsequent metamorphism and accretion of this new terrane to the western margin of North America resulted in what we collectively refer to as the Franciscan Complex (Blake and Jones, 1981).The Franciscan Complex is composed of three distinct belts: the eastern belt, the central belt, and the coastal belt. Generally, they decrease in age and metamorphic grade from east to west (Blake and Jones, 1981). Geologic mapping conducted in the region indicates that the GuRF is predominantly underlain by the coastal belt Franciscan complex with minor amounts of central belt in the northeastern portion of the ownership (McKittrick, 1995; Wagner and Bortugno, 1999; Fuller and et al., 2002). Generally, the coastal belt Franciscan consists of arkosic sandstone and andesitic greywacke sandstone that underwent low grade metamorphism as a result of subduction. Shear strength of the exposed bedrock is highly variable and dependent upon the local structure, bedding, and lithology.

Landslides are widespread across the GuRF locally and the greater Coast Range Mountains as a result of intense or long duration rainfall, downcutting of streams which undercuts steep slopes, inherent weakness of deformed bedrock, and shaking during episodic seismic events (Fuller and Custis, 2002). Large, deep-seated rockslides (e.g. translational-rotational landslides) occur across the landscape and are generally characterized by a very slow moving slide mass and deep slide plane extending well into bedrock. A majority of the shallow landslides (e.g. debris slides and flows) occur on slopes over 65 percent and are concentrated on steep streamside slopes along the outside of meander bends along the North Fork Gualala River and its larger tributaries (McKittrick, 1995; Fuller et al., 2002).

Figure 4-4 illustrates slopes within the GuRF based on light detection and ranging (LiDAR) data. Recent unconsolidated channel deposits composed primarily of sand, silt and gravel are exposed along the active channels along the North Fork Gualala River within the GuRF.

4.1.3.4 Soils

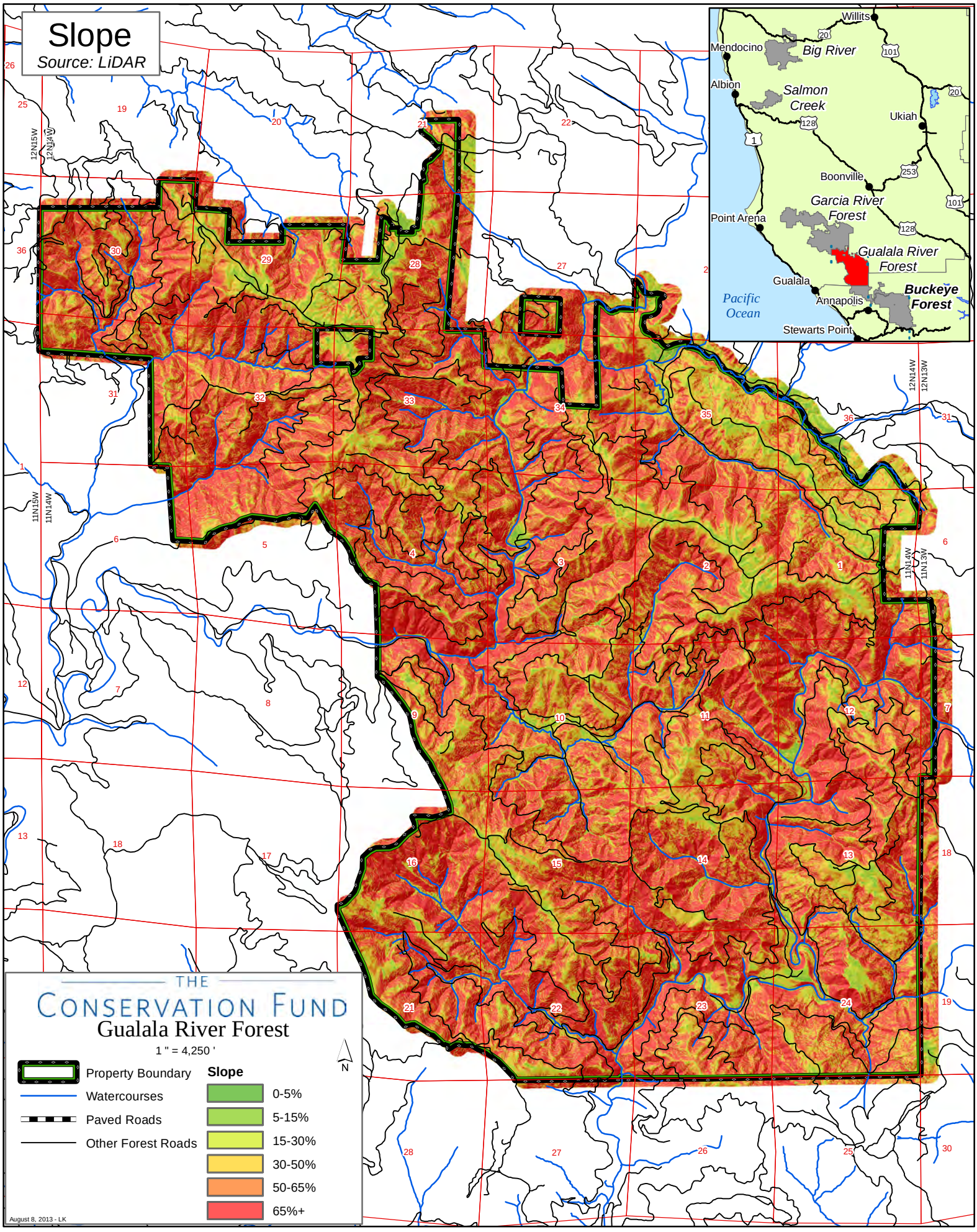
The Natural Resource Conservation Service (NRCS) soil survey depicts four dominant distinct soil complexes on the GuRF (Rittiman and Thorson, 2002). Formed from the weathering of sedimentary rock, colluvial soils blanket a majority of the hillslopes across the Coast Range Mountains. Rittiman and Thorson (2002) mapped the following dominant soils on the GuRF:

Figure 4-5: Robinson Creek East, a tributary to the North Fork Gualala River. Photo by Gualala River Watershed Council.

- Yellowhound-Kibesillah-Ornbaun complex
- Woodin-Yellowhound complex
- Ornbaun-Zeni complex
- Squawrock-Garcia-Witherell complex

Thickness of the overlying colluvial soil can be highly variable. Generally, colluvium is thin along ridges and upper sideslopes (typically 1-2 feet), and thick (as much as 5-10 feet) within deep swales and local depressions. The Gualala watershed is typical of North Coast watersheds that have geology prone to storm induced erosion events (GRWC, 2013). Kelsey et al. (1981) stated that watersheds in "The California Coast Ranges between San Francisco and the Oregon border contain the most rapidly eroding, large order, non-glaciated drainage basins of comparable size in the United States (Judson and Ritter, 1964). The combination of the underlying pervasively sheared and often folded Franciscan rocks (Bailey et. al., 1964), recent uplift, and a distinctive climate accounts for the large sediment yields." Suspended sediment and turbidity are elevated for periods of time during the high runoff, rainy season (GRWC, 2013).

For more information on soil types and descriptions, see Rittiman and Thorson (2002) and the NRCS soil series map on Figure 4-6. Soil loss tolerance rate is defined by the NRCS as the amount of soil that can be lost due to natural erosion annually with the soil maintaining its potential to produce food and fiber. The soil loss tolerance is mapped from NRCS data on Figure 4-7, illustrating high tolerance for soil generally throughout the property, i.e. the underlying soil can still be highly productive even with erosion.


Slope
Source: LiDAR
Willits
Mendocino
Big River
Albion
Salmon Creek
Ukiah
Boonville
Garcia River Forest
Point Arena
Gualala River Forest
Gualala
Buckeye Forest
Annapolis
Pacific Ocean
Stewarts Point
20
101
128
1
253
12N15W
12N14W
12N13W
11N15W
11N14W
11N13W
THE CONSERVATION FUND
Gualala River Forest
1 " = 4,250 '
N
Property Boundary
Watercourses
Paved Roads
Other Forest Roads
Slope
0-5%
5-15%
15-30%
30-50%
50-65%
65%+
August 8, 2013 - LK

NRCS Soil Series

Source: NRCS SSURGO Soils

THE CONSERVATION FUND

Gualala River Forest

1 " = 4,500 '

N

- Property Boundary
- Watercourses
- Paved Roads
- Other Forest Roads

Gualala SSURGO Soils

MUSYM

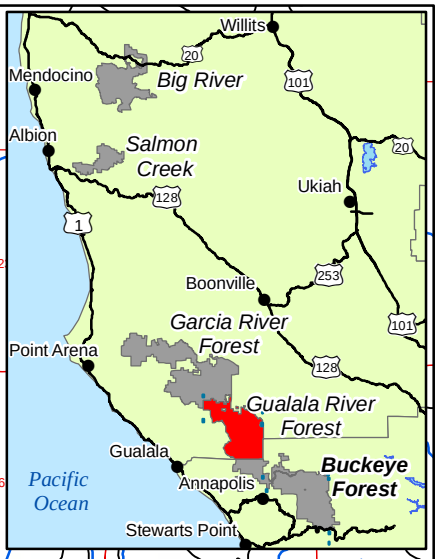
119, 120, 187, 188, 189, 190, 191, 205, 206, 207, 231, 232, 235, 236, 237

July 10, 2013 - LK

Map Unit	Map Unit Name	Acres
		0.01
119	Casabonne-Wohly complex, 9 to 30 percent slopes	52.45
120	Casabonne-Wohly complex, 30 to 50 percent slopes	309.12
187	Ornbaun-Zeni complex, 9 to 30 percent slopes	55.04
188	Ornbaun-Zeni complex, 30 to 50 percent slopes	1244.94
189	Ornbaun-Zeni complex, 50 to 75 percent slopes	662.06
190	Pardaloe-Woodin complex, 50 to 75 percent slopes	9.48
191	Pardaloe-Woodin-Casabonne complex, 30 to 50 percent slopes	194.47
205	Squawrock-Garcia-Witherell complex, 15 to 50 percent slopes	10.13
206	Squawrock-Garcia-Witherell complex, 50 to 75 percent slopes	74.19
207	Squawrock-Witherell complex, 15 to 50 percent slopes	52.94
231	Woodin-Yellowhound complex, 30 to 50 percent slopes	1134.63
232	Woodin-Yellowhound complex, 50 to 75 percent slopes	1515.00
235	Yellowhound-Kibesillah complex, 50 to 75 percent slopes	2530.44
236	Yellowhound-Kibesillah-Ornbaun complex, 9 to 30 percent slopes	526.67
237	Yellowhound-Kibesillah-Ornbaun complex, 30 to 50 percent slopes	5165.80

Soil Loss Tolerance Factor

Source: SSURGO Soils



THE CONSERVATION FUND

Gualala River Forest

1 " = 4,500 '

N

Property Boundary

Watercourses

Paved Roads

Other Forest Roads

Gualala SSURGO Soils

Soil Loss Tolerance Factor

0 - Minimum

2

3

4 - Maximum

August 6, 2013 - LK

4.1.4 Regulatory Setting

Numerous statutes have been enacted to protect water quality and associated aquatic habitat and terrestrial species including plants and animals and their habitat in California. Table 4-1 below summarizes the state and federal environmental laws and regulations that pertain to forest management on the North Coast.

Table 4-1: State and Federal Laws Applicable to Forest Management

Regulation	State or Federal	Responsible Agency
California Coastal Act	State	California Coastal Commission
California Endangered Species Act	State	California Department of Fish & Wildlife
California Environmental Quality Act (CEQA)	State	All State Agencies
Clean Water Act	Federal	U.S. Environmental Protection Agency, U.S. Army Corps of Engineers
Coastal Zone Management Act	State and Federal	National Oceanic and Atmospheric Administration (NOAA), California Coastal Commission
Endangered Species Act	Federal	NOAA, U.S. Fish and Wildlife Service
Porter-Cologne Water Quality Act	State	State Water Resources Control Board
Z'Berg-Nejedly Forest Practice Act	State	California Department of Forestry and Fire Protection

The federal Endangered Species Act (ESA) establishes a process by which animal and plant species can be listed for federal protection. That protection limits any activity that may result in a "taking" – causing death to one or more individuals of that species either through direct action (such as hunting) or indirect action (such as destruction of its habitat). A species may be listed as "threatened" or "endangered," depending on the level of peril and the status of the remaining population; an "endangered" designation carries a greater degree of protection. The National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) has authority for enforcement of marine and anadromous species under ESA, such as Coho salmon and steelhead trout. The U.S. Fish and Wildlife Service (USFWS) has authority for enforcement of the ESA for freshwater and terrestrial species such as Northern Spotted Owl.

The California Endangered Species Act (CESA) is the state law that complements the federal ESA; it is enforced by CDFW. Many of the protected species in the North Coast – including northern spotted owl and coho salmon – are listed under both federal and state acts, and thus are protected by both federal and state agencies.

The state Z'berg Nejedly Forest Practice Act was passed in 1973 to ensure sustainable and environmentally appropriate forestry in California. CAL FIRE promulgates rules to implement the law. Over time, the legislature has passed many laws increasing its scope and detail. CAL FIRE has done likewise with the regulations. The process to permit timber harvest now involves a multi-agency review

which may involve up to four state and local agencies and two or more federal agencies, depending on the location and potential issues involved in the plan. Additional permits from other agencies – both state and federal – are often required.

The federal Clean Water Act (CWA) establishes the broadest framework for water quality regulations, including the protection of wetlands. The Porter-Cologne Water Quality Act is the state corollary. Regulatory authority is coordinated between federal and state agencies, primarily the EPA and SWRCB. The U.S. Army Corps of Engineers has permitting authority under Section 404(d) of the CWA, which regulates discharges into U.S. waters, including wetlands. Section 303(d) of the CWA describes the regulation of "impaired water bodies," a designation given a water body that fails to meet specific water quality standards. Each state is required to maintain a list of impaired water bodies and to develop TMDLs for each impaired water body to address both point and nonpoint sources of pollution. An implementation plan, also known as an action plan, identifies a program for implementing the necessary pollution load reduction requirements to meet water quality standards. While not strictly a requirement of the TMDL as described by the Clean Water Act and associated regulations, the action plan is required under the State Porter-Cologne Water Quality Control Act. In California, there are 509 water bodies listed as impaired; 28 of these are within the North Coast Region. The North Coast Regional Water Quality Control Board (NCRWQCB) is charged with developing most TMDLs in the region.

Many of the TMDLs in the North Coast are focused on sediment and temperature pollution, both of which generally are generated from nonpoint sources such as stormwater run-off and erosion from roads, especially logging roads and unpaved rural residential roads. Poor timber harvest practices in the past have impacted stream health by causing loss of riparian vegetation and increased sedimentation. Beneficial uses of the Gualala River listed by the NCRWQCB (Watershed Planning Chapter, 2005) include:

- Commercial and sport fishing
- Cold freshwater habitat
- Migration of aquatic organisms
- Spawning, reproduction, and early development of salmonids; and
- Estuarine habitat.

The Water Quality Control Plan for the North Coast Region (Basin Plan) also includes the following potential beneficial uses within the North Fork Gualala River watershed: municipal and domestic water supply, agricultural water supply, industrial service water supply, groundwater recharge, freshwater replenishment, navigation, water contact recreation (REC-1), non-contact water recreation (REC-2), wildlife habitat, rare/threatened/endangered species, and aquaculture. Existing beneficial uses within the Rockpile Creek watershed include all of the above, plus warm freshwater habitat, minus freshwater replenishment, (NCRWQCB, 2011).

The Gualala River watershed was listed under the CWA Section 303(d) List of Impaired Waterbodies for excessive sedimentation and subsequent anadromous salmonid habitat loss, high water temperature levels, and high levels of naturally occurring aluminum (within the mainstem Gualala River only). The EPA established the Gualala River TMDL for Sedimentation/Siltation on December 20, 2001. The Gualala River TMDL for water temperature is scheduled to be completed by 2019; the TMDL for aluminum is

scheduled for completion by 2021. (A very small portion of the GuRF is also within the Garcia watershed and subject to the TMDL requirements—these will be addressed in site-specific project prescriptions.)

4.2 Forest and Terrestrial Conditions

4.2.1 Forest Overview

The GuRF is typical of the north coast of California—dominated by native conifers (primarily redwood, Douglas-fir and sugar pine) and adapted to the steep slopes and heavy rainfall that typify the region. The Forest is richly productive and supports significant wildlife, including many imperiled species, such as coho salmon, steelhead trout, and northern spotted owls. The majority of the Forest has been harvested at least twice since the arrival of European settlers around the turn of the 20th century. Some of the forest stands are 80 years old, but most are much younger—the result of significant harvesting in the 1950s through the current day. The timber inventory on the Forest is depleted compared to historic levels but is comparable to other industrial timberland in the region. And because of its unique properties and appearance, redwood is still one of the most valuable lumber species in the world.

Figure 4-8: Redwood stand on the North Coast. Photo by Whitney Flanagan, The Conservation Fund.

The Forest is well situated for continued IFM—there is good road infrastructure, low to average site productivity for forests in the redwood region, and a mixture of mature forest and rapidly growing young stands. That said, less than half the Forest currently is able to support a commercial timber harvest, many of the roads and stream crossings will need upgrading in the next twenty years to facilitate timber harvesting. The property is an excellent candidate for long-term restoration because, despite over 60 years of industrial timber management, there is still viable aquatic habitat and a high diversity of plant communities (including riparian forests, coastal redwood forest, well-stocked riparian areas, and mixed hardwood/conifer forest) in addition to sensitive plant and animal species including coho and steelhead.

4.2.2 Operational Constraints

It is important to understand several key facets of forest management on the GuRF (and coastal Mendocino County forestland, in general) that constrain potential forest management operations—especially low-impact ecological silviculture. These include:

- Steep slopes. The steep slopes characteristic of the Coast Range routinely require specialized cable yarding equipment to move logs from the woods to the landing with the minimum of soil

disturbance. This style of harvesting operation is considerably more expensive than ground-based (tractor) logging, which is only possible on gentle slopes. In addition, care must be taken to properly identify and protect slopes with high potential to fail through landslide or debris torrent so as to avoid potential impacts to riparian and aquatic habitats.

- Low volumes. The history of industrial management has resulted in stands with considerably less merchantable timber volume than desired. This is typically because young even-aged stands have not had the time to develop more fully or because uneven-aged stands had much of the valuable timber already removed. Almost all stands are well stocked with conifers that are healthy and growing well—it will require several decades of patient management and thinning before the Forest as a whole develops the desired timber volumes. In the meantime, many silvicultural options are precluded because of the low stocking and/or value.
- Hardwood competition. In some stands the development of the desired characteristics (e.g. closed canopy of large conifers) is hampered by excessive competition from brush and non-merchantable trees. In almost all cases this competition is from native species (e.g. tanoak) that have been allowed to over colonize because of past logging practices. Reduction in hardwood competition through manual treatments (sawing) or chemical applications (herbicides) is effective but expensive, with potential safety and environmental concerns. Achievement of our long-term objectives will require the dedication of financial and personnel resources to thoughtfully and patiently reduce hardwood competition to levels more closely approximating their natural distribution in the redwood/Douglas-fir forest type.
- Operating season. The high rainfall that helps make the forest so productive also means harvesting and road improvement operations basically cease during the rainy season to avoid damage to the road infrastructure and potential delivery of sediment to streams. This means almost all activities need to be completed during the summer, and logging contractors have a very limited window in which they can support their businesses.
- Limited markets for products. Currently, timber markets are at a cyclical low, although the local market is expected to regain modest value in the coming year or two. The number of sawmills in the region purchasing conifer saw logs has declined on an almost annual basis (although the remaining mills are efficient and well-capitalized). Virtually no markets exist for conifer pulpwood or hardwoods (of any size), which reduces the feasibility of improvement or sanitation-type harvests that typically generate low-quality wood in order to improve future stand conditions.
- Complex regulations. The permitting process for timber harvests and associated road usage is time-consuming, inefficient and complex. While intended to prevent environmental damage, many of the requirements are very challenging to assess, report, implement, and/or monitor. The Fund budgets six months and $30,000 to $50,000 to prepare and administer a timber harvest plan (THP), which is five to ten times the cost of a similar operation in Oregon or Washington. Enhancements to the regulatory process could free up significant time and money to benefit other projects.

Forest Inventory System

The Fund maintains linked forest inventory and geographic information system (GIS) databases in order to be able to assess, document, and monitor the forest conditions. Previous Forest data was obtained from

North Coast Resource Management (NCRM). Since acquiring the property, the Fund has acquired high definition digital imagery LiDAR data to provide high resolution and accurate forest classification. These tools are critical for understanding forest conditions, habitat availability, road plans and landslide vulnerability and will form the basis for the field inventory.

As part of the Fund's Option A, stratification of the forest inventory is currently underway to more accurately determine species composition across the GuRF. Timber cruising is scheduled for fall and winter 2013 and will provide a more accurate picture of forest species composition. The Forest Planning and Projection System (FPS) software is used to compile and grow the forest inventory in a spatially explicit manner and subject to our specific silvicultural prescriptions.

To increase our ability to understand and evaluate forest growth and development, we will be installing a system of permanent plots wherein all the trees are individually numbered (and likely mapped) so as to enable the long-term monitoring of growth and mortality of individual trees and at the plot level. This plot information is very important in being able to confirm or calibrate the growth model (although ten years of observation on the permanent plots on the GRF indicate a high degree of accuracy of the growth model).

4.2.3 Current Stand Conditions

Current stand conditions in the GuRF will be updated following fall timber cruising. The GuRF will be using a new stratification system consisting of three bins. Table 4-2 below summarizes the new strata system.

Table 4-2: Gualala River Forest Stratification System

Category	Class Names	Class Breaks
Percent Canopy Cover over 25ft	O (Open) L (Low) M (Medium) D (Dense) E (Extremely Dense)	20% canopy cover bins where % cover is defined as crown elements above 25ft
Mean Tree Height	1, 2, 3, 4, 5, 6, 7	25 foot height bins of mean tree heights
Tree Height Variability (Coefficient of Variation [CV] of Tree Height)	H (Homogeneous) I (Intermediate) V (Variable)	Homogeneous stands are any stand with CV < 0.23 Intermediate: 0.23<= CV < 0.33 Variable: CV >= 0.34

4.2.4 Productivity and Site Index

The GuRF is generally redwood and Douglas-fir site class 3 and 4 lands. The average measured site index at base age 50 from the 2013 inventory is Douglas-fir = 91, redwood = 75, and sugar pine = 99.

4.3 Terrestrial Habitat and Species

4.3.1 Habitat Overview

Terrestrial habitat communities present on the GuRF include Redwood, Douglas-fir, Coastal Oak Woodland, Montane Hardwood, Mixed Chaparral, Coastal Scrub and Grasslands. On most sites redwood would dominate if vegetation succession were allowed to proceed naturally. Each of the habitat types listed above provide food and cover for a wide variety of wildlife species. Redwood habitats provide food, cover, or special habitat elements for 193 wildlife species including a variety of sensitive species (Marcot, 1979). Oak Woodlands are reported to provide food (mast) or cover for over 60 wildlife species, including resident populations of quail, wild turkey, squirrel, and deer. Primary conifer species are coastal redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*), with a substantial volume of sugar pine (*Pinus lambertiana*). The dominant hardwood species on the GuRF is tanoak (*Lithocarpus densiflorus*), with madrone (*Arbutus menziesii*), oak (*Quercus* spp.), California laurel (*Umbellularia californica*), and other California hardwoods interspersed throughout the forest (NCRM, 2011).

Table 4-3 below details habitat types and approximate associated percentage of the GuRF according to the California Vegetation (CalVeg) system. The CalVeg system is unreliable at fine-scale classifications, because it is based on remote sensing and a brief snapshot of conditions; for example, much of the area classified as annual grasses are roads and landings that are naturally revegetating. A complete survey of vegetation types has not been made of the property. However, Appendix A contains a more detailed discussion of botanical resources of the GuRF by botanists Geri Hulse-Stephens and Kerry Heise.

Table 4-3: Habitat Types and Approximate Percent within the Forest

Habitat Type	Approximate Percent
Redwood	70%
Douglas-fir	5%
Coastal Oak Woodland	< 1%
Montane Hardwood	15-22%
Mixed Chaparral	< 1%
Coastal Scrub	< 1%
Grasslands	< 1%

4.3.2 Special Status Species

The GuRF property overlaps two U.S. Geological Survey (USGS) 7.5-minute quadrangle maps: Gube Mountain (3812373) and McGuire Ridge (3812374). A Rarefind Report (California Natural Diversity Database, or CNDDB) search of the GuRF property within these two USGS quad maps identified five occurrences of three sensitive animal species (see Table 4-4 below). The California Native Plant Society (CNPS) predicted the occurrence of four rare plant species based on data results from the McGuire Ridge

quad map; no rare plant species were predicted within the Gube Mountain quad (Appendix B). Further data contributing to Table 4-4 are from Heise and Hulse-Stephens (2013) and GRWC (2013).

Federally threatened listed species confirmed in the forest include Coho salmon, steelhead trout, and northern spotted owl. The northern spotted owl is the best understood terrestrial species, is believed to be the most imperiled, and is intended to benefit from our management actions; it is described in more detail below.

Table 4-4: Terrestrial Rare, Threatened, Endangered, Sensitive and Species of Concern Which May Potentially Occur on the Gualala River Forest

Species	**Listing Status**
Animals	
California red-legged frog (*Rana draytonii*)	FT CDFW: SSC
Coho salmon (*Oncorhynchus kisutch*) Central California Coast Evolutionarily Significant Unit (ESU)	FE SE
Foothill yellow-legged frog (*Rana boylii*)	CDFW: SSC
Gualala roach (*Lavinia symmetricus parvipinnis*)	CDFW: SSC
Sonoma tree vole (*Arborimus pomo*)	CDFW: SSC
Steelhead (*Oncorhynchus mykiss*) Central California Coast ESU	FT
Western pond turtle (*Emys marmorata*)	CDFW: SSC
Plants	
Fringed false hellebore (*Veratrum fimbriatum*)	None
Running-pine (*Lycopodium clavatum*)	None
Santa Cruz clover (*Trifolium buckwestiorum*)	BLM: Sensitive
Swamp harebell (*Campanula californica*)	BLM: Sensitive
Thin-lobed horkelia (*Horkelia tenuiloba*)	BLM: Sensitive
White-flowered rein orchid (*Piperia candida*)	BLM: Sensitive

Listing Status Codes:
FE= Federally Endangered, FT=Federally Threatened; SE=State Endangered
CDFW: SSC = California Species of Special Concern
BLM: Sensitive

4.3.3 Northern Spotted Owl

The northern spotted owl (NSO) range is north of the San Francisco peninsula throughout the coastal and inland ranges of California and throughout the coastal and Cascade mountain ranges of Oregon and Washington to southern British Columbia. The Redwood Region accounts for only about nine percent of the northern spotted owl's range.

Figure 4-9: Northern spotted owl. Photo by Mike Stephens.

Two NSO activity centers are located on the GuRF based on current surveys, with six additional activity centers located on neighboring properties. According to CDFW, NSOs prefer dense, old-growth, multi-layered mixed conifer, redwood, and Douglas-fir forests. Prime NSO habitat consists of moderate-to-dense stands of medium-to-large trees and multi-layered stands of redwood and Douglas-fir, with mature, multi-layered stands required for breeding. Based on a study conducted in northwestern California, however, the greatest habitat fitness for NSOs is a mix of mature and old-growth forests interspersed with open vegetation types like brush and younger forest (NCRM, 2011).

Primary prey items for NSO include dusky-footed woodrat, flying squirrels, mice, voles (including the red tree vole), small rabbits, small birds, bats and large arthropods. NSOs roost in forests with a dense, multi-layered canopy for seclusion and appear to prefer north-facing slopes in summer due to intolerance for high temperatures. NSOs require a large home range of 100-600 acres of mature forest with permanent water and suitable nesting trees and snags with broken tops or cavities (NCRM, 2011).

The NSO was listed as a threatened species under the federal ESA in 1990 as concern mounted over the continuing loss of habitat that the owls require for survival and reproductive success. In accordance with the ESA listing, landowners within the range of the NSO are required to survey for their presence if any kind of habitat altering activity such as timber harvest is proposed. The USFWS is in charge of administration and consultations with regard to species protected under the ESA. The USFWS developed an NSO survey protocol in 1991 (revised in 1992), which is followed today. In order to address the presence of barred owls, the USFWS issued an update NSO survey protocol in 2011, which was subsequently revised 2012. CAL FIRE has been charged with reviewing NSO data submitted with THPs to determine if harvesting will result in the take of NSO because USFWS does not have the staffing to evaluate each THP.

The California Forest Practice Rules define minimum foraging and nesting/roosting habitat conditions and require minimum habitat retention levels at the 500-foot, 1,000-foot, 0.7-mile, and 1.3-mile radii of the activity center. Additionally, prior to commencing timber operations, surveys for NSO must be completed in conformance with the USFWS guidelines.

The Fund is fortunate to have Mike Stephens, one of the region's NSO experts, responsible for NSO surveys, habitat classification review, and USFWS and CAL FIRE permit coordination. In addition to what is required by the ESA, the Fund has undertaken exhaustive survey efforts to locate all NSO on our property to facilitate timber harvest as well as road improvement projects and stream habitat improvement projects. The Fund's commitment to predominantly uneven-aged selection silviculture is designed to maintain and increase habitat values. The biggest threat to the future of the forest's owls is not habitat loss

but rather the invasive barred owl which displaces the NSO (Kelly et al., 2003), suppresses its calling behavior (Crozier et al., 2006), and is steadily increasing in Mendocino County.

A detailed report on the life history and habitat requirements of the northern spotted owl, with particular attention to the forest's owls, is included as Appendix C.

4.4 Watershed Conditions

4.4.1 Water Quality Overview

The GuRF lands have been managed for industrial timber production for many decades. The Recovery Strategy for California Coho Salmon prepared by the Department of Fish and Game (Coho Strategy) states, "historical forestry practices and some current forestry practices have been shown to impact several freshwater habitat components important to anadromous salmonids in general, and coho salmon specifically. These impacts include increased maximum and average summer water temperatures, decreased winter water temperature, and increased daily temperature fluctuations; increased sedimentation; loss of LWD [large woody debris]; decreased DO [dissolved oxygen] concentrations; increased instream organic matter; and decreased stream-bank stability" (CDFG, 2004).

Past and potentially current forest management practices have been identified as a principal source of sediments in the Redwood Region. According to the NPS Implementation Plan, "silviculture contributes pollution to 17 percent of the polluted rivers… in California (SWRCB). Without adequate controls, forestry operations may degrade the characteristics of waters that receive drainage from forestlands. For example, (1) sediment concentrations can increase due to accelerated erosion, (2) water temperatures can increase due to removal of overstory riparian shade, (3) dissolved oxygen can be depleted due to accumulation of slash and other organic debris, and (4) concentrations of organic and inorganic chemicals can increase due to harvesting and fertilizers and pesticides."

While past forest management has been a significant contributing cause of impairment of North Coast water bodies, there is broad agreement that preventing fragmentation of large tracts of coastal forests and implementing management measures relating to road maintenance and sustainable forest practices is the most feasible means of enhancing water quality in the Region. These measures are described in detail in Section 5.

The Gualala River Watershed Council (GRWC) contributed the majority of the information on stream conditions and aquatic species affecting management and is excerpted below. The GRWC Aquatic Management Plan for the GuRF is included in its entirety as Appendix D.

4.4.2 Stream Conditions

The complexity of stream conditions within the North Fork Gualala River and Rockpile Creek sub-basins and the clear differences between tributaries and main-stems makes it difficult to develop Fund ownership-wide assessments and recommendations. In order to be specific this section provides information on streams in the context of CalWater Planning Watersheds within the North Fork Gualala River and Rockpile Creek Super Planning Watersheds (SPWS)(GRWC, 2013).

North Fork Gualala River SPWS

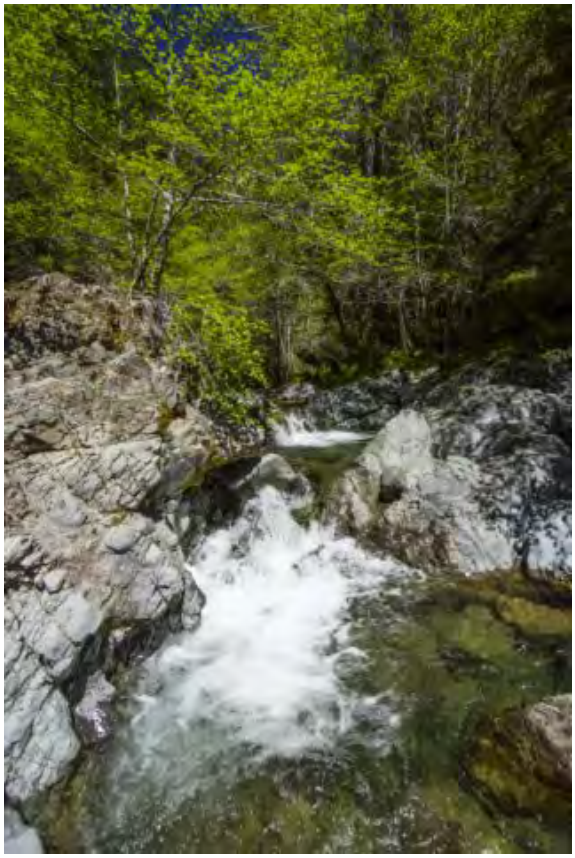


Figure 4-10: North Fork Gualala River just below Hayfield Creek. Photo by Gualala River Watershed Council.

The North Fork sub-basin (CalWater 2.2a 113.81, North Fork SPW) encompasses 47.9 square miles of private land in the northern region of the Gualala River Watershed. The main channel has a zig-zag pattern in response to faulting. Two major faults have influenced channel formation in the North Fork SPW. The Tombs Creek Fault bisects the headwater channels, and the San Andreas Fault runs along the lower portion of the main-stem. There are 127 miles of "blue line" streams, and five major tributaries: Little North Fork, Robinson Creek, Dry Creek, Stewart Creek, and Billings Creek. Predominant land uses include timber production, grazing, small vineyards, and some 40-acre and larger subdivisions in the headwaters.

At 7,925 acres the GuRF ownership is 26% of the North Fork basin spanning Robinson Creek, Stewart Creek and Billings Creek Planning Watersheds (PWS).

The basin has the highest timber site quality in the watershed. With over 70 inches of rainfall per year within the coastal fog influence, the lower and middle reaches of the North Fork sub-basin contain prime timber growing ground for Redwood and Douglas fir. In the upper third of the North Fork sub-basin, there is an abrupt vegetation transition to the mélange clay soil type. At the base of the Billings Creek PW along the Tombs Creek fault, dense conifer stands give way to prairie grasslands and oak woodland.

The North Fork sub-basin has the highest road density (6.5 miles per sq. mile) in the watershed. The road network is extensive, made up of mainly private roads. The roads were built primarily to support timber operations; most were constructed during the period from the 1950s to 1970s. Due to the Gualala River Watershed Council (GRWC) Restoration Program and the cooperative efforts of Gualala Redwoods, Inc. (GRI), extensive road restoration projects have been completed in the Doty Creek and Robinson Creek PWs decreasing the effective road density to 4.6 miles per sq. mile.

Legacy in-stream sediment deposits are slowly transporting out of the watershed. Sediment levels, indicative of disturbance, occur along 29 of 127 miles (23%) of the blue lines streams in the sub-basin. This is a 40% reduction compared to levels in 1984. Most of the reduction is occurring in the headwater tributaries, while the lower reaches show less change (Klamt, et al. 2002).

Within the North Fork Basin tributaries Maximum Weekly Average Temperature (MWAT) ranges are primarily within suitable categories (13°C to 17°C) with Robinson Creek East as the outlier with temperatures at 18.7°C. The main-stem sites vary from suitable to unsuitable for summertime rearing (15.5°C to 22.0°C). There is a trend of higher water temperatures upstream in the North Fork to lower

temperatures as the stream flows towards the ocean. In the upper reaches air temperatures are generally higher and canopy density lower in the northeastern oak woodland and grassland, probably contributing to higher water temperatures. As the North Fork flows west into the coastal influence and better canopy coverage, it also receives flows from cooler tributaries and springs, combining to reduce the main-stem water temperatures (Klamt et al., 2002).

The North Fork SPWS is considered the highest priority watershed as an "Initial Focus Core Area" for restoration (NMFS, 2012). Two factors contribute to this ranking and the importance the sub-basin provides to the Gualala River watershed as a whole. First, it provides the highest quality salmonid refugia available in the watershed and is the only sub-basin to have possible remnant populations of coho salmon. During the past decade coho salmon have been found in the Little North Fork and its tributary Doty Creek, McGann Gulch, and Dry Creek. Second, the North Fork is an important source of base flows and cold water infusion to the lower Gualala during the late season periods when the estuary is prone to warmer temperatures and high salinity conditions. The North Fork contributes greater runoff per unit area than the other major tributaries feeding the lower river and estuary/lagoon in the summer months (ECORP Consulting, Inc. et al., 2005).

Lack of large wood abundance, excess sediment and deficient in-channel canopy density in the headwaters are the cause of most salmonid limiting factors in the North Fork basin (Klamt, et al., 2003). In the lower basin, limiting factors are being addressed on a planning watershed scale by the upgrading of road systems and the placement of large wood through GRWC restoration programs and landowner collaboration.

Robinson Creek CalWater Planning Watershed

Robinson Creek PWS is a 13.7 mi^2 (8,792 acre) sub-watershed that drains 45.9 miles of blue line stream of which approximately 16 miles is salmonid habitat. The three main tributaries Dry Creek, Robinson Creek and McGann Gulch within the Robinson Creek PWS all have suitable temperatures for coho salmon.

The GuRF encompasses approximately 1,982 acres (3.1 sq. miles) concentrated in the headwaters of Dry Creek. Although the ownership area is confined to two headwaters streams, these drainages are important ecosystems to Dry Creek, one of the last streams where coho have been documented in the watershed.

Robinson Creek PWS has a high road density of 6.8 miles per mi^2, totaling 43 miles of primarily private timber roads. A recent collaborative restoration effort on GRI property within the PW has decreased the effective road density to 3.6 miles per mi^2. It is estimated 83% of the total erosion yield within the watershed is road-related (O'Connor, 2008). Approximately 23% (21 miles) of the total road network is on GuRF property.

Implementing road-related sediment source reduction strategies and the appropriate management of headwater systems will benefit downstream reaches by attenuating floods, maintaining water supplies and quality, preventing increased in-stream siltation and aggradations, and provide a steady supply of food resources.

Dry Creek

Dry Creek is a 2nd order stream and an important Class I (2.3 miles) tributary to the North Fork of the Gualala. Dry Creek drains a watershed of approximately 4,104 acres. Steelhead and coho have been historically documented within the system, and it is one of the last streams to have documented coho populations in the watershed.

2001 CCDFW habitat typing data lists the Rosgen channel type as a B4 for the first 8,431 ft then changing to a F4 channel type. The average bank-full width in the lower reach is 43.5 ft, narrowing to 17.5 ft in the upper watershed.

The GuRF property encompasses the headwaters of Dry Creek and starts approximately 2,900 ft above the confluence with Abieta Springs and 2.1 miles above the confluence with the North Fork. Anadromy ends close to the property line with a small amount of the stream (0.24 mile) classified as fish bearing on the ownership.

Sedimentation is a special concern in Dry Creek. GRWC trend monitoring demonstrates a consistent lowering or deepening of the thalweg streambed watershed-wide, confirming decreasing in-stream sediment loads. Dry Creek is the exception to the results. Surveys document aggradation of the thalweg started in 2006 with an increase above the 1998 baseline level by 12 cm in 2012.

Water and air temperature has been monitored since 1995. Current data show Dry Creek temperatures to be fully to moderately suitable for salmonids (13.8°C to 15.7°C). Canopy and pool shelter are limiting factors to salmonid production. Pool depth and frequency were also found to be limiting but may not be applicable due to stream size on the GuRF (Klamt et al. 2003).

A stream enhancement project was implemented by the GRWC and GRI in upper Dry Creek. Fourteen large wood pieces were placed during cable operations to enhance pool habitat.

Location Description

Dry Creek is a tributary to the North Fork Gualala River, which is tributary to the Gualala River. Dry Creek's legal description at the confluence with the North Fork is T11N R14W S7 and its North American Datum (NAD) 83 coordinates are 38.81444 north latitude and 123.475766 west longitude. Elevations range from about 196 feet at the mouth to 1,600 feet in the headwaters area according to the USGS McGuire Ridge 7.5-minute quadrangle.

Monitoring Sites

The GRWC Monitoring program has two installed reaches on Dry Creek. Monitoring Reach Site #211 is a reference reach and has been surveyed annually since 1998. It is located 1,000 ft upstream from the confluence of the North Fork. Site #212 is located 6,800 ft above the confluence with the North Fork, directly below the confluence with Abieta Springs. There are five air and water temperature sites in the Dry Creek basin; three of these sites are on Dry Creek proper (#211, #212 and #753).

Abieta Springs

The GuRF ownership starts 7,400 ft upstream from the confluence of Abieta Springs and Dry Creek. The stream drains a watershed of approximately 752 acres. Approximately 1.2 miles of the headwaters portion of this 1st order stream is within the Fund's ownership of the GuRF. A small portion on the property (0.6 mile) is potential steelhead habitat. Steelhead have been observed in the lower portion of the stream. The stream reach on GuRF property is classified as fish-bearing, based on habitat not on fish observations. Stream gradient and other habitat factors most likely limit coho populations to the mainstem of Dry Creek.

Abieta Springs is a 1st order stream and in 2001 CDFW habitat typed 2,695 ft of the lower portion on GRI property. The stream from the confluence to approximately 2600 ft upstream is a Rosgen F4 channel with an average bank-full width of 17 ft, changing to a B1 channel with an average width of 14 ft for the remaining distance of the survey.

Limited temperature monitoring indicates moderately suitable temperature for salmonids with a seasonal MWAT of 16.6°C (GRWC, 2012). Canopy and pool shelter are limiting factors to salmonid production. Pool depth and frequency were also found to be limiting but may not be applicable due to stream size (Klamt et al. 2003).

The headwaters should be managed for sediment control, its cold water influence on Dry Creek, and food resources for salmonid populations in the lower portion of the tributary and the Dry Creek mainstem.

Location Description

Abieta Springs is a tributary to Dry Creek, tributary to North Fork Gualala River, tributary to the Gualala River. The legal description at the confluence with Dry Creek is T11N R14W S6, and its NAD 83 coordinates are 38.8323 north latitude and 123.472775 west longitude. Elevations range from about 190 feet at the mouth to 1600 feet in the headwaters area according to the USGS McGuire Ridge 7.5-minute quadrangle.

Monitoring Sites

Abieta Springs has a GRWC temperature monitoring site (#752) but there are no installed or proposed GRWC monitoring reaches. The closest reach, Dry Creek #212, is a few hundred feet downstream from the confluence of Abieta Springs and Dry Creek and is discussed in the Dry Creek description.

Stewart Creek CalWater Planning Watershed

Stewart Creek PWS is a 10.3 mi^2 (6585 acre) sub-watershed that drains 27.1 miles of blue line stream, of which approximately 11.3 miles are class I streams, primarily concentrated in the North Fork main-stem. There are two small tributaries that feed into the North Fork: Stewart Creek and Hayfield Creek. Coho and steelhead were historically present on the North Fork main-stem according to 1960s and 1970s CDFW stream surveys.

The GuRF owns 4,392 acres (6.9 sq. miles) within the planning watershed. Representing 67% of the sub-watershed, the Fund is the largest landowner. There are approximately 6.3 miles of Class I streams on property within the PW.

Stewart Creek PWS has a high road density of 7.6 miles per mi^2, with a total of 78 miles of primarily private timber roads. It is estimated 56% of the total erosion yield within the watershed is road-related (O'Connor Environmental, 2008). Approximately 68% (53 miles) of the total road network is on GuRF property. The GRWC is currently working with GRI on assessment and implementation of sediment source restoration on their 22 miles of road within the watershed. To date 17% of the GRI road network in the basin has been hydrologically disconnected.

Implementing road-related sediment source reduction strategies, increasing in-stream canopy density and improving large wood abundance along the North Fork main-stem are the top priority recommendations for the watershed (Klamt et al, 2003)

North Fork Gualala River

The North Fork Gualala River is a 3rd order stream within the Stewart Creek PWS and has approximately 10 miles of anadromous habitat (including tributaries). The portion of the North Fork main-stem is approximately 7.6 miles in length, of which 3.4 miles are on the GuRF. The Rosgen channel type is F4; the average bank-full width is 66 feet.

In-stream data is lacking for this reach of the GuRF North Fork main-stem. 2001 habitat typing stopped at the GRI property boundary. GRWC has one monitoring reach and temperature site on the GuRF property along the upper North Fork which provides limited data for this stream reach.

Pool frequency is substandard with primary pools comprising only 19% of the surveyed reach. Large wood abundance is below optimal levels with only four pieces per 1000 ft. Center of channel canopy density is 43%.

A large wood enhancement project in collaboration between the GRWC, the Fund and TNC is planned for the upper North Fork that will provide habitat enhancement within the reach.

Temperature data was collected in 2004 and 2009; baseline reach data was collected in 2009 by the GRWC. Although temperatures appear to be moderately unsuitable for salmonids (MWAT 19.5°C and max 23.2°C), steelhead spawning adults and redds were found in the upper North Fork reach during the 2012/2013 winter GRWC spawning surveys, and preliminary snorkel surveys conducted in the main-stem on 2,800 ft above Stewart Creek have found one of the largest per mile densities of older (1+) juvenile steelhead in the North Fork basin (see Appendix 1 within the GRWC report in Appendix D).

Snorkel surveys are not yet completed; additional reaches on the property in the North Fork main-stem (total of 19,600 ft) were snorkeled throughout the summer 2013 as part of a North Fork SPWS effort to evaluate the viability of coho salmon populations within the watershed.

Location Description

The North Fork's legal description at the confluence with the South Fork is T38N R123W S26, and its NAD 83 coordinates are 38.778 north latitude and 123.499 west longitude. Stream elevations range from about 40 feet at the mouth to 520 feet at the confluence of Robinson and Billings Creek.

Monitoring Sites

A temperature site (#691) and monitoring reach (#691) are established on the North Fork main-stem within the property. Temperature data was collected in 2004, 2009 and 2013. Reach data was collected in 2009.

Stewart Creek

Stewart Creek is a 1st order stream and has a waterfall at its confluence with the North Fork that appears to be a natural barrier to anadromy. There are approximately 2.3 miles of blue line stream temporarily classified as Class I due to the possibility of a resident trout population above the waterfall. There is no in-stream data available for Stewart Creek.

Location Description

Stewart Creek is a tributary to the North Fork Gualala River, between Lost Creek and Robinson Creek East, tributary to the Gualala River. The legal description at the confluence with the North Fork is T11N R14W S9, and its NAD 83 coordinates are 38.81759 north latitude and 123.42435 west longitude. Elevations range from about 350 feet at the mouth to 1,620 feet in the headwaters area according to the USGS McGuire Ridge and Gube Mountain 7.5-minute quadrangles.

Monitoring Sites

Stewart Creek has no established or proposed GRWC monitoring reaches or temperature sites.

Hayfield Creek

Hayfield Creek is a small 1st order stream and has approximately 2.3 miles of blue line stream. It is a tributary to the North Fork main-stem but no habitat typing or monitoring data is available for the creek. Anadromy is most likely limited to approximately 2,000 ft above the confluence with the North Fork due to an increase in slope.

Location Description

The legal description at the confluence with the North Fork is T12N R14W S28 and 34 and its NAD 83 coordinates are 38.84417 north latitude and 123.4195 west longitude. Elevations range from about 480 feet at the mouth to 1,674 feet in the headwaters area according to the USGS McGuire Ridge and Gube Mountain 7.5-minute quadrangles.

Monitoring Sites

Hayfield Creek has no GRWC established or proposed monitoring reaches or temperature sites.

Billings Creek CalWater Planning Watershed

At 10,650 acres (16.6 mi^2), Billings Creek PWS is the largest sub-watershed within the North Fork SPWS. The planning watershed drains 39 miles of blue line streams, of which approximately 17 miles are potential salmonid habitat. There are two tributaries that feed into the Billings Creek main-stem: Robinson Creek East and Palmer Creek.

The GuRF encompasses 1,551 acres (2.4 mi^2) within the planning watershed. There is a small portion of Billings Creek at the east property boundary, but Robinson Creek East and its tributary Bear Creek are the primary watercourses with approximately 2.7 miles of Class I streams.

Billings Creek PWS has a road density of 4.8 miles per mi^2 representing a total of 79 miles of primarily private timber roads. It is estimated 37% of the total erosion yield within the watershed is road related (O'Connor Environmental, 2008). Approximately 15 miles of the total road network is on GuRF property. Road-related sediment should be addressed with a focus on in-stream and near-stream roads where channel braiding and/or aggradation are still persistent today (Klamt et al, 2003).

As discussed earlier the terrain changes to more open grassland at the beginning of Billings Creek and the Tombs Creek Fault Zone. Cattle grazing occurs on the east side of the property impacting Billings Creek, Robinson Creek and the lower portion of Bear Creek. Exclusionary fencing should be installed.

Large wood abundance should be augmented in the lower reaches of Robinson Creek East along with riparian restoration to provide increased bank stability and in-stream refugia habitat.

Robinson Creek East

Robinson Creek East is a 2nd order stream and does support steelhead populations (GRWC Stream Surveys, 2004, 2009). However temperatures appear to be somewhat unsuitable for coho (MWAT 18.7°C). Rosgen channel types are B2 and B3 and the average bank-full width is 31 feet. The stream drains a watershed of approximately 4,061 acres and contains approximately 3 miles of anadromous habitat.

GRWC has established monitoring reaches and temperature sites on the GuRF property along lower Robinson Creek, above and below the confluence with Bear Creek.

2009 data suggest pool frequency and depth are increasing; primary pools (> 2 ft.) increased from 16% in 2004 to 39% in 2009. Canopy density mid-channel is recovering at 77% but large wood abundance is below optimal levels at an average of nine pieces per 1,000 ft and corresponding low volume levels.

Steelhead redds were found in one Robinson Creek East reach during the 2012/2013 winter GRWC spawning surveys, and snorkel surveys will be conducted summer 2013 as part of a North Fork SPWS effort to evaluate the viability of coho salmon populations within the watershed.

Location Description

Robinson Creek East is a tributary to the North Fork Gualala River where it changes to Billings Creek, tributary to the Gualala River. Its legal description at the confluence with the North Fork is T11NR14W S34 and its NAD 83 coordinates are 38.84780 north latitude and 123.4111 west longitude. Elevations range from about 560 feet at the mouth to 2,240 feet in the headwaters area according to the USGS McGuire Ridge and Gube Mountain 7.5-minute quadrangles.

Monitoring Sites

Robinson Creek East has two GRWC established monitoring reaches and temperature sites established in 2004 (#692 and #697).

Bear Creek

Bear Creek is a tributary to Robinson Creek East and is a 1st order stream with about 1.6 miles of anadromous habitat. 100% of the stream is within the GuRF ownership. In-stream data is limited to temperature monitoring at one site in the lower portion of the Creek.

In 2009, water temperature was found to be fully suitable (MWAT 15.1°C) for salmonids. Some in-stream restoration has occurred in the past, primarily the placement of large wood structures creating plunge pools in the lower basin.

Bear Creek is one of the few streams within the property that appears to have potential summer rearing habitat for coho salmon (GRWC, pers. observations). In addition to the restoration recommendations for Billings Creek PWS, Bear Creek should be assessed for possible spawning habitat and juvenile rearing capabilities.

Location Description

The legal description at the confluence with the Robinson Creek East is T11N R14W S35 and its NAD 83 coordinates are 38.8465 north latitude and 123.40314 west longitude. Elevations range from about 600 feet at the mouth to 1,620 feet in the headwaters area according to the USGS McGuire Ridge and Gube Mountain 7.5-minute quadrangles.

Monitoring Sites

Bear Creek has one proposed GRWC monitoring reach #693. In 2009, water temperature was recorded on Bear Creek at the proposed reach site, 3,000 feet upstream of its confluence with Robinson Creek East. Temperature data loggers were placed in 2013.

Billings Creek

This stream is synonymous with the North Fork after its confluence with Robinson Creek East. It continues from the North Fork to add about another 5.9 miles of anadromous habitat. Only a small portion (0.5 mile) of the stream is within the GuRF ownership.

In-stream data is limited to temperature monitoring. Surface water flowing from the Billings Creek headwaters into the North Fork main-stem has unsuitable temperature (MWAT 20.8°C) for salmonids.

Location Description

The legal description at the confluence with the North Fork and Robinson Creek East is T11NR14W S34 and its NAD 83 coordinates are 38.8479621 north latitude and 123.4112 west longitude. Elevations range from about 520 feet at the mouth to 2,480 feet in the headwaters area according to the USGS McGuire Ridge, Gube Mountain, Zeni Ridge and Ornbaun 7.5-minute quadrangles.

Monitoring Sites

Billings Creek has no proposed GRWC monitoring reaches within the GuRF property. Beginning in 2004, water temperature was recorded periodically at a site (#698) near the Billings Creek confluence with the North Fork and Robinson Creek East.

Rockpile Creek SPWS

The 35 mi.^{2} (22,389-acre) Rockpile basin drains 88 miles of "blue line" streams, and over 60% of the basin has a high to very high landslide potential rating. There are two major tributaries to Rockpile Creek: Horsethief Canyon and Redrock Creek.

At 5,356 acres the GuRF ownership is 24% of the Rockpile Creek SPWS. The majority of the ownership spans Redrock Creek and Middle Rockpile Creek PWS. The property boundary includes a small amount of acreage (2 acres) in Lower Rockpile Creek.

In the lower reaches of the sub-basin, streams meander slightly through narrow alluviated alleys within steep valleys. The main channel is somewhat sinuous and low gradient, with a narrow floodplain and stable point bars.

Mid-century pre-1973 tractor harvesting was the dominant method used in the Rockpile basin, removing most of the old growth conifer-dominated stands throughout the lower and central reaches of the basin in a comparatively narrow time frame between 1952 and 1968. Between 1952 and 1964, 65% of the area had been subject to tractor harvest operations and by the end of the first logging era in 1968, 73.5% of the basin had been harvested (GRWC 2013).

The Rockpile Creek SPWS has 169 miles of private roads. Road density is 4.6 miles per mi.^{2} within the basin. The North Coast Watershed Assessment Program (NCWAP) restoration map targets the central and upper sub-basin reaches with the highest priority for future restoration work in sediment reduction.

Similar to the North Fork, stream channel morphology in the Rockpile sub-basin shows the following evolution over the last half century: (1) a high density of debris flow mounds in the active channel triggered by mid-20th-century storm events, (2) progressive abatement of the frequency of these point sources over successive decades, and (3) apparent improvement of in-stream channel conditions between 1984 and 2000 as evidenced by a reduction in the percentage of channel length affected by excess sediment storage or sediment sources (Klamt et al., 2002).

GRWC has eleven temperature monitoring sites throughout the basin with temperature data from 1994 to 2012. Recent temperature data show the two tributaries (Redrock and Horsethief Canyon) temperatures are in the suitable ranges for salmonids (MWAT 13.2°C to 15.9°C). The main-stem sites vary from moderately suitable to moderately unsuitable for summertime rearing (MWAT 17.1°C to 19.1°C). There is a slight trend, not as pronounced as in the North Fork, of cooling temperatures as the stream flows towards the ocean.

2001 CDFW habitat inventory data was limited in scope; only 39% of the basin was surveyed and stopped at the GRI property line. Data show habitat deficiencies related to canopy cover, pool frequency/depth, and shelter cover in the areas surveyed. More recent GRWC survey results illustrate continued channel simplification in the lower reaches of the main-stem (Lower Rockpile PWS). However, pool frequency and depth do not appear to be limiting in the central watershed (GRWC, 2012).

The Rockpile Creek SPWS is considered a "Phase I Expansion Area" for salmonid restoration efforts in the Gualala River Watershed. Key limiting factors and basin recommendations are similar to the North Fork SPWS, with more emphasis on inadequate riparian composition and density in the middle and upper

watershed. Lack of large wood abundance, excess in-stream sediment and deficient in-channel canopy density in the central and upper basin are key factors limiting salmonid habitat (Klamt, et al., 2002).

Red Rock CalWater Planning Watershed

Red Rock Creek (PWS), at 2,219 acres (3.5 $mi.^2$), is the smallest sub-watershed within the Rockpile Creek SPWS. The sub-basin drains 7.4 miles of "blue line" streams, of which approximately 3.2 miles are Class I streams. Anadromous habitat is found in the Rockpile Creek main-stem and its tributary, Red Rock Creek. The GuRF owns 1,561 acres (2.4 mi^2) which contain 2.5 miles of Class I streams within the planning watershed. The ownership represents 70% of the basin.

Red Rock Creek PWS has a road density of 6.1 miles per $mi.^2$, representing a total of 21 miles of private timber roads. It is estimated 84% of the total erosion yield within the watershed is road related (O'Connor, 2008). Approximately 15 miles (72%) of the total road network is on GuRF property. Some road-related sediment reduction work has been completed, but it is not known to what extent this work conforms to current standards. According to NCWAP, in the mid-1990s, extensive streambank rehabilitation work was implemented on roads in Redrock Creek; this work was carried out by the previous landowner, Coastal Forestlands, Ltd.

Implementing road-related sediment source reduction strategies, identifying and implementing riparian enhancement projects where current canopy density and diversity are inadequate along Rockpile main-stem and Redrock Creek, and improving large wood abundance along the Rockpile main-stem are the top priority recommendations for the watershed (Klamt et al., 2002).

Rockpile Creek

Rockpile Creek is a 2rd order stream, and within Redrock Creek PWS has approximately 1.6 miles of anadromous habitat, of which 0.75 mile is on the GuRF. The Rosgen channel type is F4; the average bank-full width is 59 feet.

In-stream data is limited for this specific section of the Rockpile Creek. However, GRWC has one monitoring reach and temperature site (#701) on the Buckeye River Forest property directly below the property line and another temperature site in the GuRF on Redrock Creek.

Pool frequency is optimal with primary pools comprising 58% of the surveyed reach. Large wood abundance is below optimal levels with 34 pieces per 1,000 ft. and a volume level of 2,961 ft^3. Center of channel canopy density is 60%. Although temperatures appear to be moderately unsuitable for salmonids (MWAT 19.5° C and Max 23.6° C) steelhead young of the year and older are found in the system.

Location Description

Rockpile Creek – Redrock PWS sub-section: The legal description at the downstream (property-line) end is T11N R14W S27, and its NAD 83 coordinates are 38.7767 north latitude and 123.4056 west longitude. Elevations at the property line range from about 130 feet at the downstream end to 150 feet at the upstream end according to the USGS McGuire Ridge 7.5-minute quadrangle.

Monitoring Sites

Temperature data (#701) was collected in 2008 and 2009; baseline reach data (#701) was collected in 2006 by the GRWC.

Red Rock Creek

Red Rock Creek is a small 1st order stream and has approximately 1 mile of blue line stream. It is a tributary to the Rockpile Creek main-stem but no habitat typing is available. Anadromy is most likely limited to approximately 2,000 ft above the confluence with Rockpile due to an increase in slope.

In 2009, water temperature was found to be fully suitable (MWAT 15.1°C) for salmonids. Some sediment source restoration has occurred along the creek.

Location Description

The legal description at the confluence of Rockpile Creek is T11N R14W S22, and its NAD 83 coordinates are 38.77961 north latitude and 123.40754 west longitude. Elevations range from about 140 feet at the mouth to 1,863 feet in the headwaters area according to the USGS McGuire Ridge 7.5-minute quadrangle.

Monitoring Sites

The GRWC Cooperative Monitoring Program has two (2) proposed reaches for Red Rock Creek; #678 and #679. Temperature data (#678) was collected in 2009.

Middle Rockpile CalWater Planning Watershed

Middle Rockpile Creek (PWS) is a 12.8 mi.^{2} (8,165 acre) sub-watershed draining 29 miles of blue line stream, of which approximately 11.4 miles are Class I streams. Anadromous habitat is found in the Rockpile Creek main-stem and its tributary, Horsethief Canyon. The GuRF ownership is 3,793 acres (46%) of the 5.9 mi.^{2} basin and has 7.2 miles of Class I streams within the planning watershed.

Historically, streamside roads and landings were densely concentrated at the base of steep ravines in Middle Rockpile Creek planning watershed. Throughout Horsethief Canyon, heavy tractors cut into the steep sidebanks at the base of the streams, making the near vertical cut banks along these roads prone to failure during winter storms. The 1963 and 1981 air photos showed a high density of road debris slides accessing streams in the Middle Rockpile PWS (Klamt et al., 2002).

The planning watershed has a road density of 5.5 miles per mi.^{2}, representing a total of 70 miles of private timber roads. It is estimated 38% of the total erosion yield within the watershed is road related (O'Connor, 2008). Approximately 35 miles (50%) of the total road network is on GuRF property.

Rockpile Creek

Rockpile Creek is a 2rd order stream with approximately 6.3 miles of Class I streams, of which 5.7 miles are on the GuRF ownership. This portion of the Rockpile main-stem is primarily low gradient (0-1%) with some interspersed reaches with steepening valleys increasing the gradient to over 1%.

In-stream data is limited for this section of the Rockpile Creek. GRWC has two temperature monitoring sites (#680, #683). Current temperatures (MWAT 19.5°C and 19.1°C) are moderately unsuitable for salmonids.

Location Description

The legal description at the downstream end of the Middle Rockpile planning watershed is T11N R14W S23, and its NAD 83 coordinates are 38.7861 north latitude and 123.40015 west longitude. Elevations range from about 150 feet at the downstream end to 380 feet at the upstream end at the property line according to the USGS McGuire Ridge and Gube Mountain 7.5-minute quadrangles.

Monitoring Sites

The GRWC has one (1) proposed monitoring reach for Rockpile Creek (#680). Temperature data (#680 & #683) were collected in 2009 and 2004.

Horsethief Canyon

Horsethief Canyon is a 1st order stream with approximately 0.75 mile of Class I stream, of which all is on the GuRF ownership.

No CDFW habitat typing data is available. GRWC has one temperature monitoring site installed in a proposed monitoring reach (#681). Current temperature (MWAT 15.1°C) is fully suitable for salmonids.

The headwaters (not on the property) of Horsethief Canyon are comprised of some of the few remaining stands of old growth redwoods and Douglas fir within the watershed. The possibility of managing the GuRF property within the Horsethief Canyon watershed for late seral growth and designating the stream as a reference reach for the Gualala River watershed should be explored (GRWC, 2013).

Location Description

Horsethief Canyon's legal description at the confluence of Rockpile Creek is T11N R14W S24, and its NAD 83 coordinates are 38.78691 north latitude and 123.37995 west longitude. Elevations range from about 200 feet at the mouth to 1,600 feet in the headwaters area according to the USGS McGuire Ridge and Gube Mountain 7.5-minute quadrangles.

Monitoring Sites

The GRWC Cooperative Monitoring Program has two (2) proposed reaches for Horsethief Canyon; #681 and #682. In 2009 and 2004, water temperature was recorded on Horsethief Canyon at site #681.

4.4.3 Aquatic Species Affecting Management

As mentioned previously, the focus of this IRMP is on the salmonid species known to or currently inhabiting the Gualala River watershed: steelhead (*Oncorhynchus mykiss*) and coho salmon (*Oncorhynchus kisutch*). Selecting an analyzed species to be used for evaluating the impacts of watershed activities on a range of native aquatic species is an accepted premise. In California's North Coast watersheds, salmonids are used as an indicator of watershed and ecosystem health and information and

management recommendations provided throughout this plan are predominantly relevant to salmonid habitat and populations (GRWC, 2013).

Three anadromous fish species and five fresh water species, including the Gualala roach (a type of minnow endemic to the Gualala River), are commonly found in the freshwater environment of the GuRF (Table 4-5). All species, excluding coho are commonly observed in most Class I watercourses in the basin. Pacific lamprey has been observed but other lamprey species (river and Western brook lamprey) which may be present in the watershed have not been documented. There is very little evidence chinook salmon ever inhabited the watershed (GRWC, 2013).

Table 4-5: Aquatic Threatened, Endangered, and Species of Concern in the Vicinity of the Forest

Species	**Listing Status**
Anadromous Fish	
Coho salmon (*Oncorhynchus kisutch*) Central California Coast Evolutionarily Significant Unit (ESU)	FE SE
Steelhead (*Oncorhynchus mykiss*) Central California Coast ESU	FT
Pacific lamprey (*Lampetra tridentata*)	
Freshwater Fish	
Gualala roach (*Lavinia symmetricus parvipinnis*)	CDFW: SSC
Coast range sculpin (*Cottus aleuticus*)	
Prickly sculpin (*Cottus asper*)	
Riffle sculpin (*Cottus gulosus*)	
Threespine stickleback (*Gasterosteus aculeatus*)	
Reptiles	
Western (Northern Pacific) pond turtle (*Emys marmorata*)	CDFW: SSC
Western aquatic garter snake (*Thamnophis couchi*)	
Amphibians	
Coastal (Pacific) giant salamander (*Dicamptodon tenebrosus*)	
Southern torrent salamander (*Rhyacotriton variegatus*)	
Northwestern salamander (*Ambystoma gracile*)	
Rough-skinned newt (*Taricha granulosa*)	
Red-bellied newt (*Taricha rivularis*)	
Coast range newt (*Taricha torosa*)	CDFW: SSC
Ensatina (*Ensatina eschscholtzi*)	
Black salamander (*Aneides flavipunctatus*)	
Tailed frog (*Ascaphus truei*)	FT CDFW: SSC
Western toad (*Bufo boreas*)	
Pacific treefrog (*Hyla regilla*)	
California red-legged frog (*Rana draytonii*)	FT CDFW: SSC
Foothill yellow-legged frog (*Rana boylii*)	CDFW: SSC

Listing Status Codes:

FE= Federally Endangered, FT=Federally Threatened; SE=State Endangered

CDFW: SSC = California Species of Special Concern

Coho Salmon (*Oncorhynchus kisutch*)

The Gualala River watershed hosts one of the few Functionally Independent Populations (FIPs) of the Central California Coast Coho (Spence et al., 2008) and has the highest Intrinsic Potential (IP), excluding the Russian River, of all the coastal watersheds for possible recovery of the California Central Coast Coho ESU (NMFS, 2012).

Coho need riverine habitats with cool clean water, appropriate water depth and flow velocities, riparian vegetation to stabilize soil and provide shade, clean gravel for spawning and egg-rearing, large woody debris to provide resting and hiding places, adequate food and varied channel forms.

In the Gualala known coho habitat is limited to the North Fork basin and more likely, the Doty and Robinson Creek Planning watersheds where small and possibly not self-sustaining coho populations have been observed during snorkel and electrofishing surveys.

Neither accurate nor credible coho salmon population estimates have been conducted in the Gualala River watershed (Klamt et al., 2002). Electrofishing (10 Pool Protocol) data from 2001 indicated that coho salmon were absent and possibly extirpated from the Gualala basin (CDFG, 2002), but coho young-of-the-year have been observed in the North Fork sub-basin and the Gualala River estuary during subsequent surveys and studies.

- 2002: coho young-of-the-year were observed in the North Fork sub-basin on McGann Gulch Creek, (R. Dingman, Gualala River Steelhead Project), and in Dry Creek (H. Alden, Gualala Redwoods, Inc.), both tributaries to the North Fork. Coho young-of-the-year were also observed on the Little North Fork and Doty Creek during electrofishing surveys (CDFG, 2002).
- 2003: in May during a Gualala River estuary sampling event a coho juvenile was found (ECORP Consulting, Inc. et al., 2005). In June, juvenile coho salmon were reported to have stranded immediately after an estuary summer breach event by NOAA fisheries personnel. Coho juveniles were found during the summer in tributaries of the North Fork during presence/absence snorkel surveys conducted by Wendy Jones (CDFG, 2004).
- 2004: juvenile coho were found in upper Dry Creek during snorkel surveys.
- 2005 to present: comprehensive surveys and/or studies that would lead to coho observations or population assessments were not conducted in the watershed during this period.

The last planting of coho salmon fingerlings in the watershed was in the Little North Fork tributary in 1998 (Klamt et al, 2002). With multiple sightings of juvenile coho continuing six years later, it is highly probable a remnant coho population exists in the Gualala.

Steelhead Trout (*Oncorhynchus mykiss*)

Starting in the 1940s and continuing today, steelhead trout have been recreationally fished on the Gualala River. CDFW conducted steelhead population surveys in 1976 and 1977 and found steelhead populations to be 7,608 and 4,324, respectively.

Figure 4-11: Steelhead in the North Fork Gualala River. Photo by Sean Case, Gualala River Watershed Council.

In 1973, CDFW estimated the steelhead population (for the entire system) was between 2,219 ("Park Hole") and 2,584 (estuary), based on recapture in two areas of the lower main-stem Gualala. The respective 95% confidence limits were 799-5,165 and 571-9,535. In 1974-75, CDFW estimated the adult steelhead population was 7,608, with a 95% confidence interval of 6,126-10,379. In 1975-76 the population was estimated at 6,300. In 1977, CDFW estimated the winter steelhead population at 4,400 (GRWC, 2013).

CDFW planted steelhead juveniles from the Mad River Hatchery in the Gualala River from 1972 through 1976, and then again from 1985 through 1989. A hatchery was operated by the Gualala River Steelhead Project (GRSP) in the late 1980s using native Gualala River brood fish that were caught by anglers. In 1994, the GRSP changed the emphasis of their program to rescue, rearing, and release.

Current adult steelhead population estimates for the Gualala River basin are not available. The GRWC currently conducts limited snorkel and spawning surveys with the goal of expanding the study scope to estimate watershed steelhead populations in the future.

In general, steelhead stocks throughout California have declined substantially. The most current estimate of the population of steelhead in California is approximately 250,000 adults, roughly half the adult population from the mid-1960s (McEwan et al., 1996).

Throughout their range, steelhead typically remain at sea for one to four growing seasons before returning to fresh water to spawn (Burgner et al., 1992). Most Gualala River steelhead migrated to sea as two-year-old fish and returned after spending two years in the ocean. However, steelhead occasionally exhibit other life history patterns: scale analysis of adults indicated they spent from one to four years in fresh water and from one to three years in the ocean (GRWC, 2013).

Steelhead do not necessarily migrate at any set age. Some individuals will remain in a stream, mature, and even spawn without ever going to sea, others will migrate to sea at less than a year old, and some will return to fresh water after spending less than a year in the ocean.

Steelhead habitat requirements are very similar to coho salmon. They need cool clean water and adequate flow for migration and summer rearing, clean gravels and cobble for spawning and winter refugia, deep pools with large wood for shelter, and healthy riparian vegetation for shade and nutrients (GRWC, 2013).

4.4.4 Existing Road Conditions

The GuRF has an extensive network of maintained roads. Most roads have internal and external locked gates to control access. In addition to frontage on Fish Rock Road maintained by Mendocino County, the Forest contains all-season main access roads and seasonal roads historically used for timber harvesting

and management activities. Prior to acquisition by the Fund, Coastal Forestlands Ltd. was maintaining and upgrading the road network in a phased approach to meet current standards. Road upgrades included improved drainage, watercourse crossings for fish passage, and standard maintenance activities. Coastal Forestlands had identified some mainline roads for ongoing maintenance while others were assessed for removal, decommissioning, reconstruction, or maintenance based on future timber harvests and potential for adverse environmental impacts (NCRM, 2011). Table 4-6 below summarizes road types and mileage by planning watershed, based on CAL FIRE GIS data (NCRM, 2011).

Table 4-6: Road Types and Mileage by Planning Watershed on the Forest

Road Type	Billings Creek	Lower Rockpile Creek	Middle Rockpile Creek	Red Rock	Robinson Creek	Stewart Creek	Gualala River Total
EP	2.0				0.9	0.5	3.5
ES	9.5	0.6	29.9	12.0	12.3	40.8	105.1
ET	2.0		7.0	0.8	2.9	10.5	23.2
PS	1.2	0.1		2.2	3.3	0.2	6.9
Total	14.6	0.7	36.9	15.0	19.4	52.0	138.7

Road Type Codes:

EP = Existing Permanent

ES = Existing Seasonal

ET = Existing Temporary & 4WD

PS = Proposed Seasonal

4.5 Archaeology and Cultural History

A California Historic Resources Information System (CHRIS) property-wide records search was requested by the Fund from the Northwest Information Center (NWIC) at Sonoma State University on March 14, 2013. Appropriate NWIC base maps, referencing cultural resources records and reports, historic-period maps, and literature for Mendocino County were reviewed as part of the request. NWIC cultural resources include archaeological resources and historical buildings and/or structures.

The NWIC has record of 73 previous surveys covering roughly 70 percent of the GuRF (NWIC, 2013). Archaeological and cultural resource surveys have been conducted by previous landowners during the preparation of THPs; many cultural sites have been located on the property. Existing cultural resources are protected from management activities through exclusion of heavy equipment operation in the immediate vicinity. Specific areas proposed for timber harvest are surveyed during the timber harvest planning process in order to detect and protect any previously unknown sites or artifacts.

In accordance with the American Indian Religious Freedom Act and the Antiquities Act, the CHRIS will be consulted prior to any land disturbing activities. Continued assessments will be made to locate cultural resources before any significant activity in the forest, and personnel trained in archaeological inventory methods will inventory all sites before timber harvest activity. These Acts require site locations and descriptions be kept confidential to protect the resources; therefore, no listing is included in this Plan.

4.5.1 Native American Resources

The NWIC (2013) report included 32 recorded Native American cultural resources in or adjacent to the GuRF. Seven Native American villages and one campsite were referenced in the ethnographic literature in or near the GuRF. People living in the general area of the GuRF at the time of Euro-American contact spoke Central Pomo, one of seven Pomoan languages (NWIC, 2013).

Within this region of Mendocino County, Native American resources have typically been found along creeks and rivers, on midslope terraces above waterways, and along trending ridges. The waterways encompassed by the NWIC report include the North Fork Gualala River, Dry Creek, Hayfield Creek, Robinson Creek, Bear Creek, Stewart Creek, and Rockpile Creek. The report also includes the mid-slope terraces above these waterways and several major trending ridges, such as McGuire, Signal, Fisher, and Yellow Hound ridges. Based on these environmental factors, the NWIC indicates there is a high potential for identifying unrecorded Native American resources within the GuRF (NWIC, 2013).

4.5.2 Historic-Period Cultural Resources

NWIC base maps identified seven previously recorded historic era archaeological resources located within the GuRF. The review of historical literature and maps indicated potential for historic-period archaeological resources on the property. The General Land Office (GLO) plat maps from 1860 to 1884 show a home or barn within the project area. The Orbaun 1943 USGS 15’ topographic quadrangle map shows four ranches—Rickard Ranch, Ciapusci Ranch, Zeni Ranch and the Gianoli Ranch just outside the GuRF boundary. Given these factors, the NWIC (2013) report indicated a high potential for identifying unrecorded historic-period archaeological resources within the GuRF.

However, the Ornbaun USGS quadrangle does not show any buildings or structures; thus, the NWIC believes there is a low potential for identifying any buildings or structures 45 years or older within the GuRF (NWIC, 2013).

5. Forest Management Goals and Measures

5.1 Forest Management Overview

The following forest management policies and strategies have been developed to guide the long-term management of the forest resources of the GuRF to ensure sustainability and fulfill the overall project purpose. These policies and strategies are derived from the IRMPs for the GRF completed in 2006, for the BRSC Forests completed in 2009, and from interim management policies set forth in the North Coast Forest Conservation Program Policy Digest (see Appendix E), as defined by the Fund from 2010 through 2012. Forestry is an inherently site-specific endeavor and policies must retain the flexibility to adapt to individual stand conditions, market characteristics, or logger capabilities.

5.1.1 Forest Management Strategies

- Silviculture practiced on the Forest will be primarily uneven-aged single-tree or small group selection in order to develop and maintain a range of tree sizes and ages within a stand, with the goal of producing valuable saw timber and utilizing natural regeneration. Even-aged variable retention harvests (to retain large trees and habitat features) may be used to rehabilitate conifer sites now dominated by hardwood, in future salvage situations, group selection or variable retention will likely be used on Douglas-fir sites; and all regeneration harvests will encourage natural regeneration.
- The Forest must generate sufficient revenue for PRI and Revolving Loan Fund payments, and to the extent consistent with the overall project purposes, investment in restoration and enhancement measures (e.g. restoration projects, road upgrades).
- Harvest levels will be significantly less than growth rates over the next few decades so as to increase timber inventory and carbon storage.
- Special attention will be given to developing and retaining critical wildlife habitat features, such as snags, downed wood, and trees of significant size.
- While the Forest presently contains smaller trees and more hardwoods than would have occurred naturally, over time the selected silvicultural methods are intended to ensure the Forest more closely approximates natural conditions.
- There are no old-growth stands on the property; there are individual trees that are residual old growth—these and other very large trees and true oaks will be maintained [see retention requirements in 5.1.5].
- Include ample internal and external review of proposed and completed THPs through the Field Consultation, Annual Operations Review, and public tours [described further in 6.2].
- The Fund has obtained, and will continue to maintain, certification under the FSC and Sustainable Forestry Initiative (SFI) standards.
- The Fund will continue to report carbon sequestration through CAR.

5.1.2 High Conservation Value Feature Protection

Most of the forest management policies are intended to guide the management of those areas of the GuRF that will support commercial timber harvesting operations. However, one of the most important steps in

determining how to manage a forest is recognizing which areas have unique ecological values that outweigh their potential contribution from a commercial harvest perspective. The protection of these features is critical to achieving the program objectives of restoring habitat for species of concern and increasing the natural diversity and ecological health of these forests.

Specific policies to address these features include the following:

- All true oak (*Quercus* spp.) woodlands and native grasslands will be preserved. Where these vegetation communities grade into adjoining conifer forest, the surrounding forest is to be managed to buffer and protect the unique ecological attributes of, oak woodlands, and native grasslands.
- There are no large wetlands on the property, but springs, seeps, and small wetlands shall receive protection measures as required by the FPR.
- Riparian forests, particularly along Class I streams, will be managed to provide for closed canopy mature forest with a high component of downed logs and other late-seral features. [Some removal of timber can be consistent with this objective - see WLPZ Protection Measures in Section 5.3, below.]
- Nest sites for NSOs are to be managed in accordance with the requirements of the USFWS and the Fund's biological consultant, Mike Stephens (see Section 4.3.3 and Appendix C for details). Inactive nest sites will be protected (because of the likelihood of repeat nesting).

Additional information on the identification and protection of these features can also be found in the High Conservation Value Features Program Memo, which is included in the North Coast Forest Conservation Program Policy Digest (Appendix E).

5.1.3 Harvest Levels

For the GuRF, growth forecasting and harvest scheduling is underway as part of development of the Option A for the ownership. In the interim, annual harvest is not to exceed 1.5mmbf for the first decade, which is based on being comparable in size and composition to the GRF excluding the Ecological Reserve.

5.1.4 Silvicultural Objectives

The principal silvicultural objectives are to grow large high-quality trees, increase structural complexity and natural diversity and establish a high level of sustainable timber production through selective harvests. These measures should maximize value growth and develop and maintain important late-seral habitat characteristics for wildlife and non-timber forest vegetation in the future. "Crop tree" target diameters are 30 to 36 inches for redwood and 22 to 28 inches for Douglas-fir. Forest management will seek to emulate late-seral ecological functions and processes to the extent feasible within a managed forest. Ultimately, these measures are intended to develop stands that have high canopy closure, some large mature trees, and a high degree of structural diversity. In time, certain stands primarily within the WLPZ of class I streams may be excluded from harvest so as to fully return to old growth conditions, once they are on an appropriate trajectory.

For additional information on silviculture decisions, THP development, harvest operations, and contractor selection please see the Fund's Forest Management Supplemental Information in Appendix E.

5.1.5 Harvest Retention Requirements and Guidelines

Figure 5-1: Downed wood in the Gualala River Forest. Photo by John Pearson.

Within a harvest area, the Fund will permanently retain or recruit downed wood, snags, and trees with high wildlife value given their recognized ecological role and ability to enrich the surrounding stand. The following policies for downed wood, snags, and wildlife trees are meant to implement this strategy by providing clear rules and numerical targets for certain types of features. [The Forest Practices Rules (FPR) do not categorically address general wildlife habitat retention trees (although there are some requirements for protection of active raptor nests), but additional guidance is available from CDFW.] Retention trees will be painted ("W") or tagged by the field foresters as they are marking the timber harvest to communicate the value of these features not just to the loggers but also the public and future foresters. Because a harvest can include many retention trees, they are not mapped or recorded unless they are suspected NSO nest trees. And while maintaining trees with high wildlife value is important, it is also critical to recognize the wildlife value of the surrounding stand and the conserved landscape, and not expect the harvest stand to mimic or contain all features which may be better represented in other areas of the property.

Downed Wood

Target: two pieces per acre (at least one conifer, 18 inch minimum diameter and ten feet minimum length).

Actions:

- Retain existing downed wood except in situations of recent windfall or fire outside of Watercourse and Lake Protection Zones (WLPZ). (In most stands this should be sufficient to meet the target.)
- Retain snags and mark trees for recruitment snags to eventually become downed wood.
- Redistribute cull conifer logs from the landing where practical (unless used for instream restoration projects).

Snags and Wildlife Trees

Target: four per acre on average across stand which may be composed of any combination of trees from the list below.

Criteria for mandatory retention:

- Snags (minimum 18-inch DBH and 20-foot height);
- Conifers greater than 48-inch DBH- Retain a minimum of one and not more than three per acre for recruitment.
- Old-growth trees (generally in the upper 20% diameter class for the species on site, deep bark patterns, flattened or irregular crowns, large limbs, crown debris accumulation)
- Raptor nest trees;
- Hardwoods over 20 inches;
- Murrelet habitat trees (low elevation old-growth and mature conifers, multi-layered canopies, mistletoe, other deformations or damage present for nest platforms)
- Den trees (cavity greater than three-inch diameter and greater than ten feet above ground);
- Trees with basal hollows or other significant features (cavities, acorn granaries, significant burn scars, significant or unusual lichen accumulation, signs of deformity, decadence, unusual bark patterns, or other unique structure or features).

Actions:

- Retain all mandatory trees and snags except where necessary to fall for operator safety, and protect with screen trees if appropriate.
- If below the target number, mark and retain additional recruitment trees. [Additional wildlife trees will likely be marked in the future from the surrounding stand as it develops.]

General Harvest Retention Guidelines

- Marked wildlife trees should be considered "escapement" trees—they are not intended for future harvest and are allowed to grow beyond the crop tree target size.
- In the absence of mandatory retention trees, on average at least one conifer per acre should be retained from the largest ten percent of the diameter distribution of the stand.
- Marking of the wildlife trees (with paint or tags) is intended to communicate the recognition of the importance of that stem to future foresters, agency reviewers, and the public.
- For the next 20 years some preference for snag and downed log creation and wildlife tree recruitment will be given to cull trees and whitewoods (because of their low financial value) even though they may have a shorter lifespan.
- All retention is subject to operational considerations; the felling of any tree is permitted when necessary for operator safety, road right of way, or yarding corridors. Field foresters will attempt to avoid locating yarder corridors where they would conflict with mandatory retention wildlife trees.
- Targets shall be assessed across the entire harvest stand, not on an individual acre basis.
- Preference is for spatial grouping (clumps of downed wood, snags, and/or wildlife trees).
- The above criteria shall apply to selection harvests. When marking variable retention harvests extra screen trees may be appropriate.

All of the foregoing requirements and guidelines are subject to further review and amendment as the science and practice of forest management evolves and new research is developed and applied. Because

of past practices, some portions of the Forest do not have sufficient wildlife features and the initial targets set forth above are intended to guide the long-term retention and recruitment of these features. Two or three of anything per acre is an admittedly arbitrary number chosen to put the Forest on the right trajectory for the development and maintenance of late-seral habitat characteristics within a managed forest; achieving some of these targets will likely take more than one entry. These distribution and size targets are not expected to be the ultimate value but merely what is appropriate to select and recruit in the next twenty years; the development of late-seral habitat elements is a long-term process and will be shaped over several harvest entries. In addition, it is unclear how the establishment of Sudden Oak Death (SOD)(present on GRF and GuRF) will affect the Forest.

5.1.6 Timber Marking Guidelines

Timber marking (designating individual trees for harvest) is the art of shaping future forest stand conditions by extracting merchantable trees from the forest. The remaining trees are vigorous and free to grow while protecting and enhancing wildlife habitat, the end result being a forest well-stocked, rapidly growing, and healthy with abundant and diverse wildlife habitat features. Approaches to timber marking vary by stand condition and silvicultural objective, and it is difficult to identify a universal prescription.

Because of the thousands of individual judgment calls made while marking a stand, even individual foresters with the same objective would inevitably make slightly different decisions. The general goal of timber marking by the Fund is relatively simple: current (pre-harvest) conditions should be improved by the time of the next entry (typically ten to twenty years) while also increasing net growth. “Improved” is a subjective term, but for the purposes of this Plan it means increased values for conifer basal area, merchantable volume, snags and downed logs per acre. These are also some of the values to be used to monitor forest trends across the Forest.

Appendix E includes criteria drafted by experienced foresters, which strive to capture some of the art of achieving the desired balance between habitat recruitment and retention while removing sufficient conifer volume to satisfy the economic needs of the project. Timber marking will be conducted with these criteria in mind. One of the purposes of the Field Consultations (both pre- and post- harvest) is for the forestry team to discuss the timber marking, particularly in riparian stands, understocked areas, and near NSO activity centers.

5.1.7 Hardwood Management

Hardwood species, including tanoak, madrone, chinquapin, and alder, are an important ecological component of North Coast forests. Past management practices have resulted in an unnaturally high abundance of tanoak in many areas historically dominated by conifers. Mixed hardwoods account for 42 percent of the basal area on the GuRF; in some strata, tanoak makes up 87% of the basal area although on average it makes up 35% of the basal area. For comparison, old growth conifer stands in the area often have ten percent or less of the basal area in hardwood species. Stands with greater than 25 percent of the basal area in hardwood species account for 96 percent of the forested acres.

In addition to the ecological imbalance, the high concentration of tanoak significantly reduces conifer growth and stocking, and therefore the future financial value of the Forests, since tanoaks have effectively

no commercial value (it costs more to log and deliver than they are worth as firewood). The long-term goal is to maintain an appropriate level of tanoak and other hardwoods (probably around ten percent on average). To achieve these objectives, the following management measures will be implemented:

- All true oak (*Quercus* spp.) woodlands, individual true oaks, Madrone, Chinquapin, California bay and Red or White Alder are to be retained wherever possible. All hardwood wildlife trees are to be retained (which includes all of the above and tanoak 20 inches or greater), except where removal is required for safety concerns or necessary for yarding or road corridors.
- Where the post-harvest hardwood basal area would exceed 30 square feet of basal area per acre (averaged across the stand), hardwoods shall be controlled through manual falling or girdling or herbicide treatment through direct basal injection ("hack-and-squirt") or stump treatment to provide a post-harvest hardwood basal area of 15 to 30 square feet per acre. This may take more than one entry to achieve. These targets may be adjusted once the inventory has been completed.
- Most hardwood reduction will be achieved within a selection or thinning harvest by selective falling of tanoaks to release existing conifers. While the tanoak stumps will likely re-sprout, the conifers should have established dominance and will eventually shade-out most of the sprouts. In this type of incremental treatment (selective falling), clumps of hardwoods and individual hardwoods which do not compete with desirable conifers will be left alone.
- There are many stands where selective hardwood felling would not be sufficient to meet the desired level of conifer site occupancy. In these situations, a more aggressive treatment will be utilized through an herbicide treatment that kills a majority of the tanoak to release either existing conifers or seedlings planted shortly before or after the hardwood treatment. Even within these prescriptions, smaller areas of intact hardwoods would be intentionally retained (for biodiversity reasons). Preference for hardwood retention will be given to large trees (greater than 20 inches), true oaks, chinquapins and madrones, and groups of hardwoods. Rehabilitation treatments (including the use of herbicides) are intended to be one-time interventions and should not need to be repeated because of the decreased openings and ground disturbance associated with subsequent harvests.
- The only herbicide to be used in hardwood control treatments currently is imazapyr (tradename Arsenal). Only licensed and insured contractors with a good track record for safety and compliance may apply herbicides. All herbicide application must be in conformance with label guidelines and applicable laws. Additional herbicides may be considered in the future as they are developed and tested and reviewed with respect to FSC and SFI standards.
- Any planned use of herbicide will be clearly identified in the THP and THP summary.
- Any area where herbicide use is proposed shall be clearly posted in the forest at least 30 days prior to application.
- Reduction in the use of herbicides is an important objective; alternatives to herbicide treatment have been and will continue to be evaluated on a periodic basis. A comparison of herbicide treatment and logging of tanoaks for commercial firewood was evaluated as part of the Jarvis Camp THP on BRSC. Monumented plots will allow for long-term evaluation of effectiveness but the initial impressions are the logging method resulted in increased cost and site disturbance (exposed soil and damage to the residual stand). That said, a commercial market for tanoak would be pursued if it develops. Areas with well-established and good quality hardwoods will likely be managed for mature hardwoods instead of attempting to re-establish conifer.

- There will be no hardwood control with herbicides in WLPZs; manual falling or girdling of small hardwoods may be used, but only as part of a riparian shade enhancement project (likely with conifer underplanting).
- Priority for rehabilitation treatments will be given to high site, tractor-operable ground, with existing desirable redwood growing stock. Hardwood control measures will be reviewed periodically and revised as appropriate based on knowledge and experience gained in the field. Herbicides will likely also be used to control certain exotic invasive plants, primarily jubata grass, western star thistle French Broom and Scotch Broom. No other uses of herbicides or pesticides are anticipated.

5.1.8 Fire Management

Fire is both a natural and human-caused presence on the North Coast landscape and requires careful consideration and preparation. Figure 5-2 below illustrates relevant fire management features, including drafting sites, water sources, and helicopter landing sites. The Fund has developed a Fire Management Plan (included as Appendix F) to specify the fire prevention and response measures to be used on the Forest. This plan was submitted to CAL FIRE and is provided to all equipment operators working on-site and to the local volunteer fire departments. Decisions about fire control strategy and remediation will be made on a case-by-case basis by the North Coast Operations Manager.

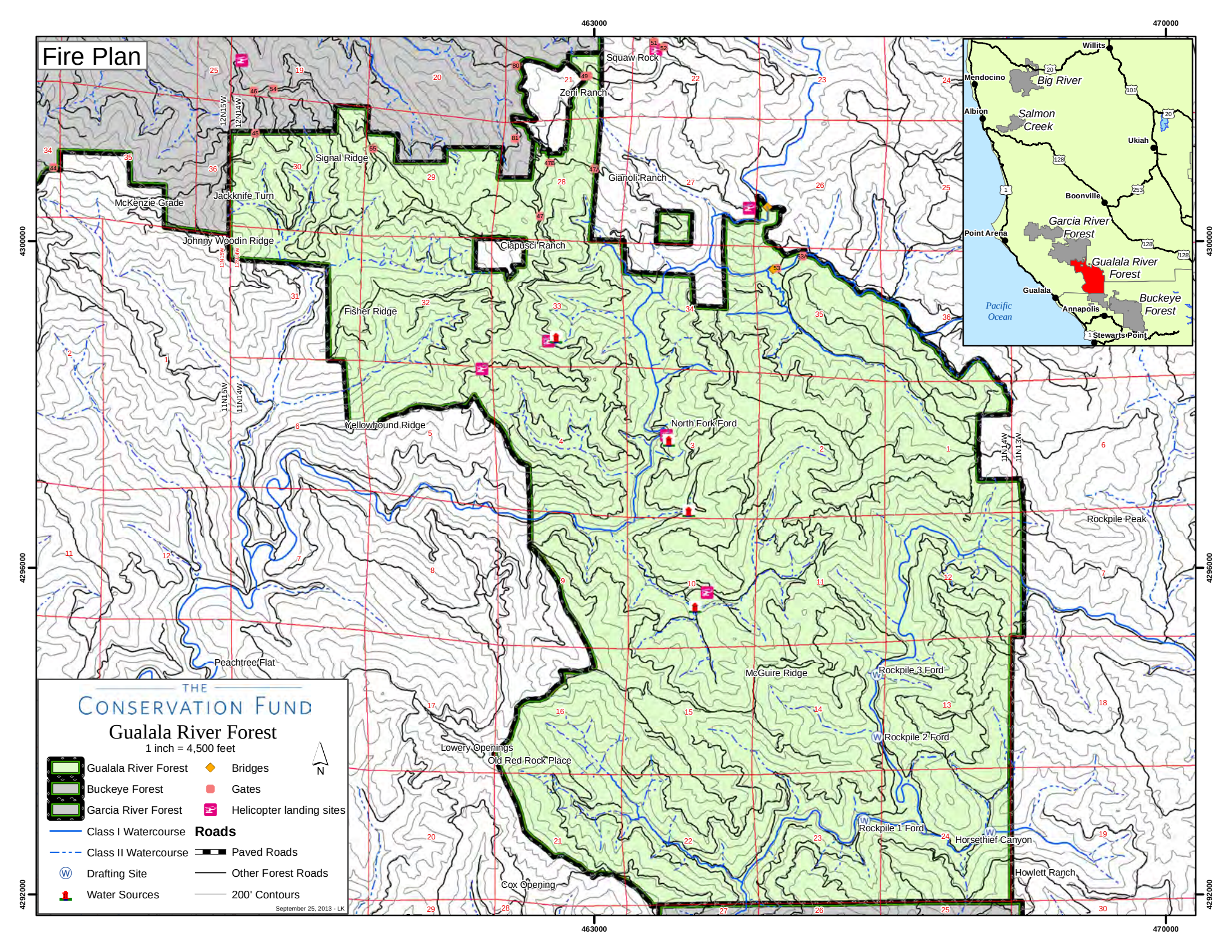
5.1.9 Monitoring and Forest Certification

Ongoing monitoring of both activity implementation and program effectiveness is a critical part of adaptive management and successful initiatives. Several monitoring strategies will be utilized in combination to ensure thorough review across multiple sectors and different temporal and geographic scales. There is detailed discussion of the aquatic monitoring strategies in Section 5.3.2, which are critical to and complementary of the forest monitoring strategies described in this section. Three broad categories of forest monitoring will be utilized: short-term harvest monitoring, long-term forest monitoring, and forest management certification. These are described in detail below.

5.1.9.1 Short-term Harvest Monitoring

Because of the sensitivity and significance of the timber harvest program, it will receive more detailed monitoring than other program activities. Numerous efforts are undertaken before, during, and following a timber harvest to ensure it is completed in accordance with the Fund's management policies, including safety, regeneration, residual stand quality, and aesthetic issues. This monitoring process begins before the harvest operation, with each THP's Field Consultation, which brings together all of the Fund's resource management team to identify any sensitive issues that deserve additional attention. In addition there is a public THP tour, prior to operation and again following completion, to solicit suggestions and answer questions from interested stakeholders.

During the harvest the supervising forester is on-site at least weekly to review the performance of the Licensed Timber Operator and address any issues that may arise. Following the harvest, the Fund's


Fire Plan
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470000
4300000
4296000
4292000
Squaw Rock
Zeni Ranch
Signal Ridge
Gianoli Ranch
McKenzie Grade
Jackknife Turn
Johnny Woodin Ridge
Ciapusci Ranch
Fisher Ridge
Yellowhound Ridge
North Fork Ford
Rockpile Peak
McGuire Ridge
Rockpile 3 Ford
Rockpile 2 Ford
Rockpile 1 Ford
Horsethief Canyon
Howlett Ranch
Peachtree Flat
Lowery Openings
Old Red Rock Place
Cox Opening
12N15W
12N14W
11N15W
11N14W
11N13W
Willits
Mendocino
Big River
Albion
Salmon Creek
Ukiah
Boonville
Garcia River Forest
Point Arena
Gualala River Forest
Gualala
Buckeye Forest
Annapolis
Pacific Ocean
Stewarts Point
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1 inch = 4,500 feet
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Buckeye Forest
Garcia River Forest
Class I Watercourse
Class II Watercourse
Drafting Site
Water Sources
Bridges
Gates
Helicopter landing sites
Roads
Paved Roads
Other Forest Roads
200' Contours
September 25, 2013 - LK

resource management team is re-convened for the Annual Operations Review, which inspects completed operations to evaluate conformance with the Fund's policies and discuss any special issues. In connection with Field Consultations, weekly harvest inspections, the Annual Operations Review, and/or the required agency reviews, certain sites or issues will be identified for continued specialized monitoring (e.g. Erosion Control Plan sites are typically monitored for at least two winters). Results of THP inspections or monitoring are available from Fund staff by request.

5.1.9.2 Long-term Harvest Monitoring

As part of the objective of restoring the forest inventory and late-seral wildlife habitat characteristics, there are several long-term monitoring targets that will be evaluated within the forest inventory system. Because of the continuous nature of the inventory updates and the long-term environmental response time, reporting on these metrics will occur approximately every ten years, although interim data will be factored into THPs and specific restoration projects. As the primary forest management goals are to increase inventory, forest productivity and late-seral characteristics, the monitoring targets are oriented around associated indicators.

Table 5-1 summarizes the long-term harvest monitoring criteria in terms of current condition and desired future targets.

Table 5-1: Long-Term Forest Monitoring Targets

Objective	**Metric**	**Current Value**	**50-Year Target Value**	**Criteria**
Conifer volume	mbf/acre	9.1	30+	Net Scribner log scale, across all forested acres
Conifer growth	Board feet/ acre/year	442	1,000+	Across all acres, pre-harvest
Snags	Number/acre	0.8	>2	All species, >18" DBH
Downed logs	Number/acre	6.6	>5	All species, >18" DBH
Hardwood competition	Percent basal area	43	<15	Average across all acres, all diameters
Harvest volume	Percent of inventory	0	<2.0	Across all acres, averaged for 10-year rolling window

5.1.9.3 Forest Certification

The Fund's North Coast Forest Conservation Program has been certified as in conformance with the FSC and SFI standards for sustainable forest management by the accreditation firms Scientific Certification Systems and NSF International Strategic Registrations. These broad-ranging standards are intended to ensure all forest management activities are planned and conducted to meet the established sustainability criteria which include hundreds of individual indicators, covering everything from water quality protection and biodiversity conservation to worker training and community involvement. Re-certifications are scheduled to occur every five years with surveillance audits annually. The standards are publicly available at: www.fscus.org and www.sfiprogram.org; the reports of the Fund's auditors are available at www.scscertified.com or from the Fund's North Coast office.

The GuRF is also an approved and verified IFM project through CAR. This program, endorsed by the California Air Resources Board, allows the Fund to quantify and publicly report on our greenhouse gas emission reductions generated as a result of the improved forest management on this property. As part of the annual audits for this program, independent auditors review the forest inventory system, the growth and yield modeling, and greenhouse gas reporting system . General information on the Forest Project Protocol can be found at https://www.climateactionreserve.org. Specific project details are available at https://thereserve2.apx.com/mymodule/reg/prjView.asp?id1=660.

This rigorous system of third-party audits is intended to help land managers evaluate and improve their practices and communicate their success. The Fund views participation in these programs as an important measure of program effectiveness and its commitment to advancing sustainable forestry.

5.2 Watershed Management Overview

As noted above, fundamental goals of the purchase and subsequent management of the forests are to "protect, restore and enhance water quality and salmonid habitat, improve forest structure and increase natural diversity [and] provide a sustainable harvest of forest products…" Described in detail in the pages that follow, the primary means of restoring water quality and salmonid habitat will be to: a) reduce direct and potential sediment inputs b) increase riparian canopy; c) minimize Class I diversions; and d) increase stream habitat complexity.

The primary means of improving forest structure, increasing natural diversity, and providing a sustainable harvest of forest products will be to implement unevenage silviculture where possible, and to develop and maintain large trees and increased stand inventories across the landscape, which will take time.

5.2.1 Road Management

As part of individual THPs previously conducted on the Forest, roads were inventoried and assessed for erosion potential. Additional road assessments within the Forest are underway, and a road management data gap analysis is currently being compiled by the Fund to prioritize future road improvements within the Forest. The road assessments utilize the CDFW-approved "Upslope Assessment and Restoration Practices" methodologies described in the California Salmonid Stream Habitat Restoration Manual (Flosi

et al., 2004). The methodologies provide a uniform, standardized and accepted protocol for identifying existing and potential erosion problems, and prescribing cost-effective treatments.

The goals of the road assessments are to develop an erosion control and erosion prevention plan that, when implemented, will: 1) substantially reduce the potential for future sediment delivery to nearby streams by improving road surface drainage; 2) upgrade or decommission road drainage structures to accommodate a 24-hour, 100-year storm discharge; 3) where roads are recommended for upgrading, provide for year-round, safe use of the inventoried road routes; and 4) reduce long-term road maintenance requirements and landowner costs.

5.2.2 Road Management Implementation Plan Timeframe

Road improvement (upgrading and decommissioning) and repairs will be conducted annually as part of the Fund's ongoing maintenance and as part of larger initiatives identified in the erosion control and erosion prevention plan described above. The Fund also will continue to upgrade roads consistent with THP and the Regional Water Board's General Waste Discharge Requirement (GWDR) order. Due to the size of the Forest and the costs of implementation, these measures may take up to ten years to complete; securing cost-share funding from CDFW and other sources will accelerate these time-frames.

Sediment Reduction Plan

To reduce sediment delivery from the road system, emphasis will be placed on increasing the number of drainage points along roads and reducing the potential for diversion at culverted watercourse crossings. Reducing diversion will be accomplished by the following management practices:

- New culverts and culverts proposed for replacement will be sized to meet the 100-year storm event.
- New or replaced culverts will be installed at stream grade with a critical dip.
- A trash rack or stake shall be installed upstream of the culvert to catch or turn debris prior to reaching the pipe. The stake shall be centered upstream of the culvert a distance equal to the culvert diameter; e.g. the stake shall be two feet upstream of a 24-inch diameter culvert.
- Rock armored fill or temporary crossings will be used on secondary roads, which see only periodic activity, to reduce maintenance requirements. Minor crossings on permanent roads may be converted to rock armored fill crossings over time.
- New roads will be designed with gentle grades, and long rolling dips will be constructed into the road and outsloped to relieve surface runoff. Where possible, watercourse crossings will be designed such that road grades dip into the crossing and then climb out of the crossing eliminating the need for abrupt critical dips.

Permanent Roads: Roads used year-round shall be designed, constructed, reconstructed or upgraded to permanent road status with the application of an adequate layer of competent rock for surface material and the installation of permanent watercourse crossings and road prism drainage structures. These roads shall receive regular and storm period inspection and maintenance as required throughout the winter period.

Seasonal Roads: Roads used primarily during the dry season but to a limited extent during wet weather shall be designed, constructed, reconstructed, and upgraded to provide permanent watercourse crossings - either culverts or rock armored fill crossings and road surface drainage structures. Roads shall be upgraded as necessary with the application of spot-rocking where needed to provide a stable running surface during the specified period of use. These roads shall receive inspection at least once during the wet weather period and shall receive at least annual maintenance.

Temporary Roads: Roads designated as temporary shall be designed to prevent erosion such that regular and storm period maintenance is not needed to prevent sediment discharges to a watercourse. All watercourse crossings, except rock armored fill crossings, shall be removed prior to October 15 of each year of installation. Inspections of these roads will occur for three years after use. Ordinary maintenance will be performed when the road is opened for use.

"The Handbook of Forest and Ranch Roads" prepared by Weaver and Hagans (1994, with updates) will be used as a guideline for all proposed road construction and improvement projects.

Road Decommissioning: Two types of "at risk" roads have been identified as a priority for decommissioning: temporary or seasonal near-stream roads, and roads on unstable slopes (typically those that traverse headwall swales). As road assessments are conducted, "at risk" roads will be identified and evaluated for decommissioning. Where alternative haul roads exist or can be constructed that replace the need for maintaining "at risk" roads, the "at risk" road will be scheduled for decommissioning. Alternatively, if no alternate access can be identified, then the "at risk" road may be upgraded or temporarily decommissioned.

5.2.3 Road Improvement Monitoring

Effectiveness monitoring to evaluate road upgrades and sediment inputs associated with THPs are conducted annually in keeping with the NCRWQCB's GWDR enrollment program. Annual monitoring reports are sent to the NCRWQCB every June (for plans not yet closed) describing the condition of each site identified during the THP process, any new sites created or discovered, and whether or not the mitigation action proposed is working as designed. To the extent possible all permanent and seasonal roads will be checked for erosion problems after large storm events, and all opened roads will be checked at least once a year for erosion problems. Corrective action will be taken as necessary to maintain crossings in a condition that will not deliver sediments.

Long-term monitoring will consist of mapping and tracking watercourse crossings using GIS in which each crossing will be mapped with Global Positioning System (GPS) tools and the condition of the crossing shall be noted. Any changes made and the year they were made shall also be noted in the GIS database. Over time a complete inventory of all road watercourse crossings will exist in the GIS database. The data can then be used to detail annual or cumulative sediment reduction activities on the forest.

5.3 Riparian Habitat Protection and Restoration Measures

5.3.1 Riparian Habitat Protection

The California FPR and other requirements of the NCRWQCB and CDFW provide extensive and complex protections for watercourses. By most estimations, combined they are the world's most comprehensive and restrictive regulations governing forestry operations near watercourses. These rules are designed to protect against changes in sediment delivery, shade, large wood recruitment, late seral wildlife habitat, bank stability, and many other issues. The rules were developed in response to major declines in salmonid habitat conditions over the last three decades.

In general, aquatic conditions seem to be slowly recovering from past practices, and current regulatory protective measures should prevent further degradation. But, it is unclear whether aquatic conditions are recovering quickly enough to recover and sustain salmonids, particularly in light of human impacts on other life stages. The acceleration of both aquatic and terrestrial restoration measures proposed in this Plan is intended to improve the prospects for the recovery and maintenance of salmonids in the GuRF.

As stated above, improvement of spawning and migration habitat for salmonid species is a key management goal for the Fund and one of the principal motivations for the acquisition of the Forest. Prohibiting development and agricultural uses on the property will preclude the largest possible impacts on water quality, followed by comprehensive property-wide road assessments to identify and prioritize sites with sediment delivery potential (the treatment of which will occur over the next ten to fifteen years at an estimated expense of over $5 million). In addition, the following silvicultural practices (discussed previously in Section 5.1.4) also will be implemented to improve water quality:

1. Upslope silviculture. Practicing principally uneven-age single-tree selection silviculture to maintain a mature forest across the GuRF with minimal openings will reduce the potential hydrologic impacts of even-aged management, which studies at Caspar Creek have linked to temporary increases in peak flows, sediment yields, and ambient temperature (see http://www.fs.fed.us/psw/topics/water/caspar/). Uneven-aged management does, however, require more frequent entries and increased road infrastructure, which is why the next strategy is so important.
2. Increased riparian protection. In addition to standard WLPZ measures, forest management will include increased canopy retention across all classes of streams.

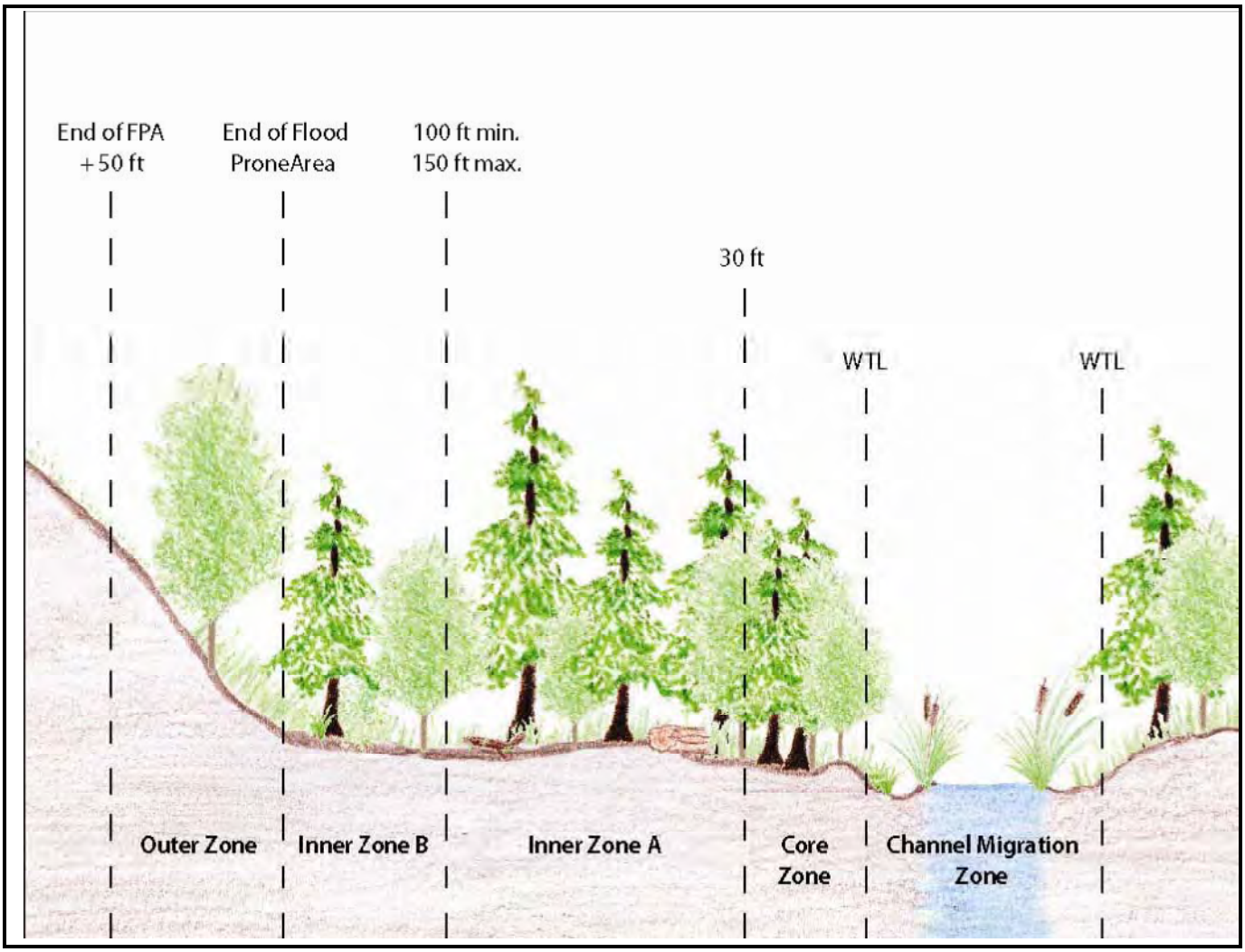
Watercourse and Lake Protection Zone Measures

Class I Watercourses:

Timber operations within the Class I WLPZ have been designed and will be conducted to protect, maintain, and contribute to restoration of properly functioning salmonid habitat and listed salmonid species. To achieve this goal, timber operations will:

- Prevent significant sediment load increase to a watercourse system or lake
- Prevent significant instability of a watercourse channel or of a watercourse or lake bank.
- Prevent significant blockage of any aquatic migratory routes for any life stage of anadromous salmonids or listed species.
- Prevent significant adverse effects to stream flow.
- Protect, maintain, and restore trees (especially conifers), snags, or downed large woody debris that currently, or may in the foreseeable future, provide large woody debris recruitment needed for instream habitat structure and fluvial geomorphic functions.
- Protect, maintain, and restore the quality and quantity of vegetative canopy needed to provide shade to the watercourse or lake to maintain daily and seasonal water temperatures within the preferred range for anadromous salmonids or listed species where they are present or could be restored; and provide a deciduous vegetation component to the riparian zone for aquatic nutrient inputs.
- Prevent significant increases in peak flows or large flood frequency.

Figure 5-3: Profile View of Class I WLPZ in Flood Prone Areas and Channel Migration Zones (not to scale)



Channel Migration Zone: When a channel migration zone (CMZ) is present upslope of the watercourse transition line (WTL), it is incorporated into the Core Zone. No timber harvesting is proposed in this zone.

Core Zone: The primary objective for this zone is streamside bank protection to promote bank stability, wood recruitment by bank erosion, and canopy retention. Timber operations are generally excluded from this zone and limited to actions which meet the objectives stated above or improve salmonid habitat consistent with 14 California Code of Regulations (CCR) 916.9 subsections (a) and (c). The width of the Core Zone is 30 feet measured from the watercourse transition line or lake transition line. No timber harvesting is proposed within the 30 foot wide core zone.

Inner Zone A: The primary objective for this zone is to develop a large number of trees for large wood recruitment, to provide additional shading, to develop vertical structural diversity, and to provide a variety of species (including hardwoods) for nutrient input. This is accomplished through the establishment of high basal area and canopy retention by retaining or more rapidly growing a sufficient number of large trees. Additional specific objectives include locating large trees retained for wood recruitment nearer to the Core Zone and maintaining or improving salmonid habitat on flood prone areas and CMZs when present. Timber operations within WLPZs are limited to those actions which meet the objectives stated above or to improve salmonid habitat consistent with 14 CCR 916.9 subsection (a) and (c).

The Inner Zone A generally encompasses the portion of the flood prone area from 30 feet beyond the WTL (Core Zone perimeter) up to 150 feet from the WTL. The minimum width of the Inner Zone A shall be the greater of the area from the landward edge of Core Zone to the landward edge of the Inner Zone B or 70 feet. The maximum width is 120 feet. **Within Inner Zone A, harvesting is subject to the following additional restrictions:**

- The silvicultural method in this area is single tree selection.
- The post harvest stand shall have a minimum 80% overstory canopy cover.
- The post harvest canopy may be composed of both conifers and hardwood species and shall have at least 25% overstory conifer canopy.
- The post harvest stand shall retain the 13 largest conifer trees (live or dead) on each acre of the area that encompasses the Core and Inner Zones.
- Large trees retained shall be the most conducive to recruitment to provide for the beneficial functions of riparian zones (e.g. trees that lean towards the channel, have an unimpeded fall path toward the watercourse, are in an advanced state of decay, are located on unstable areas or downslope of such an unstable areas, or have undermined roots) are to be given priority to be retained as future recruitment trees.
- Harvesting is planned so the quadratic mean diameter (QMD) of the flood prone area timber stand will increase.

When no floodplain or Channel Migration Zone is present the maximum width of the WLPZ is 100 feet, the harvest restrictions in the core zone and inner zone A apply.

Inner Zone B: The Inner Zone B is applicable when there are very wide flood prone areas. The Inner Zone B encompasses the portion of the flood prone area from the landward edge of the Inner Zone A (i.e.150 feet from the WTL) to the landward edge of the flood prone area. The landward edge of the Inner Zone B (i.e. the landward perimeter of the flood prone area) shall be established in accordance with flood prone area. Timber operations are permitted in this zone when conducted to meet the goals of this section, including those for the Inner Zone as follows: The primary objective for this zone is to develop a large number of trees for large wood recruitment, to provide additional shading, to develop vertical structural diversity, and to provide a variety of species (including hardwoods) for nutrient input. This is accomplished through the establishment of high basal area and canopy retention by retaining or more rapidly growing a sufficient number of large trees. Additional specific objectives include locating large trees retained for wood recruitment nearer to the Core Zone and maintaining or improving salmonid habitat on flood prone areas and CMZs when present. Timber operations within WLPZs are limited to those actions which meet the objectives stated above.

Within Inner Zone B harvesting is subject to the following additional restrictions:

- The silvicultural method in this area is single tree selection.
- The post harvest stand will retain the 13 largest conifer trees (live or dead) on each acre of the Core and Inner Zones.
- Postharvest stand shall have a minimum 50% overstory canopy cover.
- The post harvest canopy may be composed of both conifers and hardwood species and will have at least 25% overstory conifer canopy.
- Harvesting is planned so that the QMD of the flood prone area timber stand will increase.

Outer Zone: The Gualala CE requires a 200-foot WLPZ for class I streams, therefore an outer zone between 50 and 100 feet shall be applied at the outer edge of inner zone A on the ground in which the silvicultural systems for harvesting are limited to the use of commercial thinning or single tree selection, modified to meet the following requirements:

1. Post-harvest stand shall have a minimum 50% overstory canopy cover. The post-harvest canopy may be composed of both conifers and hardwood species and shall have at least 25% overstory conifer canopy.

2. Priority shall be given to retain wind firm trees.

Preferred Management Practices in the Inner and Outer Zones: When timber operations are considered pursuant to 14 CCR 916.3 [936.3, 956.3], subsection (c) and 916.4 [936.4, 956.4], subsection (d), the following Preferred Management Practices should be considered for inclusion in the Plan by the Registered Professional Forester (RPF) and by the Director:

1. Preflagging or marking of any skid trails before the preharvest inspection;

2. Heavy equipment should be limited to slopes less than 35% with low or moderate erosion hazard rating (EHR);

3. Use feller bunchers or hydraulic heel boom loaders which do not drag/skid logs through the zone;

4. Minimize turning of heavy equipment which would result in increased depth of ground surface depressions; and

5. Use mechanized harvesting equipment which delimb harvested trees on pathway over which heavy equipment would travel.

Table 5-2: Summary of Watercourse and Lake Protection Zone and Equipment Limitation Zone Widths

Slope Class	**Class II-S WLPZ Zone Width (feet)** **Core/Inner Zones**	**Class III ELZ Width (feet)**	**Wet Area ELZ Width (feet)**
<10%	0 / 50	30	30
10 - 30%	15 / 35	30	30
30 - 50%	15 / 60	50	50
>50%	15 / 85	50	50

Class II Watercourses: All Class II WLPZs shall be composed of two zones regardless of the watercourse type: a Core Zone and an Inner Zone. The Core Zone is nearest to the water; the Inner Zone is contiguous to the Core Zone and is furthest from the water. The width of the Core and Inner Zones vary depending on the following three factors: (i) side slope steepness in the WLPZ, (ii) whether the watercourse is a Class II-S or Class II-L watercourse type, and (iii) whether the watercourse is within a watershed in the coastal anadromy zone or outside the coastal anadromy zone (all watercourses within the Fund's ownership are within the coastal anadromy zone).

Class II Large:

Core Zone: 30 feet in which no harvest may occur.

Inner Zone: The widths of the Inner Zone are 70 feet and adjacent to the core zone forming a total zone of 100 feet for all class II L streams. Harvesting within the inner zone is allowed providing the 13 largest trees per acre are retained and at least 80% canopy is retained. Silvicultural systems for harvesting are limited to the use of commercial thinning or single tree selection.

Class II Standard:

Core Zone: Variable zone (0-15 feet) based on slope in which no harvesting can occur.

Inner Zone: Variable zone (35-85 feet) based on slope at least 50% of the total canopy covering the ground shall be left in a well distributed multi-storied stand configuration composed of a diversity of species similar to that found before the start of operations. The residual overstory canopy shall be composed of at least 25% of the existing overstory conifers.

Class III streams: Using the variable width Equipment Limitation Zone (ELZ) defined by the FPR, where there are no overstory retention requirements under the FPR, the Fund will retain at least 50 percent canopy and a minimum of 25 percent overstory conifer. [Note: conformance with all canopy requirements will be measured as an average across not less than a 200-foot lineal WLPZ segment—the same as the FPR.]

5.3.2 Aquatic Habitat Restoration

Aquatic habitat degradation has resulted from increased bedload and excess stream siltation caused by erosion, and increased water temperature caused by pool filling and a reduction in riparian vegetation. Aquatic habitat restoration includes reducing sediment inputs and increasing shade canopy as described in the previous sections. Baseline data that will be used to measure anticipated improvements in aquatic habitat include stream habitat surveys and spawning surveys conducted by CDFW and GRWC.

Due to the complexity of the stream environment and difficulty of working directly in stream channels, aquatic habitat restoration is expected to progress naturally as stored sediment loads are transported downstream and potential sediment inputs are removed or mitigated. The riparian management strategy described herein will result in increased stream shading over time and reduced water temperature. Direct instream habitat enhancement may occur if and when logical opportunities present themselves and stream survey data indicates that direct action is warranted.

The primary instream restoration activity will be the introduction of LWD in small order Class I channels where the likelihood of success is high. Gravel extraction can be beneficial in some systems with high levels of gravel aggradation because it can promote gravel movement and pool development in some cases. However, because of the potential technical and regulatory challenges, instream gravel removal is likely to be a low priority.

5.3.3 Aquatic Habitat Restoration Monitoring

Habitat improvements in the stream environment shall likely be monitored using stream habitat data derived from the habitat sampling methodology found in the California Salmonid Steam Habitat Restoration Manual (Flosi et al., 2010) currently in use by CDFW; some other system such as EMAP may be used in the future as the science of stream monitoring improves. Some baseline data exists for many coastal streams from CDFW stream surveys conducted in the past ten years.

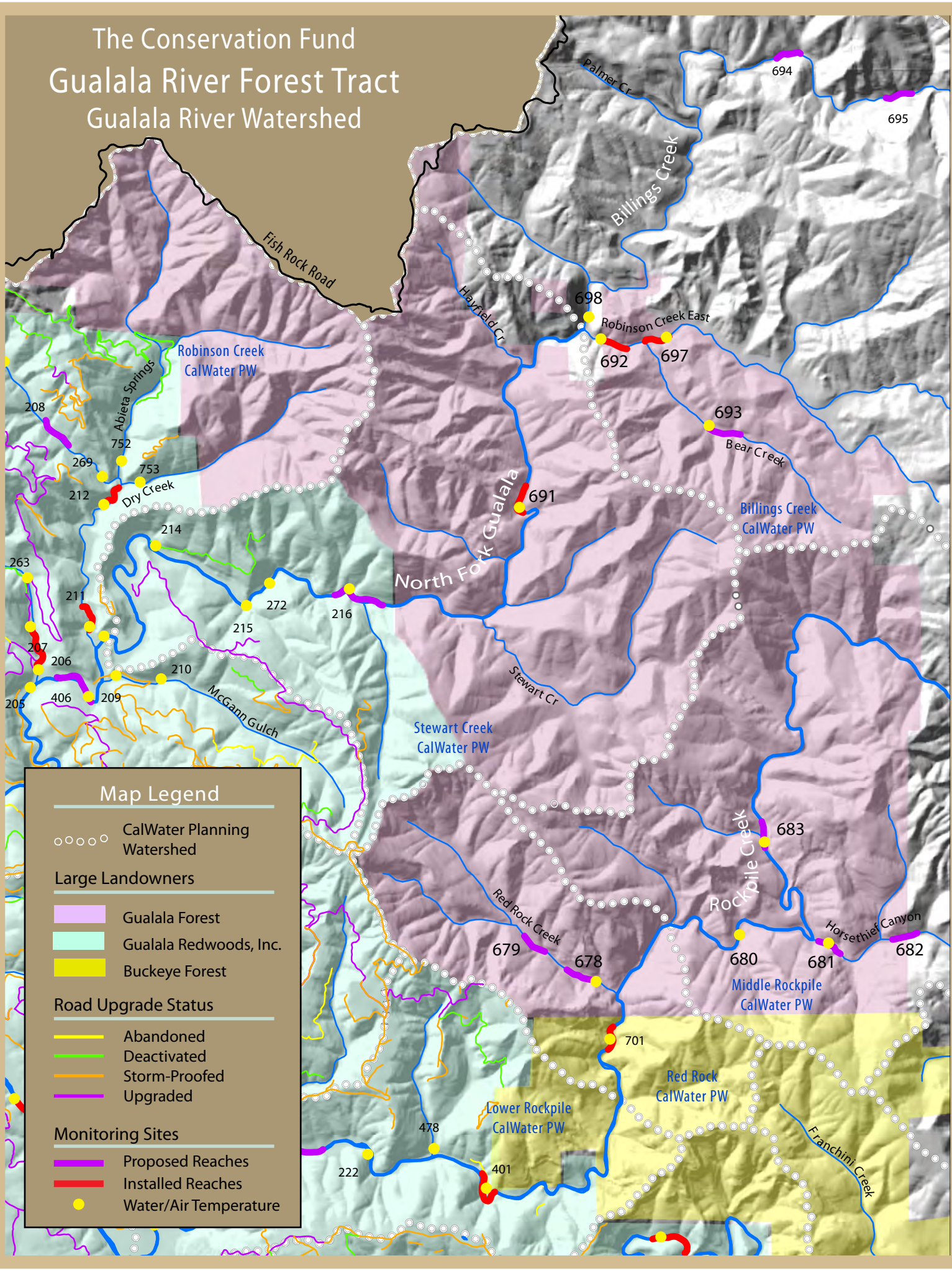
Another available stream habitat sampling method adopted by the U.S. EPA is the Environmental Monitoring and Assessment Program (EMAP) methodology. Both methods are acceptable; however since baseline data exists in the California Salmonid Steam Habitat Restoration Manual protocol, the Fund has

elected to continue with that sampling methodology for now. As a complement to either system, it will be important to maintain the network to monitor instream temperature with remote water and air temperature sensing probes (HOBO temps), as GRWC has established. Additionally, since a principal objective of this Plan is to increase salmonid populations and productivity, the Fund will seek to expand on the CDFW spawner survey reaches as the program develops.

The Fund expects positive changes from the road and stream practices mentioned in the previous sections. However, instream habitat is slow to respond to even the best intended management practices. Therefore, measuring stream habitat more than once every ten years is generally not recommended. The CDFW stream habitat assessment protocol does suggest that streams be inventoried after large storm events. The need to re-inventory will be assessed if such an event does occur; timing of the previous inventory and other previously planned management activities will be factors when deciding to re-inventory streams ahead of the recommended ten-year interval.

The eleven habitat inventory components of the California Salmonid Stream Habitat Restoration Manual include: flow, channel type, temperature, habitat type, embeddedness, shelter rating, substrate composition, canopy, bank composition and vegetation, large woody debris count, and average bankfull width. The North Fork and Rockpile Creek Stream Assessments conducted by CDFW in 2003 are available at the CDFW Coastal Watershed Program website: http://coastalwatersheds.ca.gov/Watersheds/NorthCoast/Gualala/GualalaBasin/GualalaAssessmentProducts/tabid/103/Default.aspx.

Figure 5-4 (courtesy of GRWC) illustrates road upgrade locations, proposed and installed monitoring reaches, and California watershed planning boundaries.


The Conservation Fund
Gualala River Forest Tract
Gualala River Watershed
Palmer Cr
694
695
Billings Creek
Fish Rock Road
Hayfield Cr
698
Robinson Creek East
692
697
Robinson Creek
CalWater PW
Abieta Springs
208
752
269
753
212
Dry Creek
693
Bear Creek
691
North Fork Gualala
Billings Creek
CalWater PW
214
263
211
272
216
215
207
206
210
205
406
209
McGann Gulch
Stewart Cr
Stewart Creek
CalWater PW
683
Rockpile Creek
Red Rock Creek
679
678
680
681
682
Horsethief Canyon
Middle Rockpile
CalWater PW
701
Red Rock
CalWater PW
Lower Rockpile
CalWater PW
478
222
401
Franchini Creek
Map Legend
CalWater Planning Watershed
Large Landowners
Gualala Forest
Gualala Redwoods, Inc.
Buckeye Forest
Road Upgrade Status
Abandoned
Deactivated
Storm-Proofed
Upgraded
Monitoring Sites
Proposed Reaches
Installed Reaches
Water/Air Temperature

5.4 Invasive Weed Management

In their field surveys of the Forest, consulting botanists Geri Hulse-Stephens and Kerry Heise noted the GuRF is unique in its absence of large infestations of invasive plants. Instead, disturbed roadside areas within forested habitat are frequently dominated by native California broom (*Acmispon glaber*), California brome (*Bromus carinatus*) and blue wild-rye (*Elymus glaucus*). Unique to the GuRF, infestations of French broom (*Genista monspessulana*) and jubata grass (*Cortadaria jubata*) are infrequent and small. The California Invasive Plant Council (Cal-IPC) has rated these species as "high" because they "have severe ecological impacts on physical processes, plant and animal communities and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically". Cal-IPC rated distaff thistle (*Carthamus lanatus*) as a "Red Alert" species—a species with the potential to become widely invasive in the state or has been recently reported as expanding in their range within California (Pirosko, 2003). Red Alert species have a reproductive biology given to high rates of dispersal but are not yet widespread in distribution in the county. Mendocine County conducts an eradication program for distaff thistle removal. Appendix A includes a detailed discussion of invasive weed management from botanists Geri Hulse-Stephens and Kerry Heise for the GuRF. Invasive species management will initially focus on the control of these three species.

The Fund will employ chemical and mechanical control techniques to reverse the spread of invasive species, with a preference for mechanical (including manual) control measures where they will be effective. Only licensed and insured contractors with a good track record for safety and compliance may apply herbicides. All herbicide application must be in conformance with label guidelines and applicable laws.

The highest priority for treatment will be areas planned for upcoming timber harvest or road improvement projects so as to discourage the further spread of invasives. If done prior to flowering, the physical removal of plants during road grading can reduce the spread of invasive species. However, this generally does not permanently remove the plant from a site once established, and subsequent treatments to reduce the population will be required. General road maintenance such as grading and roadside brushing will be the second line of defense to prevent invasives from re-invading a site once the initial treatment has occurred.

Addressing the high priority invasives promptly is a high priority because climate change is expected to make these species more competitive at occupying openings and roadsides. Ultimately, forest management which promotes dense forest cover to shade out invasive plants like jubata grass and broom will have the greatest and most long-lasting impact on controlling invasive species.

5.4.1 Invasive Weed Monitoring

Ongoing monitoring will focus on the distribution of invasive plants and the effectiveness of treatment efforts. Project botanists and field foresters will continue to identify and record locations of invasives. Additional evaluation projects will monitor the effectiveness of treatment efforts by long-term

survivorship of individual populations, similar to the monitoring occurring along Olsen Gulch Road on the GRF (Heise and Hulse-Stephens, 2008).

5.5 Role of Forests and the Atmosphere

A rapidly growing forest can absorb a remarkable amount of carbon dioxide, a greenhouse gas and the driver of global climate change. As a result, how forests are managed has a significant effect on our atmosphere.

The latest Intergovernmental Panel on Climate Change (IPCC) report estimated that 18 percent (and increasing) of global greenhouse gas emissions are the result of deforestation; the report recognizes financial incentives to reduce deforestation and to maintain and manage forests as one of only a handful of policy measures proven to be effective at reducing emissions (IPCC, 2007). The Redwood Region is an important and impactful location to promote forest conservation and growth because the forests of the North Coast have an almost unparalleled ability to grow and store carbon dioxide. The careful management of these redwood forest "carbon sponges" can play a role in reducing net greenhouse gas emissions while the loss of redwood forests results in significant emissions.

As a conserved working forest, the GuRF can have a positive climactic impact on several fronts. In addition to carbon storage in standing forests, the use of wood building materials has a lower carbon footprint compared to concrete or steel (because of the much greater amount of energy utilized in manufacturing and distributing metal and masonry and because wood products act as carbon reservoirs). Thus, increasing the use of California's native species as lumber and long-lived wood products can also result in decreased greenhouse gas emissions.

5.5.1 Climate Action Reserve

Because the Fund recognizes that action to address climate change is needed, the GuRF has been registered and verified as an IFM Project through CAR. Verification requires landowners model the long-term carbon storage of their forests and report emission reductions resulting from storing more carbon than required by law and common practice. This requirement necessitates a verifiable field inventory system that generates statistically reliable estimates of carbon within the forest (including living trees, snags and downed logs, shrubs, and below-ground carbon). The Fund's annual reports for CAR, as well as descriptions of the project qualifications and implementation methodology, are publicly available at www.climateactionreserve.org.

5.5.2 Preparing for Likely Climate Change

Planning for the future of the Forest must include a realistic assessment of the likely implications of climate change on management objectives and strategies. A recent study on the implications of expected climate change on California's native plants found, with the exception of some particularly sensitive oak species, the Redwood Region is not likely to experience significant losses in plant diversity (Loarie et al., 2008).

While details of the future climate cannot be known with certainty, the general indication is summers will get hotter (hence more arid), winter storms will likely increase in severity, and there will be significant changes in species' ranges (some expanding, some contracting, for both plants and animals). Some practical conclusions can be drawn relative to management of the Forest in anticipation of climate change:

1. Managing for ecological resiliency will become even more important— especially maintaining the full range of natural diversity and ecological succession processes. Practically speaking, Douglas-fir may become a more significant component of the Forest, and efforts to exclude or discourage it from redwood stands (as was common in recent history) would be unwise. Establishing redwoods in large openings, especially south-facing slopes, will likely become more difficult. Even on sites with moderate moisture, retaining summer soil moisture will be important, in turn increasing the importance of maintaining shade, downed logs, and soil nutrients. Silvicultural practices on the Forest, therefore, should continue to be focused on maintaining mixed species stands that are well-stocked and maintained through selection silviculture that retains wildlife habitat features.
2. Invasive species will become more prevalent, especially those that originate from warmer climates. Monitoring and treatment of invasive plants and animals is already part of this Plan, but climate change will increase the importance and challenge of this responsibility. It also means greater emphasis should be placed on prevention of non-native species introductions and effective early control efforts, since those approaches are considerably more cost-efficient than later eradication efforts. Control of jubata (pampas) grass, broom, and other weeds will continue to be our highest priorities.
3. An expected increase in the severity of winter storms only increases the importance of storm-proofing the road system, an effort already well underway.
4. Fires, both natural and human-caused, will likely increase in frequency and severity. The Fund will need to maintain the capacity and expertise gained during previous fire seasons.

6. Community Use and Involvement

The Fund will provide a range of opportunities for community use and involvement consistent with the protection of natural resources, long-term restoration and enhancement, and active forest management. These opportunities range from research, education, and demonstration to participation in restoration projects and unsupervised pedestrian access.

To foster community involvement and support, the Fund provides guided tours of areas intended for timber harvests, road improvement and restoration projects, and native plants, as well as tours tailored for youth education. These programs familiarize the public with sustainable management methods and goals and build community partnerships. The Fund is evaluating the potential for unsupervised public access.

6.1 History of Community Use and Involvement

Beginning in the 1850s and continuing until purchase by the Fund, the GuRF was managed as private industrial timberland. The landowner officially had “no trespassing” policies, including warnings on property boundaries and security patrols, but trespass was difficult to prevent and a range of unauthorized recreational and illegal activities occurred on the Forest, including hunting and dirt bike/off-highway vehicle use. Marijuana growers cause pollution, break gates and locks to gain access, and can be a safety concern for field personnel and other users. Motorcycle usage can tear up the roads, causing erosion and potentially damaging streams. The dumping of trash is unsightly, a pollution hazard, and costly to remove. These activities can be disruptive to the Forest’s ecology but are typically difficult to monitor. When these activities are observed, they will be reported to the proper authorities. Unauthorized activities will be discouraged, but they are an ongoing problem and unrealistic to expect they will ever be completely absent from the Forest.

6.2 Goals and Objectives for Community Use and Involvement

The Fund intends to provide a range of opportunities for community use and involvement that can be reasonably managed in a manner consistent with the protection of natural resources, long-term restoration and enhancement, and active forest management. These opportunities range from research, education, and demonstrations to participation in restoration activities. The following are the Fund’s guidelines for community use and involvement.

- Be a good neighbor by holding to the highest professional standards, cooperating with other neighboring landowners, discouraging illegal trash dumping, patrolling for illegal activities and providing assistance with community-based projects.
- Provide reasonable dispute management. Should a dispute arise with a local citizen, neighbor, partner organization, current or potential contractor, or other interested entity, the Fund will first seek to resolve the dispute through open communication, prior to more formal dispute resolution through mediation or litigation.
- Provide THP tours either before or shortly after submission of harvest plans to CAL FIRE, and again following completion of the operation. Fund staff will actively seek community review of

its operations and programs and will be responsive to questions or concerns raised by the local community. THP Summaries will be provided to facilitate community understanding.
- Provide opportunities for on-site demonstrations of watershed restoration projects, sustainable forest management and other best management practices, public participation in research opportunities, educational tours, and restoration workdays.
- Build partnerships with local organizations that are mutually beneficial.
- Prepare an annual report that describes major activities on the Forest, changes to policies, and monitoring results.

6.3 Recreational Access Activities and Policies

6.3.1 Recreational Uses

Permission for additional recreational activities may be expanded on a case-by-case basis. Potential expanded uses may include equestrian, mountain biking, swimming and wading, hunting, fishing and group events. Evaluations of requests will be based on safety, potential resource damage, community benefit and administrative impact.

6.3.2 Unauthorized Activities

The Fund conducts frequent security patrols of the Forest to deter unauthorized access and illegal uses. These illegal activities include marijuana cultivation, trash dumping, poaching and off-highway vehicle use. Violators will be prosecuted.

6.4 Outreach Activities

The Fund will conduct guided tours of timber harvest areas, road improvements, restoration projects, native plants, and youth educational trips. These events familiarize the public with sustainable management methods and goals and build community partnerships. Tours of THPs serve to demonstrate to the public the planning and process behind managing the Forest sustainably and to solicit feedback on management activities.

Public tours of road and other infrastructure improvements offer opportunities to demonstrate and share information regarding the methods and steps the Fund is taking to improve the ecological conditions on the Forest. The Fund welcomes and appreciates community participation in restoration projects on the Forest.

The Fund has also benefited from generous time donations by local naturalists that have resulted in tours focused on such topics as native plants, giving participants a solid connection with the natural world.

6.5 Monitoring Strategies for Community Involvement

The goal of monitoring is to provide the Fund with the necessary background and feedback to appropriately manage the natural and cultural resources on the GuRF. Monitoring will be conducted continually, analyzed annually and incorporated into policies and annual program reviews.

Glossary

ANADROMOUS: fish that leave freshwater and migrate to the ocean to mature then return to freshwater to spawn (e.g. salmon, steelhead)

BF: Board feet (a measure of wood volume 1"x12"x12")

BANKFULL WIDTH: width of the channel at the point at which overbank flooding begins

BASAL AREA: area in square feet of all conifer stems on an acre

BASIN: see “watershed”

BASIN PLAN: the Water Quality Control Plan for the North Coast Region

BLUE LINE STREAM: a stream that appears as a broken or solid blue line (or a purple line) on a USGS topographic map

BOLE: trunk of a merchantable-sized tree

CALWATER: set of standardized watershed boundaries for California

CANOPY: overhead branches and leaves of streamside vegetation

CANOPY COVER: vegetation that projects over a stream

CANOPY DENSITY: percentage of the sky above the stream screened by the canopy of plants

CLASS I STREAM: watercourse with fish present

CLASS II STREAM: watercourse providing aquatic habitat for non-fish species

CLASS III STREAM: watercourse with no aquatic life present, but capable of sediment transport

COBBLE: stream substrate particles between 2.5 - 10 inches (64 - 256 mm) in diameter

CONIFER: softwood, cone-bearing tree species suitable for commercial timber production (e.g. redwood, Douglas-fir)

CONIFEROUS: any of various mostly needle-leaved or scale-leaved, chiefly evergreen, cone-bearing gymnospermous trees or shrubs such as pines, spruces, and firs

CONSERVATION EASEMENT: a legal agreement between a landowner and a qualified conservation organization that restricts usage rights of the property, such as real estate development, commercial, and industrial uses

CORD: measure of fuel-wood volume (a stacked cord occupies 128 cubic feet [4'x4'x8'] and contains about 85 cubic feet of solid wood)

COVER: anything providing protection from predators or ameliorating adverse conditions of streamflow and/or seasonal changes in metabolic costs, such as instream cover, turbulence, and/or overhead cover, for the purpose of escape, feeding, hiding, or resting

CROP TREE: a tree that has been selected for future timber harvest on which we will focus growth and subsequent increases in volume and value

CRYPTOS (Cooperative Redwood Yield Project Timber Output Simulator): a computer program that can model stand growth in redwood forests, including the effects of partial harvests

CWHR (California Wildlife Habitat Relationships): a system developed by CDFW to model the interactions between wildlife species and their habitats

DBH: "diameter at breast height" (tree diameter in inches, measured outside bark 4 1/2' above ground level)

DEBRIS: material scattered about or accumulated by either natural processes or human influences

DEBRIS JAM: log jam, or an accumulation of logs and other organic debris

DEBRIS LOADING: quantity of debris located within a specific reach of stream channel, due to natural processes or human activities

DEPOSITION: the settlement or accumulation of material out of the water column and onto the streambed, occurring when the energy of flowing water is unable to support the load of suspended sediment

DISSOLVED OXYGEN (DO): concentration of oxygen dissolved in water, expressed in mg/l or as percent saturation, where saturation is the maximum amount of oxygen that can theoretically be dissolved in water at a given altitude and temperature

EMBEDDEDNESS: the degree that larger particles (boulders, rubble, or gravel) are surrounded or covered by fine sediment, usually measured in classes according to percentage of coverage of larger particles by fine sediments

EROSION: the group of natural processes, including weathering, dissolution, abrasion, corrosion, and transportation, by which material is worn away from the earth's surface

FILL: a) the localized deposition of material eroded and transported from other areas, resulting in a change in the bed elevation; b) the deliberate placement of (generally) inorganic materials in a stream, usually along the bank

FINE SEDIMENT: fine-grained particles in stream banks and substrate defined by diameter, varying downward from 0.24 inch (6 millimeters)

FISH HABITAT: the aquatic environment and the immediately surrounding terrestrial environment that, combined, afford the necessary biological and physical support systems required by fish species during various life history stages

FLUVIAL: relating to or produced by a river or the action of a river, or situated in or near a river or stream

GEOGRAPHIC INFORMATION SYSTEM (GIS): A computer system for capturing, storing, checking, integrating, manipulating, analyzing, and displaying data related to positions on the Earth's surface. Typically, a GIS is used for handling maps of one kind or another. These might be represented as several different layers where each layer holds data about a particular kind of feature (e.g. roads). Each feature is linked to a position on the graphical image of a map.

GRADIENT: the slope of a streambed or hillside (for streams, gradient is quantified as the vertical distance of descent over the horizontal distance the stream travels)

GRAVEL: substrate particle size between 0.08 - 2.5 inches (2 - 64 mm) in diameter

GULLY: deep ditch or channel cut in the earth by running water after a prolonged downpour

HABITAT: the place where a population lives and its surroundings, both living and nonliving; includes the provision of life requirements such as food and shelter

HABITAT TYPE: a land or aquatic unit, consisting of an aggregation of habitats having equivalent structure, function, and responses to disturbance

HARDWOOD: non-conifer trees (e.g. tanoak, madrone, live oak, black and white oaks)

HERBACEOUS: non-woody seed plant (e.g. grass)

HYDROGRAPHIC UNIT: a watershed designation at the level below Hydrologic Region and above Hydrologic Sub-Area

INDICATORS: measurable reflections of conservation goals such as structure, composition, interactions, and abiotic and biotic processes; these must be maintained to ensure the long-term viability of conservation goals

INGROWTH: volume increase due to pre-merchantable timber attaining size where board foot volume can now be measured (e.g. 10-12” DBH)

INSTREAM COVER: areas of shelter in a stream channel that provide aquatic organisms protection from predators or competitors and/or a place in which to rest and conserve energy due to a reduction in the force of the current

INTERMITTENT STREAM: a seasonal stream in contact with the ground water table that flows only at certain times of the year when the ground water table is high and/or when it receives water from springs or from some surface source such as melting snow in mountainous areas. It ceases to flow above the streambed when losses from evaporation exceed the available stream flow.

LARGE WOODY DEBRIS (LWD): a large piece of relatively stable woody material having a diameter greater than 12 inches (30 centimeters) and a length greater than six feet (two meters) that intrudes into the stream channel. Large organic debris.

LATE SERAL, LATE SUCCESSIONAL: having biological characteristics and functions similar to old growth forests

LIMITING FACTOR: environmental factor that limits the growth or activities of an organism or that restricts the size of a population or its geographical range

LOP: to sever branches and trunks of cut trees so that resulting slash will lie close to the ground

MAINSTEM: the principal, largest, or dominating stream or channel of any given area or drainage system

MEAN ANNUAL INCREMENT (MAI): The average annual growth rate of a forest stand, determined by dividing stand volume (including partial harvests) by stand age. Culmination of mean annual increment occurs at the age when MAI is greatest, and determines the optimal rotation age for maximizing long term yields in even-aged management.

MELANGE: a mix of sheared shale with blocks of other rock imbedded within.

MERCHANTABLE: sound conifer trees at least 10" in diameter

MERCHANTABLE SPECIES: commercial conifer timber species being purchased by local sawmills, including redwood, Douglas-fir, grand fir, western hemlock, sitka spruce, and bishop pine

NET VOLUME: tree volume remaining after deducting unmerchantable and cull material

OLD GROWTH: see attached Appendix G for detailed definitions

PLUGS: seedling stock grown in nursery styrofoam containers.

POLES: trees 4"-11" DBH

PRE COMMERCIAL THINNING: cutting in a pre-merchantable conifer stand (2-10"DBH) to reduce unwanted trees and improve growth on remaining trees

REDD: a spawning nest made by a fish, especially a salmon or trout

REGENERATION: renewal of a tree crop, either by planting or natural seeding

RELEASE: freeing a tree (usually a conifer) from competition by cutting growth (usually a hardwood) surrounding or overtopping it

RESIDUAL GROWTH: mature trees (often of lower quality) left after original logging

RIFFLE: a shallow area extending across a streambed, over which water rushes quickly and is broken into waves by obstructions under the water

RILL: an erosion channel that typically forms where rainfall and surface runoff is concentrated on slopes. If the channel is larger than one square foot in size, it is called a gully.

RIPARIAN: pertaining to anything connected with or immediately adjacent to the banks of a stream or other body of water

RIPARIAN AREA: the area between a stream or other body of water and the adjacent upland identified by soil characteristics and distinctive vegetation. It includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation.

RIPARIAN VEGETATION: vegetation growing on or near the banks of a stream or other body of water on soils that exhibit some wetness characteristics during some portion of the growing season

RUBBLE: stream substrate particles between 2.5 and 10 inches (64 and 256 millimeters) in diameter

SALMONID: fish of the family *Salmonidae*, including salmon, trout, chars, whitefish, ciscoes, and grayling

SAPLINGS: trees 1"-4" DBH

SCOUR: localized removal of material from the stream bed by flowing water – the opposite of fill

SECOND GROWTH TREES: established as seedlings after original old-growth logging (also called young-growth)

SEDIMENT: fragmented material that originates from weathering of rocks and decomposition of organic material that is transported by, suspended in, and eventually deposited by water or air, or is accumulated in beds by other natural phenomena

SEEDLINGS: trees less than 1" DBH

SERAL STAGES: the series of relatively transitory plant communities that develop during ecological succession from bare ground to the climax stage

SILVICULTURE: the care and cultivation of forest trees; forestry

SITE CLASS, SITE INDEX: When used in relation to stocking regulations, it means one of the site classes or indexes listed in Forest Practice Rules 14 CCR 1060. When used in relation to growth modeling, it usually refers to the site system developed by Krumland and Wensel for the CRYPTOS growth simulator.

SITE INDEX: productive capacity of an area to grow trees, based on height of dominant trees at given age; often expressed as a numeral from I (very good site) to V (poor site)

SKID TRAIL: temporary road for tractor/skidder travel to logging landing

SLASH: branches and other residue left on a forest floor after the cutting of timber

SMOLT: juvenile salmonid one or more years old that has undergone physiological changes to cope with a marine environment, the seaward migration stage of an anadromous salmonid

SNAG: dead standing tree

SPAWNING: to produce or deposit eggs

STAND TABLE: graph which shows the number of trees of each diameter class per acre

STAND: tree community sharing characteristics which can be silviculturally managed as a unit

STOCKING: number, or density, of trees in a given area

STREAM CORRIDOR: A stream corridor is usually defined by geomorphic formation, with the corridor occupying the continuous low profile of the valley. The corridor contains a perennial, intermittent, or ephemeral stream and adjacent vegetative fringe.

STUMPAGE: net value of standing timber to owner, exclusive of logging or trucking costs

SUBSTRATE: material (silt, sand, gravel, cobble, etc.) that forms a stream or lakebed

SUSTAINABLE: "Development or resource use that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland 1987)

SUSTAINED YIELD PLAN: yield that a forest can continually produce at a given intensity of management

THALWEG: the line connecting the lowest or deepest points along a streambed

THIN FROM BELOW: selective removal of intermediate and/or suppressed conifers from the understory to allow more space for remaining trees

THRIFTY: describes a healthy and fast-growing tree

UNDERCUT BANK: a bank that has had its base cut away by the water action along man-made and natural overhangs in the stream

V*: measures of percent sediment filling of a stream pool with deposits such as silt, sand, and gravel compared to the total volume

VEXAR: plastic mesh tube used to protect young trees from animal browsing

WATERSHED: total land area draining to any point in a stream, as measured on a map, aerial photograph or other horizontal plane (also called catchment area, watershed, and basin)

WATERSHEDS WITH THREATENED OR IMPAIRED VALUES: any planning watershed where populations of anadromous salmonids that are listed as threatened, endangered, or candidate under the State or Federal Endangered Species Acts with their implementing regulations, are currently present or can be restored

WETLAND: an area subjected to periodic inundation, usually with soil and vegetative characteristics that separate it from adjoining non-inundated areas

WHITE WOODS: grand fir and hemlock.

WORKING FOREST: forest managed for or including timber production

YARDER: logging machine which uses a suspended cable to lift logs

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APPENDIX A

Botanical Resources of the Gualala River Forest: An Assessment

Mendocino County, California

September, 2013

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Introduction and Overview

The purpose of this botanical resource assessment is to evaluate the vascular botanical resources of the Gualala River Forest (GRF) parcel administered by The Conservation Fund. This assessment presents results of the most current vascular plant inventories, summarizes the status of rare plants and communities, outlines vegetation habitat types, describes invasive plants and pathogens, and provides management recommendations. The current knowledge of the flora on the GRF is not complete as no property-wide botanical inventory has been conducted. However, a review of past THP species lists along with smaller scale surveys associated with specific projects, and other reconnaissance trips to the property has yielded a good baseline from which to build from.

Site visits across the GRF in 2012 and 2013 documented the occurrence of many additional plants (Appendix A) including 2 new rare species: Santa Cruz clover (*Trifolium buckwestiorum*), and white rein orchid (*Piperia candida*). Additionally, two vegetation alliances considered rare include: purple needle grass grassland and Oregon oak woodland. These preliminary findings indicate that the Gualala River Forest ranks 3rd in species richness among the TCF parcels (Table 1). The total number of vascular taxa will undoubtedly increase over time as additional survey work is conducted.

Table 1. Floristic Summary of TCF Properties in Mendocino County

	Species / taxa	Families	Exotic Species	Rare Species
Big River	668	93	160	4
Garcia River	606	90	123	6
Gualala River	**395**	**82**	**94**	**3**
Salmon Creek	234	62	49	9

Methods

Pre-survey tasks include a query from the On-line 8th Edition of the CNPS Inventory of Rare and Endangered Plants and the California Natural Diversity Database (CNDDB) specifying all plants with California Rare Plant Rankings of 1A, 1B, 2A, 2B, 3, and 4 surrounding the Gualala River Forest. Plants restricted to coastal bluff habitat, coastal marsh and sand dunes were not included due to the absence of suitable habitat on the Gualala GRF. A further refinement of the search was made by consulting The Jepson Manual (Baldwin et al. 2013) including only those known to occur within the North Coast (Nco), North Coast Range Outer (NcoRO) and the Northwest (NW).

This query resulted in a list of rare species (Appendix B) that have been documented within a 12-quad area surrounding the GRF parcel and therefore the most likely to occur within the GRF as well. Habitat preferences obtained for these species helped direct survey efforts by identifying areas with similar local environmental conditions.

From various existing sources of information, the botanical resources were assessed with respect to their reliability. Some species noted on old THP plant lists inside the current boundary of the GRF could not be confirmed from our own surveys, and others were considered uncertain due to their known distributions lying well beyond the North Coast coniferous forest. These taxa are

clearly indicated on the list of vascular plants for the GRF (Appendix A). The over-all quality of the botanical resources were further assessed by identifying known species on these sites including rare and endangered species and plant communities, and existing and potential threats.

The survey lists reviewed in the THP archives did not represent the diversity of species with potential to occur across the GRF parcel. Gaps in compiled plant lists for Gualala are apparent in some under-represented families which include Asteraceae, Brassicaceae, Fabaceae, and Poaceae. The diversity representative in these families is generally high in the outer North Coast Range. Additionally, many lists reviewed included taxa well outside their known distribution and so their reliability is uncertain.

Rare bryophytes and lichens have only recently been included in CNPS or CNDDB lists of rare species with potential to occur. This understudied group of non-vascular plants has little representation in the current compilation of species observed on the GRF although there is potential habitat for rare bryophytes and lichens to occur here.

VEGETATION

Forest and Woodland

The coniferous forest across the GRF, is comprised largely of Douglas fir/tanoak forest. Stands are notably dryer than the Garcia River watershed to the north and commonly include sugar pine, another drought-tolerant forest species. Redwood (*S. sempervirens*) is more commonly found on north-facing slopes and deep canyons with moister conditions, especially on the western end of the property. Size classes are in the smaller range of 12-24 inches dbh, typical of North Coast coniferous forests, and there are no existing stands of old-growth.

Near ridgetops, slopes are dryer still and typically support a mixed scrub community of chamise (*Adenostemma fasciculatum), Arctostaphylos columbiana,* Eastwood manzanita (*A. glandulosa),* common manzanita (*A. manzanita),* wavy-leafed ceanothus (*Ceanothus foliosus),* and blue blossom *(C. thyrsiflorus*).

Chinquapin (*C. chrysophylla*) is a characteristic tree in some Douglas fir dominated and mixed Douglas fir/tanoak stands, occasionally reaching heights of up to 75 feet and 2 ft. dbh. It was not observed in great enough density to form its own alliance on the Gualala River Forest.

***Pseudotsuga menziesii-Lithocarpus densiflorus* Forest alliance,** Douglas fir-tanoak forest
Membersip rules for this alliance require that Douglas fir and tanoak together comprise 30 to 60 percent of the relative cover in the tree canopy (Sawyer et al, 2009).

Stand conifers include Douglas fir (*Pseudotsuga menziesii*), sugar pine (*Pinus lambertiana*), redwood (*Sequoia sempervirens*), western hemlock (*Tsuga heterophylla*), and to a lesser extent grand fir (*Abies grandis*). Hardwoods include tanoak (*Notholithocarpus densiflorus*), Pacific madrone (*Arbutus menziesii*), golden chinquapin (*Chrysolepis chrysophylla*), and Pacific bay (*Umbellularia californica*).

North-facing slopes vary in composition but Douglas fir, tanoak, and sugar pine are common along with short statured Shreve oak (*Quercus parvula var. shrevei*) and madrone (*Arbutus menziesii*). Understory plants include toyon, (*Heteromeles arbutifolia*), poison oak (*Toxicodendron diversilobum*), California huckleberry (*Vaccinium ovatum*), bracken fern (*Pteridium aquilinum var. pubescens*), trailing snowberry (*Symphoricarpos mollis*), redwood sorrel (*Oxalis oregano*), modesty (*Whipplea modesta*), western heart's ease (*Viola ocellata*), pine grass (*Calamagrostis rubescens*), sword fern (*Polystichum munitum*), and Purdy's iris (*Iris purdyi*).

***Lithocarpus densiflorus* Forest Alliance**, Tanoak forest

In this type of forest tanoak comprises greater than 60 percent of relative cover in the tree layer (Sawyer et al, 2009). Tanoak (*Notholithocarpus densiflorus*) can dominate some forest stands, especially on south-facing slopes. For most stands observed the understory cover was very sparse, sometimes consisting of only one or two species such as bracken fern, California huckleberry, or saplings of tanoak. Note that *Notholithocarpus densiflorus* is now the recognized name for this species.

The water mold fungus, *Phytophthora ramorum*, which is responsible for SOD (Sudden Oak Death) has infected a considerable area of tanoak forest as well as scattered individuals across the GRF. Within the current range of *P. ramorum* which extends from Monterey County north along the Coast Ranges to Southwestern Oregon, tanoak exhibits little resistance to the pathogen. Although central coastal California has been the hardest hit numerous computer models indicate that Mendocino, Humboldt, and Del Norte counties are at a high risk of SOD infection (Kliejunas 2010).

Quercus garryana Woodland Alliance, Oregon white oak woodland

This alliance is comprised of greater than 30 percent relative cover in the tree canopy or greater than 25 percent absolute cover of Oregon oak where an appreciable conifer cover is lacking (Sawyer et al, 2009).

Although extensive stands of Garry oak are found throughout the Northern California Coast Ranges they are best developed on northern slopes in the interior Coast Ranges further east of the Gualala River Forest. However, east of Bear Creek on the northeast corner of the GRF the vegetation grades from a closed conifer forest canopy into an open oak woodland with patches of interspersed grassland. This area is likely influenced both by geologic and edaphic factors as well as its location beyond the summer fog zone. Here, small stands of Garry oak woodland are found along with Shreve oak, aka interior live oak, black oak (*Q. kelloggii*), and Douglas fir. Very large Shreve and Garry oak grow in the large exotic grass-dominated opening near the confluence of Robinson and Bear Creeks on alluvial terraces, and rolling seep-fed topography. North-facing slopes above Robinson Creek support dense hardwood stands of mixed oak and Douglas fir, with a diverse native compliment of herbaceous perennials and grasses within the understory.

Some small stands in this area meet the requirements for the *Quercus garryana* Woodland Alliance (QGWA), such as those that support >25% absolute cover of Q. garryana and lacking any appreciable conifer cover, otherwise they are considered associates of a Douglas fir Alliance

(Sawyer et al 2009). The QGWA is considered rare in California (NatureServe rank S3) and is a unique vegetation type commonly supporting a rich suite of native understory grasses, forbs, and shrubs.

Common Species Associated with the Douglas-fir / Redwood Forest

Tree Canopy

Abies grandis	*Grand Fir*
Arbutus menziesii	*Pacific Madrone*
Chrysolepis chrysophylla	*Chinquapin*
Notholithocarpus densiflorus	*Tanoak*
Pseudotsuga menziesii	*Douglas-Fir*
Sequoia sempervirens	*Redwood*
Tsuga heterophylla	*Western Hemlock*
Umbellularia californica	*California Bay*

Shrub Canopy

Baccharis pilularis	*Coyote Brush*
Corylus cornuta var. californica	*Hazlenut*
Lathyrus vestitus var. vestitus	*Hillside Pea*
Lonicera hispidula var. vacillans	*Honeysuckle*
Polystichum munitum	*Western Sword Fern*
Pteridium aquilinum var. pubescens	*Bracken Fern*
Rhododendron occidentale	*Western azalea*
Rosa gymnocarpa	*Wood Rose*
Rubus leucodermis	*Western raspberry*
Rubus parviflorus	*Thimbleberry*
Rubus ursinus	*California blackberry*
Toxicodendron diversilobum	*Poison Oak*
Vaccinium ovatum	*California honeysuckle*
Woodwardia fimbriata	*Giant Chain Fern*

Herbaceous Canopy

Carex globosa	
Elymus glaucus ssp. glaucus	*Blue Wild Rye*
Festuca occidentalis	*Western Fescue*
Hieracium albiflorum	*Hawkweed*
Madia madioides	*Woodland Tarweed*
Osmorhiza chilensis	*Sweet Cicely*
Pentagramma triangularis	*Goldenback Fern*
Polygala californica	*California Milkwort*
Sanicula crassicaulis	*Gamble Weed*
Viola sempervirens	*Evergreen Violet*
Whipplea modesta	*Yerba de Selva*

Grasslands

The grasslands on the Gualala River Forest (GRF) represent a small portion of the overall acreage and are broadly distributed throughout the parcel. Grasslands occur on ridgetops and north, south, east and west facing slopes. They host a variety of native and non-native grasses and forbs. The grasslands occur on the edges of coniferous forest and occasionally as part of an oak savannah landscape where hardwood trees and some shrub species are dispersed widely within the grassland.

Overall, 10 grasslands patches were identified and mapped within the GRF. These generally lack emergent shrubs and many contain areas with moderate to high cover of the native purple needle grass, (*Stipa pulchra*). Ten percent or greater relative cover by purple needlegrass qualifies grasslands as Special Status Natural Communities by the California Department of Fish and Wildlife (CDFW).

Patch of purple needlegrass in grassland #6 on the GRF. 2013

Special status natural communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. Table 2 shows the locations of the purple needlegrass natural communities that have been observed and were documented for this report.

Two types of grasslands as defined by Sawyer (2009) were observed within the GRF; wild oat grasslands [*Avena* (*barbata, fatua*) Semi-Natural Herbaceous Stands] and purple needle grass grassland [*Nasella pulchra* Herbaceous Alliance]. Note that *Stipa pulchra* is now the recognized name for this species.

***Avena* (*barbata, fatua*) Semi-Natural Herbaceous Stands**, Wild oat grasslands.

This alliance is comprised of greater than 50% relative cover by *Avena* spp. and less than 10% cover by native herbs in the herbaceous layer (Sawyer et al, 2009).

Wild oat dominates these grasslands along with a suite of non-native grasses that include soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), foxtail chess (*Bromus madritensis* var. *madritensis*), big quaking grass (*Briza maxima)*, hedgehog dogtail (*Cynosurus echinatus*) and medusahead (*Elymus caput-medusae*). Occasional stands of native blue wildrye (*Elymus glaucus*) occur on the edges of grassy openings along with California brome (*Bromus carinatus*). California oat grass (*Danthonia californica*) occurs also in many of the grasslands. Non-native forbs present in early spring include red-stemmed filaree (*Erodium cicutarium), Soliva sessilis,* and smooth cat's ear (*Hypochaeris glabra*).

Non-native forbes present in late spring and early summer include Italian thistle (*Carduus pycnocephalus*), distaff thistle (*Carthamnus lanatus*), Malta starthistle (*Centaurea melitensis*), *Petrohagia dubia* and Japanese hedge parsley (*Torilis arvensis*). Native forbs present in early spring include miniature lupine (*Lupinus bicolor*), popcorn flower *(Plagiobothrys nothofulvus*), owl's clover (*Castilleja densiflora*) and as many as 10 members of the clover genus, *Trifolium* spp. Native forbes present in late spring and early summer include harvest brodiaea (*Brodiaea elegans*), blue dicks (*Dichelostemma capitatum* ssp. *capitatum*), California poppy (*Eschscholzia californica*), vinegar weed (*Trichostema lanceolatum*), *Navarretia pubescens* and *Sidalcea diploscypha.*

***Nasella pulchra* Herbaceous Alliance,** Purple needlegrass grassland.
This alliance is comprised of greater than 10% cover of purple needle grass in the herbaceous layer (Sawyer et al, 2009).

Purple needlegrass grasslands are generally represented as dense patches where purple needlegrass is greater than 10 % relative cover within larger wild oat grasslands. Purple needlegrass grassland occurs as low to moderate, to high-density stands within the larger wild oat grassland communities. It is likely that many of the grasslands present on the GRF were historically dominated by purple needlegrass and what remains is a remnant. Currently most of the purple needlegrass grasslands exhibit disturbance by wild pigs.

Table 2. Grassland patches on the GRF (acreage from timber conversion not included)

Grassland	Lat.	Long.	Elev (m)	Acres	Notes
1	38.84491	-123.39757	305	3.0	Primarily non-native grassland
2	38.84078	-123.38835	293	5.2	Primarily non-native grassland
3	38.83679	-123.38316	268	4.4	Primarily non-native grassland
4	38.83369	-123.37269	354	7.8	Identified from aerial image, not verified
5	38.81202	-123.41174	189	4.8	Significant wild pig disturbance
6a	38.80276	-123.40094	317	1.2	Dense patches of purple needlegrass
6b	38.80168	-123.39915	329	2.5	Dense patches of purple needlegrass
7	38.79386	-123.37920	244	2.1	Appears to have been a former barrow-pit
8	38.79149	-123.37417	232	1.4	High quality native grassland
9	38.79080	-123.37080	195	2.2	High quality native grassland
10	38.79775	-123.41270	366	1.0	Identified from aerial image, not verified
TOTAL				35.6	

Wetlands
Wetlands occurring on the Gualala River Forest are primarily riparian in nature. They are comprised of the North Fork of the Gualala River and its tributaries; Bear Creek, Billings Creek, Dry Creek, Hayfield Creek, Robinson Creek, and Stewart Creek; and to the south Rockpile Creek and its tributaries, Horsethief Canyon and Red Rock Creek. In addition many unnamed creeks and intermittent streams provide some wetland habitat. Roadside wetlands, where road development has exposed a seep or a spring, are not common on the GRF. Seasonally moist areas in grassy openings occur occasionally. One such site is located at the confluence of Bear and Robinson creeks and appears to be a former millpond supporting habitat for some vernal pool species.

***Alnus Rhombifolia* Forest Alliance**, White alder groves
This Alliance consists of a plant community comprising a tree canopy greater than five percent absolute cover of mature white alder trees (Sawyer et al, 2009).

The North Fork of the Gualala River is a steep-sided channel supporting a narrow band of riparian trees dominated by white alder (*Alnus rhombifolia*) and redwood with occasional big-leaf maple (*Acer macrophyllum*), Oregon ash (*Fraxinus latifolia*), and Pacific bay (*Umbellularia californica*) and a medley of understory willows that include Sitka willow (*Salix sitchensis*), red willow (*Salix laevigata*), and Scouler's willow (*Salix scouleriana*). In some places large Shreve oak, canyon live oak (*Q. chrysolepis*), tanoak (*Notholithocarpus densiflorus*), and sugar pine (*Pinus lambertiana*), grow near the edge of the channel or on terraces. Hazelnut (*Cornus cornuta* subsp. *californica*), western azalea (*Rhododendron occidentalis*) and sweet bush (*Calycanthus occidentalis*) occur under the shaded canopy (Heise and Hulse-Stephens 2012a).

Torrent sedge (*Carex nudata*) is conspicuous along the cobbled channel bottom and in some places forming a dense cover across the width of the channel. Giant chain fern (*Woodwardia fimbriata*), Durango root (*Datisca glomerata*) and giant horsetail (*Equisetum telematiea*) also commonly occur along the waters edge. Mossy riverside banks host herbaceous natives that include western brookfoam (*Boykinia occidentialis*), alum root (*Heuchera micrantha*), Merten's saxifrage (*Saxifraga mertensiana*), leopard lily (*Lilium pardalinum*), streamside orchid (*Epipactus gigantea*) and smooth trisetum (*Trisetum canescens*).

Disturbed terraces and remnants of roads support an assortment of exotic grass species such as tall fescue (*Festuca arundinacea*), soft chess (*Bromus hordeaceus*), ripgut grass (*B. diandrus*), Orchard grass (*Dactylis glomerata*), large quaking grass (*Briza maxima*),

White alder and torrent sedge on bank of the North Fork Gualala near North Fork Ford. 2013

and smilo grass (*Stipa miliacea*). At the confluence of Hayfield Creek with the N. Fork Gualala, cold water flowing over calcareous rock supports a unique assemblage of an unusual mosses and liverworts. The dominant moss is *Fissidens grandifrons,* which forms large, stiff, tufted stems that lie flat under flowing water. The leaves are characteristically blackish green and shiny. This is a widespread moss species but seldom encountered. It is considered a good indicator of calcareous habitats with good water quality (Malcolm et al. 2009).

Areas along Billings Creek represent a dryer riparian habitat dominated by Douglas-fir, California bay laurel and interior live oak (*Quercus chrysolepis*) with few white alder in the overstory. The herbaceous stratum is rich with natives that include ferns: California polypody (*Polypodium californicum*), sword fern (*Polystichum californicum*), fragile fern (*Cystopteris fragilis*) and gold-back fern (*Pentagramma triangularis* subsp. *triangularis*), forbs: Durango root , fawn lily (*Erythronium californicum*), fetid adder's tongue (*Scoliopus bigelovii*), redwood ivy (*Vancouveria planipetala*), western brookfoam and small-flowered tonella (*Tonella tenella*) and graminoids: Geyer's oniongrass (*Melica geyeri*), Alaskan oniongrass (*Melica subulata*) and Coville's rush (*Juncus covillei*). Rich in bryophytes, mosses here include *Scleropodium obtusifolium*, *Grimmia lisae* and *G. laevigata, Leucolepis acanthoneuron* and *Kindbergia praelonga*.

Moist Meadows

Within grasslands mesic swales provide habitat for wetland plants. These swales are generally dominated by Pacific rush (*Juncus effusus* subsp. *pacificus*). Natives such as common monkeyflower (*Mimulus guttatus*), water chickweed (*Montia fontana*), spike bentgrass (*Agrostis exerata*), California skullcap (*Scutellaria californica*) and foothill sedge (*Carex tumulicola*) co-occur with non-natives that include common velvet grass (*Holcus lanatus*), Italian ryegrass (*Festuca perennis*) and pennyroyal (*Mentha pulegium*).

Mill Pond

Just East of Bridge 53 over Bear Creek is the site of a manipulated area that appears to have impounded water that served as a mill pond. This area lies in a low hollow and the alterations in terrain have produced a complex of hydrologic niches that support some wetland plants. The pond area no long retains water for long periods due to a deeply incised gully that drains the former pond but the low areas still have a prolonged hydro-period that support native vernal pool popcorn flower (*Plagiobothrys bracteatus*), vernal-pool speedwell (*Veronica peregrina* subsp. *xalapensis*) and western blue flag (*Iris missouriensis*), as well as non-native spiny-fruited buttercup (*Ranunculus muricatus*), birdfoot trefoil (*Lotus corniculatus*), Mediterranean barley (*Hordeum marinum* subsp. *gussoneanum*) and pennyroyal.

Special Status Plant and Rare Community Recommendations

Sensitive plant communities are considered valuable for the diversity and often rarity of the species they support and as a resource need to be inventoried and documented on the GRF. It is recommended that property-wide floristic survey of vascular plants, bryophytes, and macrolichens on the Gualala GRF be conducted to document existing plant species, occurrences of rare, threatened or endangered species, other special status plants, vegetation communities, and invasive plants that could potentially threaten native plant populations property wide. Special status plants are not limited to those that have been listed by state and federal agencies

but include any plants that, based on all available data, can be shown to be rare, threatened, or endangered (CNPS 2013).

In addition, listed terrestrial communities (areas that are of highly limited distribution, and may or may not contain special status plants) are areas with high conservation value and are recommended for inventory and documentation. It is recommended that sampling be done by representative vegetation types with attention to slope, aspect, hydrology, and soils. An exotic plant assessment should be included, and spatial data should be collected for rare plant occurrences and invasive plant infestations; photo-documentation should be a component of each of these assessments.

Rare plants are by definition of limited distribution or population size. Whether broadly distributed, though occurring infrequently and in small populations, or narrowly distributed and locally abundant, or locally rare occurring along the periphery of their range (Lepig and White 2006), each rare plant has optimal conditions that allow for its continued survival. Some plants are sensitive to disturbance and some plants are disturbance dependent. It is important to have such information when making management decisions. Knowledge of these conditions will be foundational to an informed management strategy for each species found on the GRF. A monitoring plan is recommended for each elemental occurrence,* with management strategies developed for each species, adapted over time based on the results of monitoring.

*CNDDB defines a rare plant occurrence (an "Element Occurrence" or "EO") as a population (or group of populations) of plants separated by at least ¼ mile from another population(s). NDDB will map separate populations in detail, but will consider them all one EO if they occur within ¼ mile of each other.

RARE PLANT DESCRIPTIONS

White-Flowered Rein Orchid (*Piperia candida)*

The white-flowered rein orchid (*Piperia candida)* has been documented since 2005 on the adjacent Garcia River Forest when a small population was found along the North Fork road during a property-wide botanical inventory. Additional botanical surveys between 2008 and 2012 have documented over 50 additional populations (Heise and Hulse-Stephens 2012b). On the Gualala River Forest *P. candida* has only been located at one site which lies along the margin of Sugar Pine Road just west of the North Fork Ford (Table 3). Only 3 plants were observed here in 2012 but in mid May of 2013 we observed 26 plants, one with an inflorescence. These were growing on the outboard side of the road in 2" of Douglas fir duff.

Generally *P. candida* is found growing on shady ground in low to moderate numbers but over 100 plants have been observed on the Garcia River Forest, primarily on old skid trails, along the margins of seasonal and permanent logging roads, and on road banks. Since we have not observed any plants on relatively undisturbed habitat it is difficult to say

what the pattern of *P. candida* distribution was prior to logging. Presumably it preferred the moderate shade and shallow soils of sites adjacent to naturally occurring outcrops. In lieu of these somewhat rare habitat features it is quite possible that it is more common now in these forests than it was historically due to the increase in available habitat associated with logging. Following this reasoning it is tempting to suggest that *P. candida* needs regular disturbance to survive. However, since it may have taken decades or longer for populations to become established at these sites, it is important to consider what effect repeated disturbance could have on the long term viability of *P. candida* in coniferous forests.

P. candida is difficult to monitor as flowering can be infrequent both within and across populations. From our observations in Mendocino County this occurs late in the season from mid-July to mid-September. Additionally, herbivory may play an important role in its seasonal variation which increases the difficulty of identifying factors that are responsible for declines.

Description

P. candida is a perennial herb and a member of the Orchid Family (*Orchidaceae*) and can be found in coniferous and mixed evergreen forests primarily from the Bay Area northward to southern Alaska (Baldwin et al. 2012). The white flowers are sparse to numerous, often on one side of the stem. The dorsal sepal has a green mid-vein. The white triangular shaped lip points downward. The spur is relatively short at only 2-3½ mm long. The flowers purportedly have a honey like fragrance.

According to the authors of *Piperia* in the Flora of North America "The flowers in *Piperia candida* are more completely white and more ephemeral than in any other member of the genus." *Piperia candida* and the more common wood rein orchid (*P. elongata*) have overlapping distributions so accurate determination of species in the field is not possible without mature flowers. Ackerman and Morgan (2002), comment that "this is perhaps the most taxonomically complex orchid genus in North America. Considerable variation occurs within most species, and distinctions among taxa are often subtle".

Rarity Status

CRPR 1B.2:
1B = Rare, threatened or endangered in California and elsewhere
.2 = Fairly endangered in California
White flowered rein orchid has no state or federal listing.

State Rank: S2 Imperiled (CNPS 2012)
Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
Global Rank: G3 (fewer than 100 viable occurrences)
At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

Site Characteristics
The vegetation type for this species is redwood and Douglas fir forest with mixed hardwoods and conifer including tanoak, madrone, canyon live oak, and sugar pine. Occasional western hemlock (*Tsuga heterophylla*) occurs near these populations as well further to the west on the Garcia River Forest. All areas where the plants have been found have minimal to non-existent accumulations of litter, duff and slash. Litter layers deeper than 3-4" appear to be unsuitable. Overstory hardwood trees are generally larger trees in the 12-24" diameter class. The evergreen huckleberry is a common associate brush species, though generally in low densities (less than 25% cover).

In general more mesic sites have richer understory plant diversity including western huckleberry, California wax myrtle (*Myrica californica*), wood rose (*Rosa gymnocarpa*) and thimbleberry (*Rubus parviflorus).* Herbaceous plants associated with the populations include: Pacific starflower (*Trientalis latifolia)*, redwood sorrel, redwood ivy, modesty, and *Carex globosa.*

Recommendation:
Since this is the only known population of P. candida on the Gualala River Forest all efforts should be made to reduce impact to the site. A shade buffer should be placed around the occurrence of no less than 100 ft. and be composed of all trees with crowns shading the population. Additionally, no chemical hardwood reduction treatment should occur within the shade buffer. Yearly monitoring of this population should be conducted as well.

Santa Cruz Clover *(Trifolium buckwestiorum*)
The known range of the *T. buckwestiorum* is restricted to Mendocino, Monterey, Santa Cruz and Sonoma counties. Recent findings during THP surveys on the Garcia River Forest indicate substantially larger occurrences in the northern part of its range in Mendocino County. Currently, over 100,000 individuals of Santa Cruz Clover are estimated to occur in over 100 populations, comprising over 30 occurrences (population clusters separated by .25 miles) on the Garcia River Forest along the Graphite, North Fork Garcia, Blue Water Hole, and Hollow Tree Roads (Heise and Hulse-Stephens 2012c). Surveys on the Gualala River Forest in 2012 and 2013 have added 15 additional populations (Table 3).

Plant Description: Santa Cruz clover is an annual plant that displays several growth habit phases. In more impoverished soils where moisture is limited to brief accumulations following spring storms the plant grows to about 2cm and develops sessile non-involucred heads of 1 or 2 flowers, followed by seed set before desiccation. If moisture availability is extended by cool temperatures, spring rains, or available ground water the plant gradually produces a well-developed involucre with

conspicuous tooted lobes that subtend a head of a few to many flowers.
Stems range from 2cm to more than 20cm. and are decumbent to ascending.
Leaves occur along the stems and stipules have bristle-tipped teeth. Leaflets are .5 to 1.5 cm, round to elliptic and finely serrate.
Inflorescence can range from a singular flower without an involucre to a head of flowers, 5 to many, nested in a bowl-shaped involucre that is irregularly toothed and cut.
Flowers consist of a calyx tube 4-5mm, 10 veined with lobes smaller than the tube. Each lobe has 3 to 5 tiny lateral teeth ending in a 1-1.5 red bristle. The corolla is 6-7mm pale pink or white.
Seed: 1 (2)

Associated Species:
Roadbed species associated with the Santa Cruz clover include native grasses: slender hairgrass (*Deschampsia elongata*) and *Bromus vulgaris*; non-native grasses: common velvet grass (*Holcus lanatus*), six weeks fescue (*Vulpia bromoides*) and silver European hairgrass (*Aira caryophyllea*); native herbs: miniature lotus (*Lotus micranthus*), Spanish clover *(Acmispon americanum*), white-topped clover (*Trifolium varigatum),* tomcat clover *(T. wildenovii),* pinole clover (*T. bifidum),* and small-headed clover (*T. microcephalum)*. Non-native herbs include hairy cat's ears (*Hypochaeris radicata*) smooth cat's ear (*H. glabra*), little hop clover (*Trifolium dubium*), and *Soliva sessilis*.

Discussion
Santa Cruz clover is widely distributed along the margins of the Yellow Hound and Sugar Pine roads in the northern portion of the GRF east of the N. Fork Gualala River and concentrated along the seasonal road east of Bear Creek.. Occurrences are patchy to continuous and range from a few individuals to many thousand per square meter. This rather atypical habitat for a rare plant, its diminutive size, brief blooming period, and resemblance to other clovers has resulted in a species that is likely more widespread than previously believed and frequently overlooked by botanists in the field.

It appears that a lack of disturbance can be as detrimental to *Trifolium buckwestiorum* as too much disturbance. In a discussion of the Coastal Terrace Prairie found on the Santa Cruz CNPS website (http://www.cruzcnps.org) the relationship of *T. buckwestiorum* to disturbance was discussed as follows: "the majority of prairie plant diversity rests in the annual wildflowers. All of these species are, to some extent, disturbance dependent. That is, without soil disturbance and, especially, thatch removal they fail to germinate. Examples of listed species that occur in Santa Cruz County meadows include: *Trifolium buckwestiorum* (Santa Cruz Clover)... Historically, soil disturbance and thatch removal occurred in conjunction with large herbivores, which became extinct in the late Pleistocene. Locally, these species owe their existence to grazing; trail side soil disturbance, and other human induced disturbances. Without such disturbance, the native annuals retreat to tiny refugia of very shallow soil too poor and dry to support weeds."

Our own observations over the past few years agree with this assessment as Santa Cruz clover in sites that receive little or no yearly disturbance from grading tend to be out-competed by other plants.

Rarity Status
CRPR 1B.1
1B = Rare, threatened or endangered in California and elsewhere
.1 = Seriously endangered in California
State Rank: S1.1 (Less than 6 occurrences OR less than 1000 individuals OR less than 2000 acres.)
Global Rank: G1

Monitoring Recommendations
Continue to monitor the 20 permanent Santa Cruz clover monitoring sites located on the western half of the Garcia parcel which include 10 restrictive sites where grading between Feb. 1- June 1 and application of Dust-off are to be avoided. Evaluate the need to incorporate additional permanent monitoring sites from the Gualala parcel and Hollow Tree Road area on the eastern portion of the Garcia parcel in the management plan. Until then, it is recommended that the Gualala parcel follow the same guidelines as outlined in the Santa Cruz clover management plans for the Garcia River Forest which basically states that (with the exception of the 10 restrictive sites mentioned above) normal road maintenance across all the clover sites be permitted using best road management practices.

Table 3 Gualala River Forest Rare Species
Abundance classes for Trbu: 1 = 1-100 2 = 100-1,000 3 = >1,000
Note: 3 Pica plants observed in 2012 and 26 observed in 2013

ID	lat	lon	ele (m)	abundance
Pica	38.82799	-123.42591	266	n=3, 26
Trbu 1	38.84757	-123.43607	511	2
Trbu 2	38.83216	-123.43724	314	2
Trbu 3	38.83162	-123.43707	320	3
Trbu 4	38.83061	-123.43666	353	2
Trbu 5	38.82932	-123.43070	279	1
Trbu 6	38.82910	-123.42850	261	2
Trbu 7	38.83387	-123.43382	470	2
Trbu 8	38.84227	-123.43596	422	3
Trbu 9	38.84454	-123.43706	438	1
Trbu 10	38.84495	-123.43631	419	3
Trbu 11	38.83540	-123.38207	328	3
Trbu 12	38.83698	-123.38438	331	1
Trbu 13	38.83890	-123.38819	324	1
Trbu 14	38.84601	-123.39867	253	2
Trbu 15	38.80275	-123.40060	345	3

Invasive Plants

Best practice land management requires a vigilant approach to invasive plants. The introduction of foreign species into new landscapes can cause ecological chaos by altering natural processes and reducing biodiversity. In their home environment plant populations are regulated by slowly-evolving natural controls, but in lieu of these, introductions into a novel environment can result in an invasive plant response. Climate change adds a further dimension to the problem of invasive plant encroachment. Naturalized exotic species may prove more successful in adapting to changing environmental conditions, becoming more invasive, and furthering displacement of native species. For these reasons early control is of great importance.

The GRF is notable in its absence of large infestations of invasive plants. Instead disturbed roadside areas within forested habitat are frequently dominated by native California broom (*Acmispon glaber*), California brome (*Bromus carinatus*) and blue wild-rye (*Elymus glaucus*). Unique to the GRF, infestations of French broom (*Genista monspessulana*) and jubata grass (*Cortadaria jubata*) are infrequent and small. Grasslands display an array of invasive exotic species especially within proximity of the road prism but infestations currently remain limited. A total of 94 exotic species (24% of the flora) have been recorded for the GRF (Appendix A). Exotic species are largely represented by the grass (*Poaceae*), sunflower (*Asteraceae*) and the legume (*Fabaceae*) families. Twelve of these species are listed by both the California Department of Food and Agriculture (CDFA) and the California Invasive Plant Counsel (Cal-IPC) as invasive. Cal-IPC rates invasive species as high, moderate or limited. A list of invasive exotics observed within the GRF, with ratings of either high or moderate, are found in the table below.

Table 4. Invasive Exotic Plants on the Gualala River Forest

Scientific name	Common name	Cal-IPC rating	Habitat
Carduus pycnocephalus	Italian thistle	moderate	Grassland, woodland, forest, roadside
Carthamus lanatus	distaff thistle	moderate/Red Alert	Grassland, roadside
Centaurea solstitialis	yellow star thistle	high	Grassland, woodland edges, roadside
Cirsium arvense	Canadian thistle	moderate	Grassland, riparian, forest
Cirsium vulgare	bull thistle	moderate	Grassland, riparian, roadside
Cortaderia jubata	jubata grass	high	Forest opening, roadside
Cytisus scoparius	Scotch broom	High	Woodland, roadside
Elymus caput-medusae	Medusahead grass	high	Grassland, roadside
Ficus carica	Edible fig	Moderate	Riparian woodland
Genista monspessulana	French broom	high	Forest, grassland
Hypericum perforatum	Klamath weed	moderate	Grassland
Mentha pulegium	penny royal	moderate	Grassland, wetlands

Cal-IPC assigns a rating of **high** to species that "*have severe ecological impacts on physical processes, plant and animal communities and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically*" (Cal-IPC, 2013).

Cal-IPC assigns a rating of **moderate** to species that "*have substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread*" (Cal-IPC, 2013).

Cal-IPC **Red Alert** species are species that have the potential to become widely invasive in the state or have been recently reported as expanding in their range within California (Pirosko 2003). Distaff Thistle is considered by both the State of California (CDFA) and Mendocino County to be a Red Alert species. Red Alert species are those with a reproductive biology that is given to high rates of dispersal but are not yet widespread in distribution in the county. Mendocino County conducts an eradication program for distaff thistle removal.

Table 5. Locations of High-rated and Red Alert Invasive Species on the GRF

	Distaff thistle	Scotch broom	Jubata grass	Medusahead grass	French broom
1	N38 51.005 W123 24.198	N38 47.574 W123 22.894	N38 47.864 W123 25.241	N38 50.143 W123 22.918	N38 47.887 W123 24.541
2	N38 50.473 W123 23.288			N38 50.220 W123 23.064	N38 48.997 W123 23.791
3	N38 50.842 W123 24.073				N38 49.017 W123 23.841
4	N38 49.525 W123 22.437				N38 50.715 W123 26.169
5	N38 48.727 W123 24.877				
6	N38 50.964 W123 26.057				

Invasive Plant Recommendations

Field observations made in preparation for this report encompassed the road system of the area east of Gate 47 which comprises approximately 80 percent of the GRF. Across this area we observed a conspicuous absence of large invasive plant infestations compared to other Northern Coastal forested lands that have been historically managed for timber harvest. The limited presence of invasive plants presents an opportunity for the Conservation Fund to undertake an effective invasive plant management program.

This program would be comprised of five elements which are outlined below:

1.) Prioritize treatment by targeting species that have the greatest potential to displace native species and degrade managed forest lands.

Three of the invasive species ranked high or moderate shown in Table 2 are known to be especially aggressive and have the greatest potential to degrade forested habitat and areas of high resource value. Jubata grass (*Cortadaria jubata*) and French broom (*Genista monspessulana*) have a dispersal regime and biology that is especially compatible with conditions in Northern Coastal forests. Distaff thistle is a recent introduction to Mendocino County and has displayed an aggressive dispersal behavior in coastal grasslands. A comprehensive effort should be made to identify infestations and to treat them. A preliminary record of known locations of these infestations is presented in Table 3 above. A description of the invasive biology and treatment methods for jubata grass and French broom are described in detail in the *Invasive Plant Management Plan for the Salmon Creek Forest* (Hulse-Stephens 2010).

Distaff Thistle is an annual plant that reproduces by seed and can disperse great distances with the help of animals, machinery, mud and water. Its seeds can remain dormant and viable for up to eight years (DiTomaso et al, 2013). Without introduction of new seed, seed banks decrease by 70-74% per year. One plant can produce many stems that may mat together due to their dense spines and form a small thicket (Wikipedia.org.). Methods for removal of distaff thistle include both mechanical and chemical means. Mendocino County Agricultural Advisors office invasive plant specialist, Ray Harrie, advised that distaff thistle is prevalent in Sonoma County. He said that the Mendocino County office is trying to "hold the line at Fish Rock Road". The County treats infestations with an herbicide known as "Transline" that is thistle specific and has a three-year residual effect. He mentioned that it is an expensive herbicide that comes in quantities that are greater than most landowners can utilize. He stated that hand-control either by timed mowing or hand pulling, depending on the size of the infestation, can be very effective and requires follow-up for eight to ten years (Harrie, R., pers. comm. Sept. 2013).

2.) Conduct a comprehensive survey identifying and mapping any infestations not shown in Table 3 above.

While some mapping of invasive infestations has already occurred this body of knowledge should be expanded to include all roads within the GRF. Some of the mapping should be completed in winter months when the threat of encountering marijuana growers is reduced.

Distaff thistle (*Carthamus lanatus*) above opening near confluence of Bear and Robinson Creeks, GRF. 2013

3.) Undertake systematic removal of these infestations.

Mechanical and hand removal of invasive plants have proven to be very effective on infestations of jubata grass and French broom on The Conservation Fund's Salmon Creek Forest. Where infestations are relatively small as they are on the GRF organized efforts by stakeholder groups or the California Conservation Corp would restore the landscape to a very high level baseline. Distaff thistle can be treated by mechanical means or by methods recommended by the Mendocino County Agricultural Advisor.

4.) Develop an annual follow-up site inspection and treatment program

Follow-up efforts are an essential part of the success of any invasive plant management program. This requires that personnel return to treated sites at least every 2 years for the first 10 years after treatment of jubata grass and French broom and annually for at least 8 years after initial distaff thistle treatment. This follow up could be accomplished by an annual visit to all treated sites by one or two persons trained to identify invasive plants in incipient stages or Conservation Fund personnel, foresters or security staff, who could return to treated sites in the course of other duties and remove by hand any seedlings prior to reproductive maturity.

5.) Implement a system such as Early Detection Rapid Response that protects the Forest against new future invaders.

Early Detection Rapid Response (EDRR) is a program developed to identify incipient introductions of invasive exotics and remove them before they achieve significant establishment. EDRR efforts increase the likelihood that invasions will be halted and eradicated (NISC). EDRR principles include:

- Preparation of educational materials to assist staff and stakeholders in the field who may be capable of noticing a new occurrence of a particularly troublesome invader.
- Development and maintenance of a list of priority species with greatest potential for spread and impact.
- Monitoring of status and trends of species of highest management concern. Any significant disturbance that bares the soil and opens the canopy, providing habitat for the spread of invasive exotic plants, may be added to the monitoring sites.
- Detection and removal of new occurrences of selected invasive exotic plants in prioritized habitats before they become established (Odion and Sarr 2007).

Invasive Pathogens

Outbreaks of Sudden Oak Death caused by the pathogen Phytopthora ramorum have killed tens of thousands of native oak and tanoak trees in 14 coastal counties in California. Intensive efforts to monitor the extent, pathology and control are underway by the California Oak Mortality Task Force and other research institutions; however, there is as yet no cure for *Phytopthora ramorum* and its associated diseases. Current best management practices focus on monitoring its extent and attempting to prevent further spread. Surveys and samples for sudden oak death on the GRF have not detected sudden oak death. A list of regulated hosts and plants associated with *P. ramorum* is regularly updated and available on-line at www.aphis.usda.gov/ppq/ispm/pramorum.

Table 6. SOD Hosts currently known on the GRF

Scientific name	**common name**	**family**
Acer macrophyllum	bigleaf maple	Sapindaceae
Adiantum aleuticum	western maidenhair fern	Pteridaceae
Adiantum jordanii	California maidenhair fern	Pteridaceae
*Aesculus californica**	California buckeye	Sapindaceae
Arbutus menziesii	madrone	Ericaceae
Arctostaphylos manzanita	manzanita	Ericaceae
Frangula californica	California coffeeberry	Rhamnaceae
*Frangula purshiana**	Cascara	Rhamnaceae
Heteromeles arbutifolia	toyon	Rosaceae
Lonicera hispidula	California honeysuckle	Caprifoliaceae
Maianthemum racemosum	false Solomon's seal	Ruscaceae
Notholithocarpus densiflorus	tanoak	Fagaceae
Pseudotsuga menziesii var. *menziesii*	Douglas fir	Pinaceae
Quercus chrysolepis	canyon live oak	Fagaceae
Quercus kelloggii	California black oak	Fagaceae
Quercus parvula var. *shrevei*	Shreve's oak	Fagaceae
Rhododendron macrophyllum	California rose bay	Ericaceae
Rhododendron occidentale	western azalea	Ericaceae
Rosa gymnocarpa	wood rose	Rosaceae
Sequoia sempervirens	coast redwood	Cupressaceae
Trientalis latifolia	Western starflower	Myrsinaceae
Umbellularia californica,	California bay laurel	Lauraceae
Vaccinium ovatum	Evergreen huckleberry	Ericaceae

*= not observed on GRF, high probability of occurrence

Conclusion

This assessment of the botanical resources of the Gualala River Forest relied on an assortment of historical documents, mostly plant lists from THPs as well as more current sources obtained from field investigations over the past two years (Heise and Hulse-Stephens 2012a). Aside from the unique collection of native grassland patches described above, the GRF lacks the habitat diversity found across other TCF parcels, such as non-riparian wetlands, serpentine, and coastal forest stands. Much of this can be explained by location, topography, and geology, however, historic disturbance related to commercial timber harvesting specific to the GRF may also be an important factor.

An extensive baseline survey of the Gualala River Forest is needed to help fill in our gaps of the flora on the Gualala River Forest and will provide more informed management decisions. It is recommended that such a survey:

1. Be property wide in extent and include vascular plants, bryophytes and macro lichens (see Plant Inventory and Special Status Plant Recommendations above).
2. Be conducted according the CNPS and CDFW guidelines (CDFG 2009).
3. Include spatial data for rare species, invasive plants, locally rare taxa mapping.
4. Should include a refinement of vegetation type descriptions.

These surveys will reduce significantly the data gaps and will provide essential information for development of critical policies and procedures for best management practices to be applied on the GRF. With the information collected in these surveys: 1) an invasive plant monitoring plan along with prevention procedures can be developed; 2) sufficient information will be available to develop a rare plant monitoring and management plan to preserve and further the sensitive species and plant communities on the GRF; and 3) management recommendations for vegetation types may be developed based on an assessment of vegetation communities and their vitality in relationship to historical land management practices.

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Appendix A Vascular Plants of the Gualala River Forest, Mendocino County, California.

Plant surveys conducted by Kerry Heise and Geri Hulse-Stephens, 2012, 2013

Nomenclature and taxonomy follows the Jepson Manual, Higher Plants of California, 2nd edition, 2012.

Exotic species followed by an asterix have the potential to become invasive.

Rare plants in bold: California Rare Plant Rank 1B = Plants rare, threatened, or endangered in Calif. and elsewhere; CRPR 2 = Rare, threatened, or endangered in Calif., but more common elsewere; CRPR 3 = A review list, plants needing more information; CRPR 4 = A watch list, plants of limited distribution.

Note: Asterix in exotic column indicates taxa has potential to become invasive
Asterix after species name indicates an unconfirmed taxa taken from earlier THP reports.

Total taxa: 404 Families: 82 Exotics: 94

Family	**Scientific Name**	**Common Name**	**Exotic**
LYCOPHYTES - Spike Mosses and Club Mosses			
Selaginellaceae - Spike-Moss family			
	Selaginella wallacei		
FERNS			
Blechnaceae -Deer Fern Family			
	Woodwardia fimbriata	Giant Chain Fern	
Dennstaedtiaceae - Bracken Fern Family			
	Pteridium aquilinum var. pubescens	Bracken Fern	
Dryopteridaceae -Wood Fern Family			
	Dryopteris arguta		
	Polystichum californicum	California Sword Fern	
	Polystichum imbricans ssp. imbricans		
	Polystichum munitum	western swordf fern	
Equisetaceae - Horsetail Family			
	Equisetum arvense	common horsetail	
	Equisetum hyemale ssp. affine	common scouring rush	
	Equisetum laevigatum	smooth scouring rush	
	Equisetum telmateia ssp. braunii	giant horsetail	
Polypodiaceae - Polypody Family			
	Polypodium californicum	California polypody	
	Polypodium glycyrrhiza	licorice fern	
	Polypodium sp.		
Pteridaceae - Brake Fern Family			
	Adiantum aleuticum	five-finger fern	
	Adiantum capillus-veneris		
	Adiantum jordanii		
	Pentagramma triangularis ssp. *triangularis*	Goldenback Fern	
Woodsiaceae - Cliff fern Family			
	Athyrium filix-femina var. cyclosorum	Lady Fern	
	Cystopteris fragilis	Fragile Fern	
GYMNOSPERMS			
Cupressaceae - Cypress Family			
	Sequoia sempervirens	Coast Redwood	
Pinaceae - Pine Family			
	Pinus lambertiana	sugar pine	

	Pseudotsuga menziesii	Douglas Fir	
	Tsuga heterophylla	western hemlock	
Taxaceae - Yew Family			
	Torreya californica	California nut-meg	
MAGNOLIIDS			
Aristolochiaceae - Pipevine Family			
	Asarum caudatum	Wild-Ginger	
Calycanthaceae - Sweet-shrub Family			
	Calycanthus occidentalis	spicebush	
Lauraceae - Laurel Family			
	Umbellularia californica	California Bay	
EUDICOTS			
Adoxaceae - Muskroot Family			
	Sambucus nigra subsp. caerulea (S. mexicana) *	Blue Elderberry	
	Sambucus racemosa var. racemosa	red elderberry	
Anacardiaceae - Sumac Family			
	Toxicodendron diversilobum	Poison Oak	
Apiaceae - Carrot Family			
	Apiastrum angustifolium *	wild celery	
	Daucus carota *	carrot	x
	Daucus pusillus	Rattlesnake Weed	
	Foeniculum vulgare *	fennel	x
	Heracleum maximum (H. lanatum) *	cow parsnip	
	Osmorhiza berteroi (O. chilensis)	Sweet Cicley	
	Perideridia kelloggii	Yampah	
	Sanicula bipinnata	poison sanicle	
	Sanicula bipinnatifida	Purple Sanicle	
	Sanicula crassicaulis	Gamble Weed	
	Sanicula laciniata		
	Torilis arvensis	Japanese Hedge Parsley	x
	Yabea microcarpa		
Araliaceae - Ginsing Family			
	Aralia californica	Elk Clover	
Asteraceae - Aster Family			
	Achillea millefolium	Yarrow	
	Adenocaulon bicolor	Trail Plant, Silver Arrow	
	Agoseris heterophylla		
	Anisocarpus madioides (Madia madioides)	woodland tarweed	
	Anaphalis margaritacea	Pearly Everlasting	
	Arnica discoidea		
	Artemisia douglasiana	Mugwort	
	Baccharis glutinosa (B. douglasii)	Marsh Baccharis	
	Baccharis pilularis	Coyote Brush	
	Bellis perennis *	English daisy	x
	Carduus pycnocephalus	Italian Thistle	x*
	Carthamus lanatus *	woolly distaff thistle	x*
	Centaurea solstitialis	Yellow Star-Thistle	x*
	Cirsium arvense *	Canada thistle	x*
	Cirsium brevistylum		
	Cirsium vulgare	Bull Thistle	x*
	Crepis capillaris		
	Ericameria arborescens	Golden Fleece	

	Erigeron canadensis (Conyza c.)	horseweed	x
	Eriophyllum lanatum var. arachnoideum	Common Wooly Sunflower	
	Euchiton sphaericus (Gnaphalium japonicus)		x
	Eurybia radulina (Aster radulinus)	Broad-leafed Aster	
	Gamochaeta ustulata (Gnaphalium purpureum)	featherweed	
	Gnaphalium palustre	cudweed	
	Helenium puberulum		
	Hieracium albiflorum	Hawkweed	
	Hypochaeris glabra	Smooth Cat's Ear	x
	Hypochaeris radicata	Hairy Cat's Ear	x
	*Leucanthemum vulgare **	ox-eye daisy	x
	Logfia californica (Filago filaginoides)	California cottonrose	
	Logfia gallica (Filago gallica)		
	Madia exigua	Litter Tarweed	
	Madia gracilis	Slender Tarweed	
	Malacothrix floccifera		
	Micropus californicus	Slender Cottonweed	
	Pseudognaphalium beneolens	cudweed	
	Pseudognaphalium californicum		
	Pseudognaphalium luteo-album	cudweed	x
	Psilocarphus brevissimus var. brevissimus	dwarf woolly-heads	
	Senecio vulgaris		x
	Soliva sessilis		x
	Taraxacum officionalis	California dandelion	x
	Tolpis barbata		x
	Wyethia glabra	Coast Range mule ears	
Berberidaceae - Barberry Family			
	Achlys californica	vanilla leaf	
	Vancouveria planipetala	Redwood Ivy	
Betulaceae - Birch Family			
	Alnus rhombifolia	White Alder	
	Alnus rubra	red alder	
	Corylus cornuta subsp. californica	Hazelnut	
Boraginaceae - Borage Family			
	Amsinckia menziesii var. intermedia	Rancher's Fireweed	
	Cynglossum grande	Hound's Tongue	
	Eriodictyon californicum	yerba santa	
	*Hackelia floribunda * (out of range)*	many-flowered stickweed	
	Myosotis discolor	Blue Scorpion Grass	x
	Myosotis latifolia	forget-me-not	
	Nemophila menziesii var. atomaria	Baby White-eyes	
	Nemophila menziesii var. menziesii	Baby Blue-eyes	
	Nemophila parviflora		
	Nemophila pedunculata		
	Plagiobothrys bracteatus		
	Plagiobothrys nothofulvus	Popcorn Flower	
Brassicaceae- Mustard Family			
	Brassica nigra	black mustard	x
	Cardamine californica	milk maids	
	*Cardamine nuttallii **		
	Cardamine oligosperma		

	Raphanus sativus *	radish	x
Campanulaceae - Bluebell Family			
	Asyneuma prenanthoides (Campanula p.)	California harebell	
Caprifoliaceae - Honeysuckle Family			
	Lonicera hispidula	Honeysuckle	
	Lonicera involucrata var. *ledebourii*	twinberry	
	Symphoricarpos mollis	Creeping Snowberry	
Caryophyllaceae - Pink Family			
	Cerastium arvense subsp. strictum *	field mouse-ear chickweed	
	Cerastium glomeratum	Mouse-ear Chickweed	x
	Petrorhagia dubia		x
	Sagina decumbens subsp. occidentalis	pearlwort	
	Silene laciniata subsp. californica	Indian Pink	
	Spergularia rubra	sand-spurrey	x
	Stellaria crispa		
	Stellaria media	common chickweed	x
Celastraceae - Staff Tree Family			
	Euonymus occidentalis	western burning bush	
Chenopodiaceae - Goosefoot Family			
	Chenopodium bothrys	Jerusalem oak	x
Convolvulaceae - Morning-Glory Family			
	Calystegia purpurata ssp purpurata		
Cornaceae - Dogwood Family			
	Cornus nuttallii	Mountain Dogwood	
Crassulaceae - Stonecrop Family			
	Sedum spathulifolium		
Cucurbitaceae - Gourd Family			
	Marah fabacea	California man-root	
Datiscaceae - Datisca Family			
	Datisca glomerata	Durango Root	
Dipsacaceae - Teasel Family			
	Dipsacus fullonum	wild teasel	x
Ericaceae - Heath Family			
	Arbutus menziesii	madrone	
	Arctostaphylos columbiana		
	Arctostaphylos glandulosa subsp. glandulosa	Eastwood manzanita	
	Arctostaphylos manzanita subsp. glaucescens	common manzanita	
	Arctostaphylos manzanita subsp. manzanita	common manzanita	
	Gaultheria shallon	salal	
	Pityopus californicus * 4.2	**California pinefoot**	
	Pyrola picta	white-veined wintergreen	
	Rhododendron occidentale	western azalea	
	Vaccinium ovatum	California huckleberry	
	Vaccinium parvifolium	red huckleberry	
Fabaceae - Pea Family			
	Acmispon americanus var. americanus (Lotus purshianus)	Spanish lotus	
	Acmispon brachycarpus (Lotus humistratus)	deervetch	
	Acmispon glaber (Lotus scoparius)	California broom	x
	Acmispon parviflorus (Lotus micranthus)	deervetch	
	Cytisus scoparius	Scotch broom	x
	Genista monspessulana	French Broom	x*

	Hoita macrostachya	leather root	
	*Hosackia rosea (Lotus aboriginus) **		
	Lathyrus cicera		x
	*Lathyrus sulphureus **		
	Lathyrus sp.		
	Lathyrus torreyi		
	Lathyrus vestitus var. vestitus	hillside pea	
	Lotus corniculatus	birdfoot trefoil	x
	Lupinus arboreus		
	Lupinus bicolor	miniature lupine	
	Medicago polymorpha	California burclover	x
	Pickeringia montana var montana	chaparral pea	
	Trifolium barbigerum var barbigerum		
	Trifolium bifidum var bifidum		
	Trifolium buckwestiorum 1B.1		
	*Trifolium campestre **	hop clover	x
	Trifolium cernuum		
	Trifolium ciliolatum		
	Trifolium dichotomum (T. albopurpureum var. d.)		
	Trifolium dubium	little hop clover	x
	Trifolium hirtum	rose clover	x
	Trifolium microcephalum	maiden clover	
	Trifolium microdon	thimble clover (native)	
	Trifolium oliganthum		
	Trifolium repens	white clover	x
	Trifolium subterraneum	subterranean Clover	x
	Trifolium varigatum	white-topped clover	
	Trifolium willdenovii	tomcat clover	
	Vicia americana	American vetch	
	Vicia cracca (waif)		x
	Vicia sativa ssp nigra	narrow-leaved vetch	x
	Vicia sativa ssp sativa	spring vetch	x
	Vicia tetrasperma		x
Fagaceae - Beech Family			
	Chrysolepis chrysophylla var. chrysophylla	chinquapin	
	Notholithocarpus densiflorus var. densiflorus	tan oak	
	Quercus agrifolia	Coast Live Oak	
	Quercus chrysolepis	Canyon Live Oak	
	Quercus garryana var. garryana	Oregon Oak, Garry Oak	
	Quercus kelloggii	Black Oak	
	Quercus parvula var. shrevei	Shreve oak	
Gentianaceae - Gentian Family			
	Cicendia quadrangularis		
	Zeltnera muehlenbergii (Centarium m.)	Montery centaury	
Geraniaceae - Geranium Family			
	Erodium botrys	Broadleaf Filaree	x
	Erodium cicutarium	Red-stemmed Filaree	x
	Geranium dissectum	Cut-leaf Geranium	x
	Geranium molle	Dove-foot Geranium	x
	Pelargonium grossularioides		x
Grossulariaceae - Gooseberry Family			

	Ribes californicum ssp. californicum	hillside gooseberry	
Hypericaceae - St. John's Wort Family			
	Hypericum concinnum	gold-wire	
	Hypericum perforatum	Klamath Weed	x*
Lamiaceae - Mint Family			
	Clinopodium douglasii (Satureja d.)	Yerba Buena	
	Lepechinia calycina	pitcher sage	
	Mentha pulegium	Penny Royal	x*
	Mentha spicata	spearmint	x
	Monardella villosa ssp. villosa	Coyote Mint	
	Pogogyne zizyphoroides		
	Prunella vulgaris var. lanceolata	Self-Heal	
	Scutellaria californica	California Skullcap	
	Stachys ajugoides	Hedge Nettle	
	Stachys rigida	Hedge Nettle	
	Trichostema lanceolatum	Vinegar Weed	
Linaceae - Flax Family			
	Linum bienne	Common flax	x
Malvaceae - Mallow Family			
	Sidalcea calycosa subsp. calycosa *	vernal pool checkerbloom	
	Sidalcea diploscypha		
Montiaceae - Montia Family			
	Calandrinia ciliata	red maids	
	Claytonia perfoliata	miner's lettuce	
	Montia fontana	water chickweed	
Moraceae- Mulberry Family			
	Ficus carica	Edible fig	x
Myricaceae- Wax Mytrle Family			
	Morella californica (Myrica california)	California wax myrtle	
Myrsinaceae - Myrsine Family			
	Anagallis arvensis	Scarlet Pimpernel	x
	Trientalis latifolia	Star Flower	
Oleaceae - Olive Family			
	Fraxinus latifolia	Oregon Ash	
	Fraxinus dipetala	California Ash	
Onagraceae - Evening Primrose Family			
	Clarkia concinna	Red Ribbons	
	Epilobium brachycarpum		
	Epilobium ciliatum ssp. ciliatum	Northern Willow Herb	
	Epilobium minutum		
Orobanchaceae - Broomrape Family			
	Castilleja attenuata	valley tassels	
	Castilleja densiflora	owl's clover	
	Pedicularis densiflora	Indian warrior	
	Triphysaria pusilla		
	Triphysaria versicolor ssp. versicolor		
Oxalidaceae- Oxalis Family			
	Oxalis oregana	Redwood Sorrel	
Papaveraceae - Poppy Family			
	Eschscholzia californica	California Poppy	
Philadelphaceae - Mock Orange Family			

	Whipplea modesta	Yerba de Selva, Modesty	
Phrymaceae - Lopseed Family			
	Mimulus aurantiacus subsp. aurantiacus	sticky monkey-flower	
	Mimulus guttatus	common monkeyflower	
	Mimulus moschatus	musk monkeyflower	
Plantaginaceae - Plantain Family			
	Callitriche heterophylla var. bolanderi	Bolander's Water-Starwort	
	Callitriche marginata		
	Digitalis purpurea	foxglove	x
	*Penstemon heterophyllus var. heterophyllus **	beardtongue	
	Plantago erecta		
	Plantago coronopus	cut-leaf plantain	x
	Plantago lanceolata	English plantain	x
	Tonella tenella		
Polemoniaceae - Phlox Family			
	Collomia heterophylla	Varied-Leaf Collomia	
	Leptosiphon bicolor (Linanthus b.)	Bicolored Linanthus	
	Navarretia pubescens		
	Navarretia squarrosa	Skunkweed	
Polygalaceae - Milkwort Family			
	Polygala californica	California Milkwort	
Polygonaceae - Buckwheat Family			
	Rumex acetosella	sheep sorrel	x
	rumex conglomeratus		x
	Rumex crispus	curly dock	x
Ranunculaceae - Buttercup Family			
	Anemone deltoidea	windflower	
	Aquilegia formosa	Columbine	
	Delphinium nudicaule	Red Larkspur	
	*Ranunculs acris * (waif)*		x
	Ranunculus muricatus		x
	Ranunculus occidentalis	western buttercup	
	Ranunculus uncinatus		
Rhamnaceae - Buckthorn Family			
	Ceanothus foliosus var. foliosus	wavy-leafed ceanothus	
	Ceanothus integerrimus	Deer Brush	
	Ceanothus thyrsiflorus		
	Frangula californica (Rhamnus californica)	California coffeeberry	
Rosaceae - Rose Family			
	Adenostemma fasciculatum	chamise	
	Aphanes occidentalis	Lady's Mantle	
	Drymocallis glandulosa var. glandulosa (Potentilla g.)	Sticky Cinquefoil	
	Fragaria vesca	Wood Strawberry	
	Heteromeles arbutifolia	Toyon	
	Holodiscus discolor	Ocean Spray	
	Malus pumila	Apple	x
	Rosa californica	California rose	
	Rosa gymnocarpa	Wood Rose	
	Rubus armeniacus (R. discolor)	Himalayan Blackberry	x
	Rubus leucodermis	Western Raspberry	
	Rubus parviflorus	Thimbleberry	

	Rubus ursinus	California Blackberry	
Rubiaceae - Madder Family			
	Galium aparine	Goose Grass	x
	Galium californicum ssp. californicum	California Bedstraw	
	Galium muricatum	Humboldt Bedstraw	
	Galium parisiense	Wall Bedstraw	x
	Galium porrigens var. porrigens	Climbing Bedstraw	
	Galium triflorum	redwood bedstraw	
	Sherardia arvensis	Field Madder	x
Salicaceae - Willow Family			
	Salix laevigata	Red Willow	
	Salix scouleriana	Scouler's willow	
	Salix sitchensis	Sitka willow	
Sapindaceae - Soapberry Family			
	Acer macrophyllum	Big Leaf Maple	
	Aesculus californica	California Buckeye	
Saxifragaceae - Saxifrage Family			
	Boykinia occidentalis		
	Heuchera micrantha	Alum Root	
	Lithophragma heterophyllum	Woodland Star	
	Saxifraga mertensiana	Merten's Saxifrage	
Scrophulariaceae - Figwort Family			
	Scrophularia californica	California figwort	
	Verbascum blattaria	moth mullein	x
	Verbascum thapsus	woolly mullein	x
Valerianaceae - Valerian Family			
	Plectritis congesta subsp. brachystemon		
Verbenaceae - Vervain Family			
	Verbena lasiostachys var. lasiostachys		
Violaceae - Violet Family			
	Viola glabella	stream violet	
	Viola ocellata	western heart's ease	
	Viola sempervirens	evergreen violet	
Vitaceae - Wild grape family			
	Vitis californica	California wild grape	
MONOCOTS			
Agavaceae - Century Plant Family			
	Chlorogalum pomeridianum	soaproot	
Alliaceae - Onion Family			
	Allium sp. *		
Cyperaceae - Sedge Family			
	Carex bolanderi	Bolander's sedge	
	Carex globosa	round-fruited sedge	
	Carex gynodynama	wonder-woman sedge	
	Carex harfordii	Harford's sedg	
	Carex leptopoda (C. deweyana subsp. leptopoda)	slender-foot sedge	
	Carex nudata	torrent Sedge	
	Cyperus difformis *		x
	Cyperus eragrostis	nutsedge	
	Eleocharis macrostachya	spikerush	
	Scirpus microcarpus		

Iridaceae - Iris Family			
	Iris douglasiana	Douglas Iris	
	Iris purdyi	Purdy's Iris	
	Sisyrinchium bellum	Blue-eyed Grass	
Juncaceae - Rush Family			
	Juncus bolanderi	Bolander's Rush	
	Juncus bufonius	Toad Rush	
	Juncus covillei	Coville's rush	
	Juncus effusus subsp. pacificus	Pacific rush	
	Juncus patens	Common Rush	
	Juncus tenuis		
	Juncus xiphioides		
	Luzula comosa	Wood Rush	
Liliaceae - Lily Family			
	Calochortus amabilis	Diogenes' lantern	
	Calochortus tolmei	Pussy Ears	
	Clintonia andrewsiana	clintonia	
	Erythronium californicum	fawn lily	
	Lilium pardalinum	Leopard Lily	
	Prosartes hookeri (Disporum hookeri)	Hooker's fairybell	
	Scoliopus bigelovii	fetid adders tongue	
Melanthiaceae - False-Hellebore Family			
	Toxicoscordion fremontii (Zigadenus fremontii)	death camus	
	Trillium ovatum	western trillium	
	Veratrum californicum var. californicum *	corn lily	
	Xerophyllum tenax	bear-grass	
Orchidaceae - Orchid family			
	Calypso bulbosa	calypso orchid	
	Corallorhiza maculata	spotted coralroot	
	Epipactis gigantea	Streamside Orchid	
	Piperia candida 1B.2	white flowered piperia	
Poaceae - Grass Family			
	Agrostis capillaris	colonial bent	x
	Agrostis exarata		
	Aira caryophyllea	silver European hairgrass	x
	Anthoxanthum occidentale (Hierochloe occidentalis)	sweet grass	
	Anthoxanthum ordoratum	sweet vernal grass	x
	Avena barbata	slender wild oat	x
	Avena fatua *		x
	Briza maxima	big quaking grass	x
	Briza minor	little quaking grass	x
	Bromus carinatus var. carinatus	California brome	
	Bromus diandrus	ripgut brome	x
	Bromus hordeaceus	soft chess	x
	Bromus laevipes	Woodland Brome	
	Bromus madritensis var. madritensis	foxtail chess	x
	Bromus sterilis	poverty brome	x
	Bromus vulgaris		
	Calamagrostis rubescens	pine grass	
	Cortaderia jubata	Jubata Grass	x*
	Cynosurus echinatus	hedgehog dogtail	x

	Dactylis glomerata	orchard grass	x
	Danthonia californica	California oatgrass	
	Deschampsia elongata	slender hairgrass	
	Elymus caput-medusae (Taeniatherum caput-medusae)	medusahead	x*
	Elymus glaucus ssp. glaucus	blue wildrye	
	Festuca arundinacea	Tall Fescue	x
	Festuca bromoides	brome fescue	x
	Festuca californica	California Fescue	
	Festuca microstachys		
	Festuca occidentalis	western fescue	
	Festuca perennis (Lolium multiflorum)	Italian ryegrass	x
	Festuca subuliflora		
	Gastridium phleoides (G. ventricosum)	nit grass	x
	Holcus lanatus	common velvet grass	x
	Melica geyeri		
	Melica hardfordii		
	Melica subulata	Alaskan Oniongrass	
	Poa annua	annual bluegrass	x
	Poa trivialis	rough bluegrass	x
	Rytidosperma penicillatum (Danthonia pilosa)	hairy oatgrass	x
	Stipa lepida (Nassella lepida)		
	Stipa pulchra (Nassella pulchra)	purple needlegrasss	
	Stipa miliacea (Piptatherum miliaceum)	smilo grass	x
	Trisetum canescens	smooth trisetum	
Ruscaceae - Buthcher's-Broom Family			
	Maianthemum racemosum (Smilacina racemosa)	branched false solomon's seal	
Themidaceae - Brodiaea Family			
	Brodiaea elegans subsp. elegans	harvest brodiaea	
	Dichelostemma capitatum ssp.capitatum	blue dicks	
	Dichelostemma congestum	ookow	
	Triteleia laxa	Ithuriel's spear	

Appendix B: Potential Rare Species within the Gualala River Forest

Query from 12 quads centered on McGuire and Gube Mtn. USGS quads.

CNPS Electronic Inventory (8th Ed.) accessed 5/8/2013

Those in bold confirmed in the GRF

Scientific Name	Common Name	Family	Rank	State	Global
Agrostis blasdalei	Blasdale's bent grass	Poaceae	1B.2	S2	G2
Astragalus agnicidus	Humboldt County milk-vetch	Fabaceae	1B.1	S3	G3
Astragalus breweri	Brewer's milk-vetch	Fabaceae	4.2	S3.2	G3
Calochortus raichei	The Cedars fairy-lantern	Liliaceae	1B.2	S2	G2
Astragalus rattanii var. rattanii	Rattan's milk-vetch	Fabaceae	4.3	S3.3	G4T3
Calamagrostis bolanderi	Bolander's reed grass	Poaceae	4.2	S3.2	G3
Calystegia purpurata ssp. saxicola	coastal bluff morning-glory	Convolvulaceae	1B.2	S2.2	G4T2
Campanula californica	swamp harebell	Campanulaceae	1B.2	S3	G3
Carex californica	California sedge	Cyperaceae	2.3	S2?	G5
Carex saliniformis	deceiving sedge	Cyperaceae	1B.2	S2.2	G2
Castilleja mendocinensis	Mendocino Coast paintbrush	Orobanchaceae	1B.2	S2.2	G2
Ceanothus confusus	Rincon Ridge ceanothus	Rhamnaceae	1B.1	S2.2	G2
Coptis laciniata	Oregon goldthread	Ranunculaceae	2.2	S3	G4G5
Cuscuta pacifica var. papillata	Mendocino dodder	Convolvulaceae	1B.2	S1	G5T1
Erigeron biolettii	streamside daisy	Asteraceae	3	S3?	G3?
Erigeron supplex	supple daisy	Asteraceae	1B.2	S2	G2
Eriogonum cedrorum	The Cedars buckwheat	Polygonaceae	1B.3	S1	G1
Erysimum concinnum	bluff wallflower	Brassicaceae	1B.2	S3	G3
Fritillaria roderickii	Roderick's fritillary	Liliaceae	1B.1	S1	G1Q
Gilia capitata ssp. tomentosa	woolly-headed gilia	Polemoniaceae	1B.1	S2	G5T2
Glyceria grandis	American manna grass	Poaceae	2.3	S2	G5
Harmonia guggolziorum	Guggolz' harmonia	Asteraceae	1B.1	S1	G1

Hesperevax sparsiflora var. brevifolia	short-leaved evax	Asteraceae	1B.2	S2S3	G4T2T3
Hesperocyparis pygmaea	pygmy cypress	Cupressaceae	1B.2	S2	G2
Horkelia marinensis	Point Reyes horkelia	Rosaceae	1B.2	S2.2	G2
Horkelia tenuiloba	thin-lobed horkelia	Rosaceae	1B.2	S2.2	G2
Lasthenia californica ssp. bakeri	Baker's goldfields	Asteraceae	1B.2	SH	G3TH
Lasthenia californica ssp. macrantha	perennial goldfields	Asteraceae	1B.2	S2.2	G3T2
Lathyrus palustris	marsh pea	Fabaceae	2.2	S2S3	G5
Lilium maritimum	coast lily	Liliaceae	1B.1	S2	G2
Lotus formosissimus	harlequin lotus	Fabaceae	4.2	S3.2	G4
Lupinus sericatus	Cobb Mountain lupine	Fabaceae	1B.2	S2.2	G2
Lycopodium clavatum	running-pine	Lycopodiaceae	4.1	S4.1	G5
Piperia candida	**white-flowered rein orchid**	**Orchidaceae**	**1B.2**	**S2**	**G3?**
Sidalcea calycosa ssp. rhizomata	Point Reyes checkerbloom	Malvaceae	1B.2	S2.2	G5T2
Sidalcea malachroides	maple-leaved checkerbloom	Malvaceae	4.2	S3S4.2	G3G4
Sidalcea malviflora ssp. purpurea	purple-stemmed checkerbloom	Malvaceae	1B.2	S2.2	G5T2
Streptanthus glandulosus ssp. hoffmanii	Hoffman's bristly jewel-flower	Brassicaceae	1B.3	SH	G4TH
Tracyina rostrata	beaked tracyina	Asteraceae	1B.2	S1S2.2	G1G2
Trifolium buckwestiorum	**Santa Cruz clover**	**Fabaceae**	**1B.1**	**S2**	**G2**
Veratrum fimbriatum	fringed false-hellebore	Melanthiaceae	4.3	S3.3	G3

APPENDIX B

CNPS California Native Plant So Rare and Endangered Plant Inventory

Plant List

4 matches found. *Click on scientific name for details*

Search Criteria

Found in Quad 38123G4

Scientific Name	Common Name	Family	Lifeform	Rare Plant Rank	State Rank	Global Rank
Campanula californica	swamp harebell	Campanulaceae	perennial rhizomatous herb	1B.2	S3	G3
Horkelia tenuiloba	thin-lobed horkelia	Rosaceae	perennial herb	1B.2	S2.2	G2
Lycopodium clavatum	running-pine	Lycopodiaceae	perennial rhizomatous herb	4.1	S4.1	G5
Veratrum fimbriatum	fringed false-hellebore	Melanthiaceae	perennial herb	4.3	S3.3	G3

Suggested Citation

California Native Plant Society (CNPS). 2013. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society. Sacramento, CA. Accessed on Friday, August 09, 2013.

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APPENDIX C

APPENDIX C: NORTHERN SPOTTED OWL LIFE HISTORY AND HABITAT INFORMATION

The spotted owl is a medium-sized owl, about 20 inches long with an average wingspan of 40 inches. Spotted owls have large dark eyes, lack ear tufts and the legs and feet are fully feathered. The spotted owl's diet generally consists of rodents and small birds with a smaller component of other various animals such as insects, bats and lizards (Forsman 1984). Spotted owls hunt for food or forage by perching and swooping on prey items. The spotted owl's range occurs from southern British Columbia to the southern part of the Sierra Madre Occidental and Oriental mountains in Mexico. The spotted owl is comprised of three subspecies within this range. The Mexican spotted owl's range is the largest occurring from the southern Rocky Mountains in Colorado; the Colorado Plateau in southern Utah; southward through Arizona, New Mexico, and far western Texas; in Mexico through the Sierra Madre Occidental and Oriental mountains and the southern end of the Mexican Plateaus range. The California spotted owl occurs throughout the Sierra Nevada mountain range in addition to the coastal mountain ranges of southern California north to the San Francisco peninsula. The Northern spotted owl range is north of the San Francisco peninsula throughout the coastal and inland ranges of California and throughout the coastal and Cascade mountain ranges of Oregon and Washington to southern British Columbia. The redwood region accounts for only about 9% of the northern spotted owl's range.

The northern spotted owl (hereafter referred to as NSO) was listed as a threatened species under the Endangered Species Act (ESA) in 1990 as concern mounted over the continuing loss of habitat NSOs appeared to require for survival and reproductive success (Federal Register 1990). As part of the ESA listing, landowners within the range of the NSO were required to survey for their presence if any kind of habitat-altering activities were proposed. The United States Fish and Wildlife Service (USFWS) is in charge of administering and consulting with species protected under the ESA. The USFWS developed a protocol for surveying for NSOs in 1991 and revised it in 1992. Subsequently, in 2011 the USFWS developed an updated protocol primarily intended to address the presence of barred owls. Additional minor revisions to the protocol were made in 2012. In August 2013, the California Fish and Game Commission designated the NSO as a "candidate" species for listing under the California Endangered Species Act (CESA). "Candidate" species still receive protection under CESA, and at this time, it is uncertain what regulatory changes may result from this new listing status.

Northern Spotted Owl Survey Procedures

Northern spotted owl surveys are currently required to be conducted in conformance with the 2012 revision of the 2011 USFWS NSO survey protocol. The USFWS NSO survey protocol requires landowners within the range of the northern spotted owl to survey areas for NSO presence if any "habitat altering, or significant disturbance" project is proposed. The method of surveying for presence requires covering the project area with survey stations spaced approximately ¼ - ½ mile apart. Each survey station is "called" for 10 minutes using a digital calling device that plays recorded NSO vocalizations.

Survey stations are called between sunset and sunrise, and the permitted survey season is March 1-August 31. The protocol requires six survey visits per year to the project area for two years prior to commencing project operations. If NSO are detected during nighttime surveys, daytime follow-up surveys are conducted in order to determine if there is a NSO territory in the area of the detection. If NSO are found during daytime surveys, they are offered mice, and the fate of these mice is recorded in order to determine reproductive status (i.e., whether a NSO territory is nesting or not).

The current survey methodology utilized across The Conservation Fund's (TCF's) entire North Coast ownership differs slightly from the USFWS protocol in that surveys are conducted ownership-wide rather than on a project-specific basis. In essence, the entire ownership is treated as individual project areas under the USFWS protocol. All other provisions in the 2012 USFWS survey protocol related to the conduct of surveys (i.e. spacing of survey visits, number of survey visits, weather constraints, follow-up visits, reproductive status determination, etc.) are followed. Conducting surveys in this manner has helped develop a better understanding of the dynamics of the NSO population throughout TCF's North Coast ownership. Annual ownership-wide surveys have better allowed TCF to identify when NSO activity centers move and when new NSO territories become established. This helps track and identify key areas for protection and minimizes the likelihood that a given project will result in the take of an NSO.

Habitat Requirements and Regulations

When the NSO was listed under the ESA in 1990, it was generally believed they required large tracts of old growth or late-seral stage forests for survival and reproductive success (Thomas et al., 1990). This was primarily a result of interpreting habitat conditions that existed around nest sites; at the time, little was known about the habitat used or needed for foraging (LaHaye et al., 1999). Recent studies have shown NSOs require a mixture of forest conditions for reproductive success and long-term survival (Franklin, 2000 and Irwin et al., 2000). Generally, NSOs require nesting habitat that consists of well-stocked, mixed conifer-dominated, dense canopy stands often close distances to year-round water and riparian habitat (Irwin et al., 2007). These stands can be of varying ages, but what is important is retained structure from older stands (Forsman et al., 1984; Solis and Guitierrez, 1990; Ripple et al., 1991; Lehmkuhl and Raphael, 1993; Hunter et al., 1995; Meyer et al., 1998). Features including branch deformities, cavities, mistletoe clumps, broken tops, debris platforms, and old squirrel, vole and raptor nests provide nesting possibilities within such stands (Blakesley et al., 1992 and Thome et al., 1998). Also, factors such as north facing slopes, providing cooler temperatures during the breeding season and areas on the lower 1/3 of slopes also seem to provide refuge from adverse environmental conditions (Irwin et al., 2007). NSOs can utilize a wide range of prey species across their range; however, in the redwood region the main prey item is the dusky-footed woodrat (Ambrose, 1991 and Mendocino Redwood Company, 1989, 2001 unpublished). In the redwood region dusky-footed woodrats occur in high densities in early successional stages, "brushy-stage" clearcuts and in the ecotones between late and early successional forests (Franklin et al., 2000). The distance relationship between stand conditions used by NSOs for nesting and foraging may well determine whether NSOs will occupy a site and/or have reproductive success. It is presumed that if NSOs have to

travel great distances between nest sites and foraging locations, it may result in poor reproductive success or exclusion of NSOs from an area altogether (Franklin et al., 2000 and Irwin et al., 2007).

The USFWS defines NSO habitat as the following:

- Nesting/roosting habitat: ≥ 60% canopy cover of trees ≥ 11" DBH (diameter at breast height) and ≥ 100 square feet of basal area of trees ≥ 11" DBH
- Foraging habitat: ≥ 40% canopy cover of trees ≥ 11" DBH and ≥ 75 square feet of basal area of trees ≥ 11" DBH
- Non-suitable Habitat: ≤ 40% canopy cover of trees ≥ 11" DBH and ≤ 75 square feet of basal area of trees ≥ 11" DBH.

The Gualala River Forest is composed of a relatively continuous landscape of closed canopy 45-55 year-old timber. The dominant tree species are sugar pine, Douglas-fir, and redwood, and there is a substantial component of mixed hardwood species, primarily tanoak. No late-seral stage stands are present on the property, but a few scattered individual residual old growth trees remain. Using the USFWS habitat definitions, the majority of the property is most likely foraging habitat, with scattered patches of nesting/roosting habitat focused primarily along riparian areas.

NSO take avoidance for Timber Harvest Plans on the Gualala River Forest will most likely be demonstrated through 14 CCR 919.9(e) of the California Forest Practice rules which require the plan submitter to consult with the USFWS. The Arcata, California office of the USFWS has prepared a set of guidelines that landowners within the coast redwood region must follow in order to ensure that the take of NSO through timber operations does not occur. The March 15, 2011 version of the Northern Spotted Owl Take Avoidance Analysis and Guidance for the California Coast Forest District ("Attachment A") outlines habitat protection measures and operational restrictions applied to known NSO sites. Revisions to the "Attachment A" guidelines are commonly made every few years. Protection measures are focused around each NSO territory's activity center. Each territory's activity center is generally that territory's most recent nest site or the most recent roost location, if no nest site is known. Under the "Attachment A" guidelines, a 100-acre core area polygon composed of the best available suitable habitat (preferably nesting/roosting) is delineated contiguous with each territory's activity center. Generally speaking, timber harvest is prohibited within each NSO territory's core area. Additionally, within 0.7 mile of each NSO activity center, at least 500 acres of suitable NSO habitat (nesting/roosting or foraging) and at least 200 acres of this habitat must be nesting/roosting habitat.

Silvicultural Objectives and Habitat Development

TCF's principal silvicultural objectives are to grow large high-quality trees, increase structural complexity and natural diversity and establish a high level of sustainable timber production through selective (individual tree and group selection) harvests. These measures should maximize [volume and] value growth [within the constraints of an

unevenage management philosophy] and develop and maintain important late-seral habitat characteristics for wildlife and non-timber forest vegetation. “Crop tree” target diameters are 30 to 36 inches for redwood and 22 to 28 inches for Douglas-fir. Forest management will seek to ensure that late-seral ecological functions and processes are present within a managed forest. Ultimately, these measures are intended to develop stands that have high canopy closure, some large mature trees, and a high degree of structural diversity, which should ensure that NSO nesting/roosting habitat is maintained and developed over time. Additonally, active timber management that creates some canopy gaps and stimulates understory vegetation growth will ensure that high quality foraging habitat is present.

Gualala River Forest NSO Survey Summary

Historically, NSO surveys on the Gualala River Forest have been somewhat inconsistent. Throughout the 1990’s-mid 2000’s surveys were conducted on a timber harvest plan specific basis and little effort was made to monitor known NSO territories for occupancy and reproductive status. Since acquiring the property, TCF has implemented a more intensive survey design. A total of 80 survey stations have been installed across the ownership and these stations were called 6 times in both 2012 and 2013 in order to “blanket call” the entire ownership. It is planned to continue “blanket calling” the ownership in the near future, but this intensive survey strategy may be reconsidered once a more extensive survey history is developed.

Surveys in 2012 and 2013 identified one NSO territory located on the ownership and one territory located immediately off property. This is a rather low density of NSO territories compared to other portions of the redwood region. The reasoning for this low NSO density is not wholly clear and is likely indicative of a variety of interacting factors. Other landowners in the redwood region have noted a west-east trend in NSO density with lower NSO densities in the east and higher densities in the west, likely due to changing climatic conditions and vegetation types. The Gualala River Forest is located further east and is characterized by a hotter drier climate than other portions of the redwood region where the NSO density is higher. Additional years of surveys are needed in order to develop a better understanding of the status of the NSO population on this property.

Additional Threats to NSOs

Aside from the habitat issues associated with NSO reproduction and survival, there is a more ominous threat to NSOs emerging, which is the invasion of the barred owl into the range of the NSO. Barred owls are in the same genus as NSOs and occupy a similar niche, competing for many of the same prey resources and nesting sites. Antagonistic behavior between barred owls and NSO is well documented throughout the Pacific northwest (Courtney et al., 2004 and Olson et al., 2005). Barred owls are displacing NSOs (Kelly et al., 2003) as well as suppressing the calling behavior of NSOs, which can make NSO survey efforts increasingly difficult and possibly ineffective (Crozier et al., 2006). In the last decade, the number of barred owls in Mendocino County has steadily

increased. Barred owls have been detected during NSO surveys across TCF's ownership and have either displaced or impaired the ability to detect NSO on the Salmon Creek and Garcia River Forest properties. No barred owls have yet been detected on the Gualala River Forest. However, there are known nearby barred owl sites on TCF's Garcia River property and the Mailliard Redwoods State Reserve, so it is likely barred owls will be found on the Gualala River Forest in the near future. In other portions of the redwood region, experimental barred owl removal trials have been partially successful at allowing NSO to re-occupy sites where they were previously displaced (Diller et al., 2012). Recent studies also suggest management activities, such as the creation of 15-25 acre patches of early seral hardwoods in close proximity to known barred owl nests and preferential removal of redwood during thinning in young stands, may provide habitat conditions that NSO are better adapted to exploit than barred owls (Irwin et al., 2013). Barred owl management activities may be considered if NSO displacement continues to become problematic and if permitting opportunities exist.

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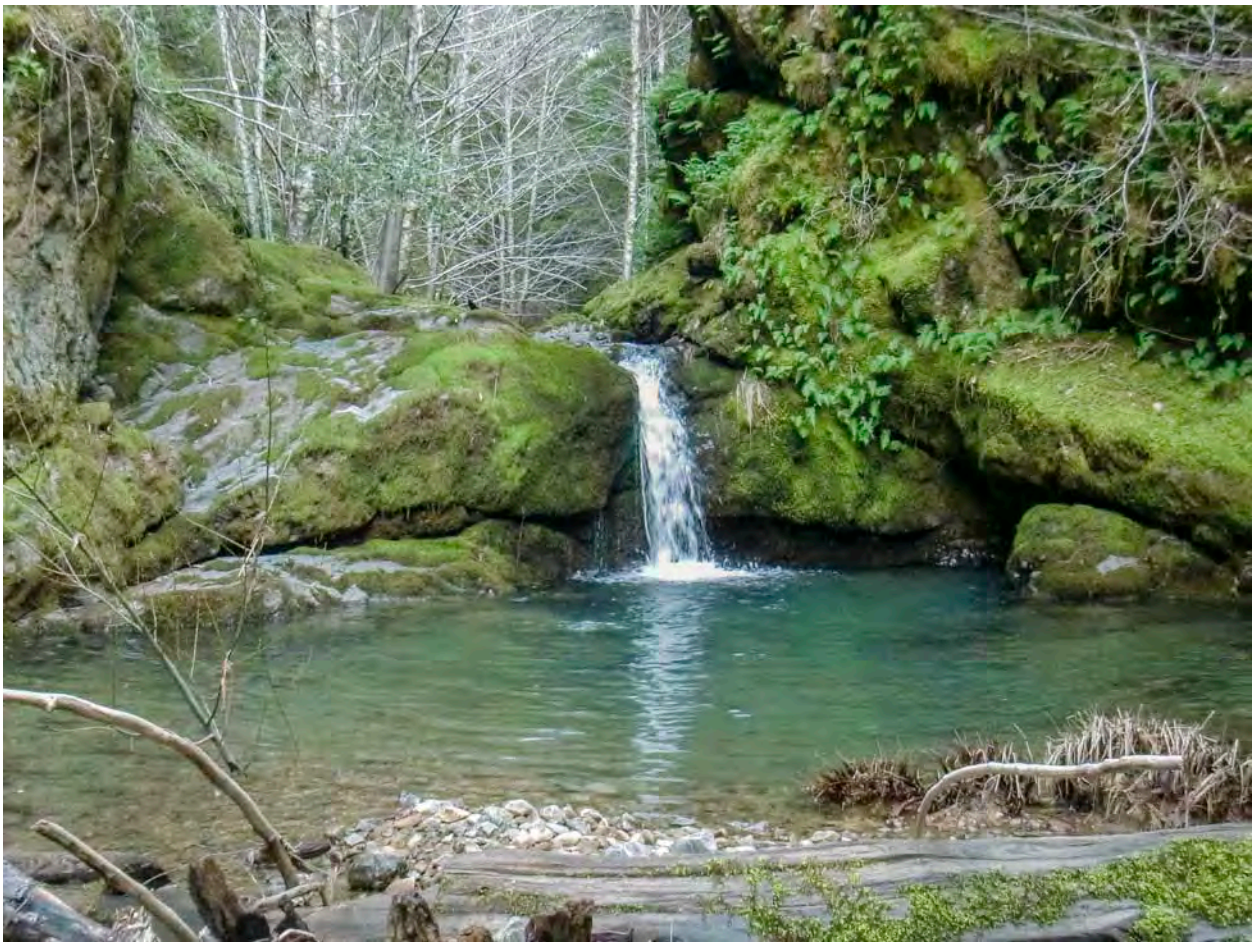
APPENDIX D

Gualala River Forest

Aquatic Management Plan



Bear Creek
Gualala River

Prepared for

The Conservation Fund

Prepared by

The Gualala River Watershed Council
P.O. Box 1269
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August, 2013

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Background

The aquatic management plan for the Gualala River Forest relies on a synthesis of information derived from a number of Gualala River watershed plans that include watershed assessments and the analysis of watershed limiting factors already completed in the Gualala River watershed.

2003 Gualala River Watershed Synthesis Report by the North Coast Watershed Assessment Program (NCWAP) (Klamt, et al, 2003), the Gualala River Watershed Council Cooperative Monitoring Program (GRWC, 2012), the Gualala Estuary and Lower River Enhancement Plan (ECORP Consulting, Inc. *et al*, 2005), Final Recovery Plan for Central California Coast coho salmon (Oncorhynchus kisutch) Evolutionarily Significant Unit (NOAA, 2012) and the Gualala River Watershed Technical Support Document for Maximum Daily Load for Sediment (NCRWQCB, 2001).

The focus of this plan is on the salmonid species known to or currently inhabiting the Gualala River watershed (steelhead (*Oncorhynchus mykiss* and coho salmon: *Oncorhynchus kisutch*). Selecting an analyzed species to be used for evaluating the impacts of watershed activities on a range of native aquatic species is an accepted premise. In California North Coast watersheds, salmonids are used as an indicator of watershed and ecosystem health and information and management recommendations provided throughout this plan are predominantly relevant to salmonid habitat and populations.

For the development of this plan it is not necessary to discuss the entirety of all studies and processes involved. Rather the purpose is to establish that certain stream conditions are commonly recognized to influence salmonid production in most watersheds throughout this region, and they are generally well recognized in peer reviewed articles and publications.

Gualala River Watershed Overview

Located in both Mendocino and Sonoma Counties, the Gualala River drains 685 miles of streams in the northern California Coastal Ranges. The river enters the Pacific Ocean south of the town of Gualala, 114 miles north of San Francisco and 17 miles south of Point Arena. At 212,563 acres (332 mi^2) it is one of the largest watersheds in the Mendocino Coast Hydrological Unit. The watershed is elongated, running over 32 miles long north-south, with an average width of 14 miles. The entire basin lies within 20 miles of the Pacific Ocean. Elevations vary from sea level to 2,602 feet at Gube Mountain and terrain is most mountainous in the northern and western parts of the basin.

The watershed has a rural population of 3,419 centered near four unincorporated communities; Gualala, Sea Ranch, Annapolis and Stewarts Point. The economic viability of the area has long depended on timber and agriculture as a main source of employment with 80% of all the watershed lands zoned for timber production.

The climate is influenced by fog near the coast with seasonal temperatures ranging between 40°F to 60°F, with the interior basin ranging from below freezing to over 90 (F) degrees seasonally. Rainfall also varies by location within the basin with 33 inches falling on average near the town of Gualala and totals reaching over 63 inches in some areas within the interior. Coastal conifer forests of redwood and Douglas fir occupy the northwestern, southwestern and central portions of the watershed while oak-woodland and grassland cover many slopes in the interior basin.

A long history of movement along the San Andreas Fault and the Tombs Creek Fault has been a dominant force in the shaping of the basin. The sub-watersheds, largely fault controlled, flow through primarily steep valleys with little or narrow floodplains.

The Gualala watershed is typical of North Coast watersheds that have geology prone to storm induced erosion events. Kelsey et al. (1981) state that watersheds in "The California Coast Ranges between San Francisco and the Oregon border contain the most rapidly eroding, large order, non-glaciated drainage basins of comparable size in the United States (Judson and Ritter, 1964). The combination of the underlying pervasively sheared and often folded Franciscan rocks (Bailey et. al., 1964), recent uplift, and a distinctive climate accounts for the large sediment yields." Suspended sediment and turbidity are elevated for periods of time during the high runoff, rainy season (NCRWQCB, 2001)

The five principal Gualala sub-basins in order of size are the Wheatfield Fork (37% of drainage), South Fork and Gualala main-stem (21%), North Fork (16%), Buckeye Creek (14%), and Rockpile Creek (12%). The main-stem extends only from the convergence of the North Fork and South Fork to the ocean, with much of this reach comprising the estuary or lagoon. This stretch of the Gualala River was designated "Wild & Scenic" by the State of California in 2003.

Map 1: Overview of Gualala River Forest

Extensive logging and road building practices in this fragile and highly erosive landscape have contributed to erosion and mass wasting, producing a legacy of increased sediment loads severely impacting aquatic habitat in the Gualala and its tributaries. Data collected in stream channels throughout the watershed show channel grading and simplification due to amplified sediment inputs.

Large scale tractor logging projects in the 1950s and early 1960s created a network of unstable truck and tractor roads. Logging practices at the time also removed over-story shade canopy from primary anadromous spawning grounds. The removal of coniferous species in the riparian corridors has resulted in a lack of mature riparian for woody debris recruitment and thus a lack of deep pools with shelter needed for salmon and steelhead summer rearing habitat.

The Gualala River lies within the Central California Coast Coho salmon Evolutionary Significant Unit (ESU), which is listed as endangered under the Endangered Species Act (NMFS 2005). Critical habitat includes all river reaches and estuarine areas accessible to Coho salmon within the ESU's geographic area (NMFS, 1999). Winter run steelhead in the Gualala river basin are part of the Northern California Steelhead Distinct Population Segment (DPS) and are listed as threatened under the Federal ESA (NMFS, 2006).

In 1993, the USEPA listed the Gualala River on its federal Clean Water Act §303(d) list of impaired water bodies due to declines in anadromous salmonids from excessive sedimentation. The listing was updated

in 2003 and water temperatures in the basin are now considered impaired as well. *A Technical Support Document (TSD) for the Total Maximum Daily Load for the Gualala* was completed by the North Coast Regional Water Quality Control Board (NCRWQCB) in 2001.

Coho naturally inhabited the streams flowing from coniferous forest but were likely sub-dominant to steelhead in interior basin areas draining the mélange due to the more open nature of the channels, less suitable habitat, and naturally warmer stream temperatures. The interior basin is largely grassland with scattered oaks. Surface water in this area generally lack shade and is warmed with abundant sunshine.

The watershed has produced timber since before the turn of the last century and presently timber and ranching are still the main land use. In recent years timber land conversions to rural subdivisions and vineyards has increased in the Buckeye Creek, the Wheatfield Fork and the South Fork Super Planning Watersheds. Aggregate mining occurs on the South Fork between the Wheatfield Fork and the North Fork.

Gualala River Forest Overview

The Gualala River Forest encompasses 13, 281 acres (21 mi^2) in both the North Fork and the Rockpile Creek Super Planning Watersheds (SPW) within the Gualala basin. The entire ownership is within Mendocino County and spans an area from the northern boundary of the watershed, Fish Rock Rd., south to the Sonoma County line. The property is situated centrally, east to west, within the watershed, with the eastern boundary extending into the Tombs Creek fault zone.

Overall, the ownership represents 6% of the Gualala River watershed and contains 20 miles of fish bearing streams. Fish bearing streams within the ownership included two main-stem tributaries to the Gualala, the North Fork and Rockpile Creek; along with nine smaller tributaries that contain portions of stream reaches classified as CalFire Class I fish bearing streams.

Table 1.1: Gualala River Forest Acreage by Planning Watersheds

Gualala River Forest CalWater Planning Watersheds	Total Watershed Acres	Total Watershed Sq. Miles	Gualala Forest Total Acres	Gualala Forest Total Sq Miles	Gualala Forest Percent of Watershed
1113.8 Gualala River HSA	212,563	332.1	13,281	20.8	6.25%
Gualala River HSA (without coastal watersheds)	190,992	298.4	13,281	20.8	6.95%
1113.81 North Fork SPWS	30,654	47.9	7,925	12.4	25.85%
113.81012 Robinson Creek PWS	8,792	13.7	1,982	3.1	22.54%
113.81011 Stewart Creek PWS	6,585	10.3	4,392	6.9	66.70%
113.81010 Billings Creek PWS	10,650	16.6	1,551	2.4	14.56%
1113.82 Rockpile SPWS	22,403	35.0	5,356	8.4	23.91%
113.82013 Lower Rockpile PWS	2,946	4.6	2	0.0	0.07%
113.82012 Redrock PWS	2,219	3.5	1,561	2.4	70.35%
113.82011 Middle Rockpile PWS	8,165	12.8	3,793	5.9	46.45%

Historically coho salmon were most likely present within both sub-basins of the ownership. In 1960s and 1970s the California Department of Fish and Wildlife (CDFW) conducted stream surveys on the North Fork main-stem from the confluence to the headwaters, steelhead trout and coho salmon were present throughout the stream system (Bill Cox, 1994). Historical surveys were not conducted in the Rockpile Creek sub-basin but steelhead have been observed.

Vegetation in the sub-basins is primarily conifer forest comprised of coast redwood (*Sequoia sempervirens*) and Douglas fir (*Pseudotsuga menziesii*). The primary constituents of the riparian canopy are coast redwood, Douglas-fir, red alder (*Alnus rubra*) and willow (*Salix* Spp.), all of which is nearly continuous throughout the main-stem stream network.

In 1997 Coastal ForestLands the previous landowner, conducted a Watershed and Aquatic Habitat Assessment and indentified sedimentation, large woody debris (LWD) and riparian canopy/temperature as key factors causing significant adverse impacts on salmonids. These factors have been confirmed in more recent assessments.

In general, the highest priority recommendations for restoration within the ownership are decrease anthropogenic sediment delivery to watercourses by upgrading, decommissioning, and abandoning forest and ranch roads. Improve sediment metering, pool density, depths, and shelter ratings by increasing the abundance of in-stream large wood. Protect riparian buffers and increase in-channel canopy density in selected areas of the main-stems and tributaries of Rockpile Creek and the North Fork (NMFS 2012, GRWC 2012, Klamt, et al 2003, NCRWQCB, 2003).

Aquatic Species

Three anadromous fish species and five fresh water species, including the Gualala Roach which is endemic to the Gualala, are commonly found in the fresh water environment of the Gualala River (Table 1.2). All species, excluding coho are commonly observed in most Class I watercourses in the basin. Pacific Lamprey has been observed but other lamprey species (River and Western Brook Lamprey) which may be present in the watershed have not been documented. There is very little evidence that Chinook salmon ever inhabited the watershed.

COHO SALMON (*ONCORHYNCHUS KISUTCH*)

The Gualala River watershed hosts one of the few Functionally Independent Populations (FIPs) of the Central California Coast Coho (Spence et al., 2008) and has the highest Intrinsic Potential (IP), excluding the Russian River, of all the coastal watersheds for possible recovery of the California Central Coast Coho ESU (NMFS, 2012).

Coho need riverine habitats that include cool clean water, appropriate water depth and flow velocities, riparian vegetation to stabilize soil and provide shade, clean gravel for spawning and egg-rearing, large woody debris to provide resting and hiding places, adequate food and varied channel forms.

In the Gualala known coho habitat is limited to the North Fork basin and more likely, the Doty and Robinson Creek Planning watersheds where small and possibly not self-sustaining coho populations have been observed during snorkel and electrofishing surveys.

Neither accurate nor credible coho salmon population estimates have been conducted in the Gualala River watershed (Klamt et al, 2003). Electrofishing (10 Pool Protocol) data from 2001 indicated that coho salmon were absent and possibly extirpated from the Gualala basin (Coho Salmon Status Review, CDFG 2001), but coho young-of-the-year have been observed in the North Fork sub-basin and the Gualala River estuary during subsequent surveys and studies.

In 2002: coho young-of-the-year were observed in the North Fork sub-basin on McGann Gulch Creek, (R. Dingman, Gualala River Steelhead Project), and in Dry Creek (H. Alden, Gualala Redwoods, Inc.), both tributaries to the North Fork. Coho young-of-the-year were also observed on the Little North Fork and Doty Creek during electrofishing surveys (CDFG, 2002).

In 2003: in May during a Gualala River estuary sampling event a coho juvenile was found (ECORP Consulting, Inc. et al, 2005). Then again in June juvenile coho salmon were reported by NOAA fisheries personnel to have stranded immediately after an estuary summer breach event. Coho juveniles were found during the summer in tributaries of the North Fork during presence/absence snorkel surveys conducted by Wendy Jones (CDFG, 2004).

2004: juvenile coho where found in upper Dry Creek during snorkel surveys.

2005 to present: comprehensive surveys and/or studies that would lead to coho observations or population assessments were not conducted in the watershed during this period.

The last planting of coho salmon fingerlings in the watershed was in the Little North Fork tributary in 1998 (Klamt et al, 2003). With multiple sightings of juvenile coho continuing six (6) years later, it is highly probable that a remnant coho population exists in the Gualala.

STEELHEAD TROUT (*ONCORHYNCHUS MYKISS*)

Starting in the 1940s and continuing today Steelhead trout have been recreationally fished on the Gualala River. The California Department of Fish and Game conducted steelhead population surveys in 1976 and 1977 and found Steelhead populations to be 7,608 and 4,324 respectively.

In 1973, CDFG estimated that the steelhead population (for the entire system) was between 2,219 ("Park Hole") and 2,584 (estuary), based on recapture in two areas of the lower main-stem Gualala. The respective 95% confidence limits were 799-5,165 and 571-9,535. In 1974-75, CDFG estimated that the adult steelhead population was 7,608, with a 95% confidence interval of 6,126-10,379 (Boydstun, 1976b). In 1975-76 the population was estimated at 6,300 (Boydstun, 1976b). In 1977, CDFG estimated the winter steelhead population at 4,400 (Sheahan, 1991).

CDFG planted steelhead juveniles from the Mad River Hatchery in the Gualala River from 1972 through 1976, and then again from 1985 through 1989. A hatchery was operated by the Gualala River Steelhead Project (GRSP) in the late 1980s using native Gualala River brood fish that were caught by anglers. In 1994, the GRSP changed the emphasis of their program to rescue, rearing, and release.

Current adult steelhead population estimates for the Gualala River basin are not available. The GRWC currently conducts limited snorkel and spawning surveys with the goal of expanding the study scope to estimate watershed steelhead populations in the future.

In general, steelhead stocks throughout California have declined substantially. The most current estimate of the population of steelhead in California is approximately 250,000 adults, which is roughly half the adult population that existed in the mid-1960s (McEwan and Jackson 1996).

Throughout their range, steelhead typically remain at sea for one to four growing seasons before returning to fresh water to spawn (Burgner et al. 1992). Boydstun (1977) found that most Gualala River steelhead migrated to sea as two-year old fish and returned after spending two years in the ocean. However, steelhead occasionally exhibit other life history patterns: scale analysis of adults indicated that they spent from one to four years in fresh water and from one to three years in the ocean (Shapovalov and Taft 1954).

Steelhead do not necessarily migrate at any set age. Some individuals will remain in a stream, mature, and even spawn without ever going to sea, others will migrate to sea at less than a year old, and some will return to fresh water after spending less than a year in the ocean.

Steelhead habitat requirements are very similar to coho salmon. They need cool clean water and adequate flow for migration and summer rearing, clean gravels and cobble for spawning and winter refugia, deep pools with large wood for shelter, and healthy riparian vegetation for shade and nutrients.

Table 1.2: Aquatic Species Present or Potentially Occurring

Common Name	Species	Listing Status		
		California	CDFW	Federal
Fish				
Anadromous				
Coho salmon	Oncorhynchus kisutch	Threatened		Endangered
Steelhead trout	Oncorhynchus mykiss			Threatened
Pacific lamprey	Lampetra tridentata			
Freshwater				
Gualala Roach	Lavinia symmetricus parvipinnis		SSC*	
Coast range sculpin	Cottus aleuticus			
Prickly sculpin	Cottus asper			
Riffle sculpin	Cottus gulosus			
Threespine stickleback	Gasterosteus aculeatus			
Reptiles				
Northern Pacific Pond Turtle	Turtle Actinemys marmorata			
Western Aquatic Garter Snake	Thamnophis couchi			
Amphibians				
Coastal (Pacific) Giant Salamander	Dicamptodon tenebrosus			
Southern Torrent Salamander	Rhyacotriton variegatus		SSC	
Northwestern Salamander	Ambystoma gracile			
Rough-skinned Newt	Taricha granulosa			
Red-bellied Newt	Taricha rivularis			
Coast Range Newt	Taricha torosa		SSC	
Ensatina	Ensatina eschscholtzi			
Black Salamander	Aneides flavipunctatus			
Tailed Frog	Ascaphus truei		SSC	Threatened
Western Toad	Bufo boreas			
Pacific Treefrog	Hyla regilla			
California red-Legged Frog	Rana draytonii		SSC	Threatened
Foothill Yellow-legged	Frog Rana boylei		SSC	

**California Department of Fish and Wildlife Species of Special Concern*

Watercourse Location & Evaluation

The complexity of stream conditions within the two sub-basins and the clear differences between tributaries and main-stems makes it difficult to develop ownership-wide assessments and recommendations. In order to be specific this chapter provides information on streams in the context of CalWater Planning Watersheds within the North Fork and Rockpile Creek SPWs.

Sub-basins are prioritized, with those streams with high habitat quality for steelhead and coho salmon given highest priority. Criteria are: riparian condition, cool water temperatures, spawning gravel quality, pool frequency, depth, and complexity.

In addition to the synthesis of existing published assessments and the corresponding limiting factors reports and recommendations, data and analysis developed by the GRWC were used to evaluate current conditions. This includes:

- A stream coverage originally developed by Gualala Redwoods, Inc. uses a watershed wide digital elevation model and the GRID module of ESRI's ArcInfo. The streams are put into classes based on the watershed acres upslope. The product was compared to the mapped streams on Gualala Redwoods, Inc. property for calibration. The analysis is used to estimate culvert size based on a 100 year flood calibration and for designating stream classifications based on potential Class I fish bearing streams and potential Class II attributes, segmented into perennial and intermittent (IIa & IIb). The analysis corresponds to the classifications for the Big Watershed by CalFire's Fire and Resource Assessment Program where slope was the controlling factor.
- A road coverage combined all available GIS road layers. Knowledgeable people were then brought together to edit the maps and create a branching road identification system that gave roads in the watershed a unique and geographically logical identification number. The road systems were then "routed" and are connected to a database and manipulated based on the information about the condition of the road in the database.
- GRWC Cooperative Monitoring Program developed a Gualala River Watershed Monitoring Program Plan with a Quality Assurance Project Plan approved by the NCRWQCB, SWRCB, DWR and CalEPA for the Gualala River watershed. Thirty-five monitoring reaches have been installed in the watershed and 110 temperature monitoring sites. Surveys of thalweg elevations, cross-sections, riparian vegetation, canopy density, substrate, temperature, and large wood inventories have been conducted at these established sites over the past 15 years. The data collected on the physical condition of the watershed allows evaluation of ecological events, trends, effects of Best Management Practices and the analysis of the effectiveness of restoration projects.

Included in the planning watershed evaluations are restoration recommendations most often attributed to the Gualala Synthesis Report by the North Coast Watershed Assessment Program (Klamt, et al, 2003). These recommendations are also incorporated in the Final Recovery Plan for Central California Coast coho salmon (Oncorhynchus kisutch) Evolutionarily Significant Unit (NOAA, 2012) but are referenced back to NCWAP. In addition, a few specific recommendations are included in the individual stream evaluations.

Map 2: Stream Classifications

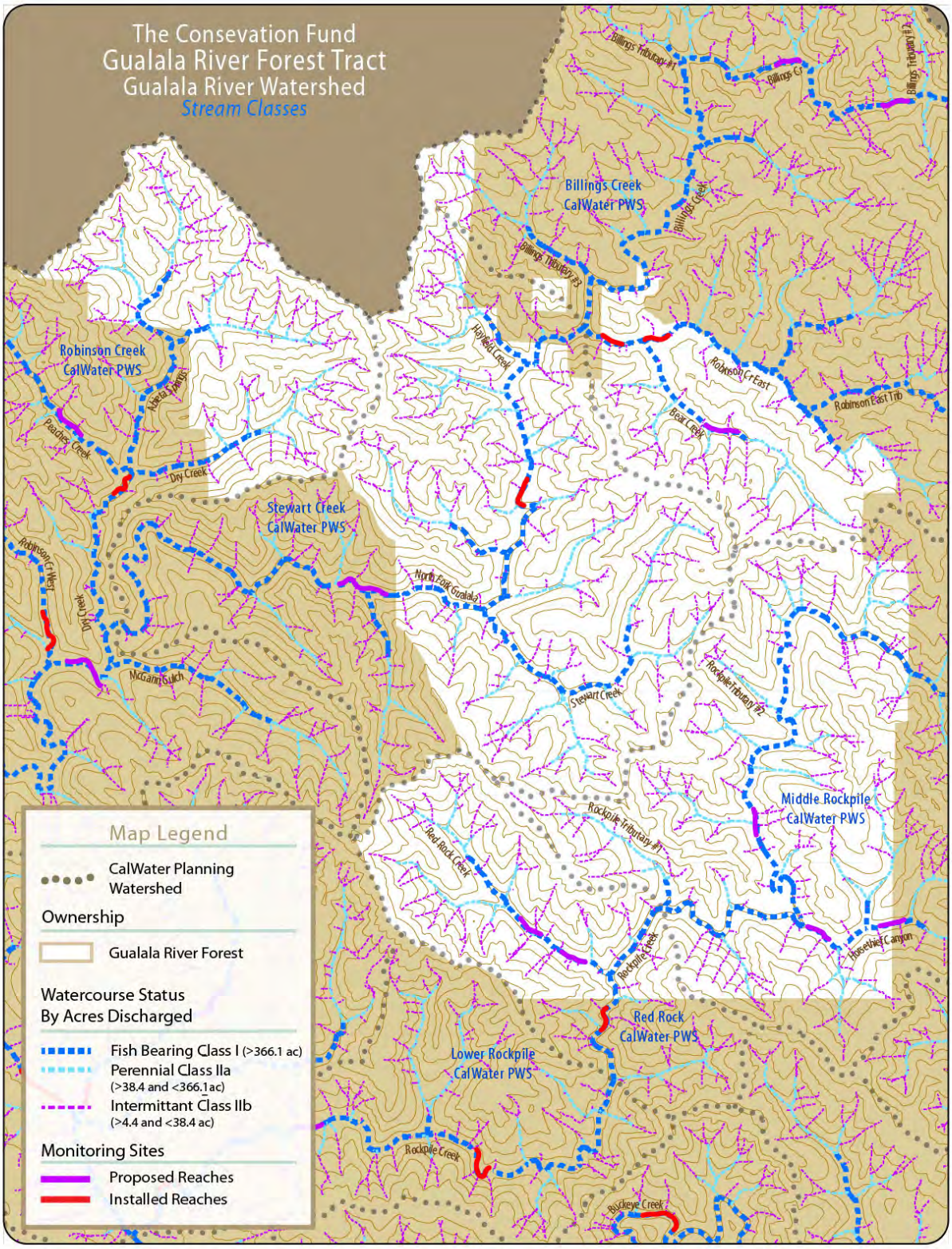
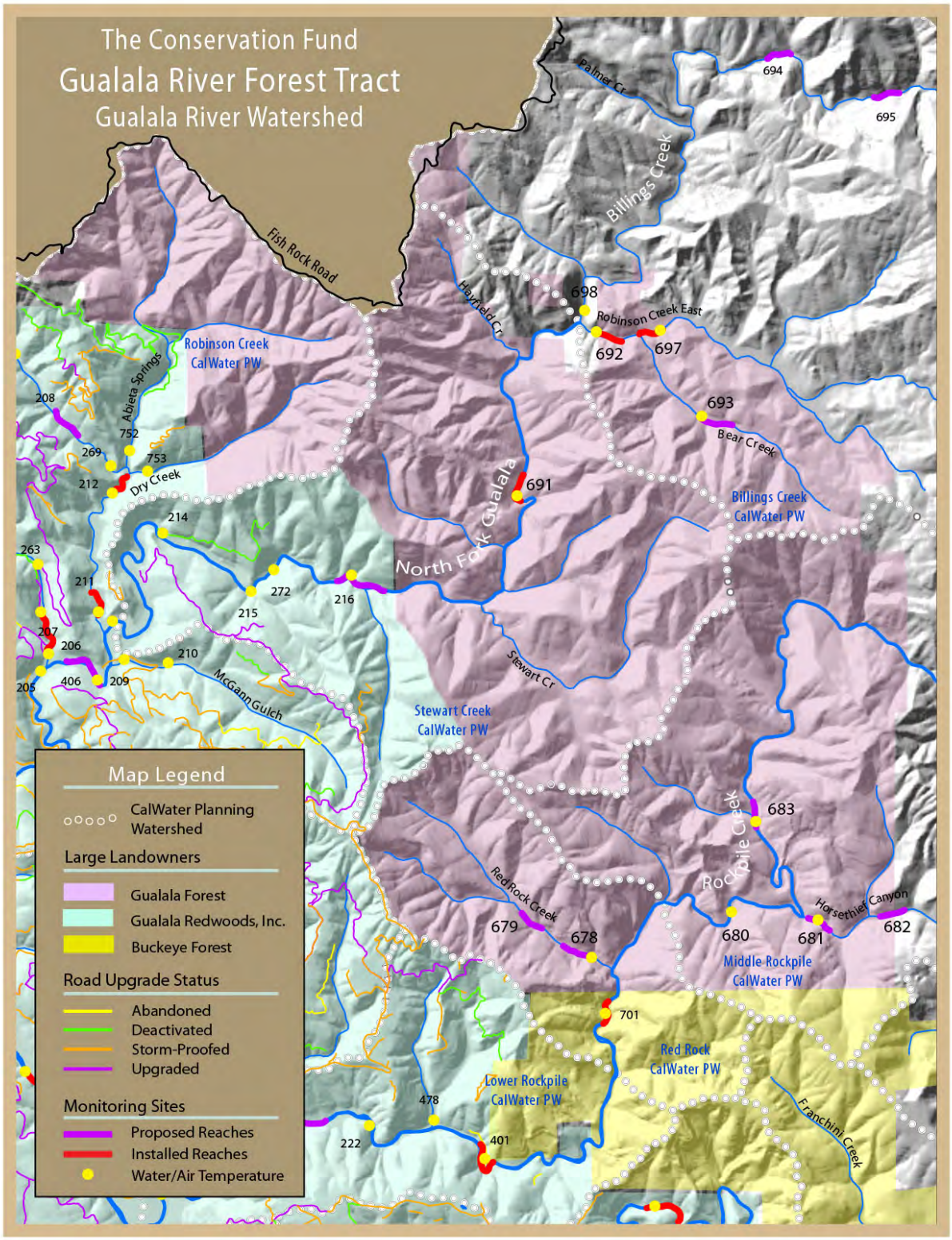


Table 1.3: Stream Class Designation

Gualala River Forest Stream Classifications* by PWS Planning Watersheds	Class I Stream Miles	Class IIa Perennial Miles	Class IIb Intermittent Miles
1113.81 North Fork Gualala SPWS			
113.81012 Robinson Creek PWS			
Gualala Forest	1.25	5.84	14.33
Other Landowners	14.73	11.29	41.81
Subtotal	15.98	17.13	56.14
113.81011 Stewart Creek PWS			
Gualala Forest	6.32	11.57	26.89
Other Landowners	4.81	3.50	11.84
Subtotal	11.13	15.07	38.73
113.81010 Billings Creek CalWater PWS			
Gualala Forest	2.73	3.10	9.45
Other Landowners	14.17	21.68	64.98
Subtotal	16.90	24.78	74.43
1113.82 Rockpile Creek SPWS			
113.82012 Red Rock CalWater PWS			
Gualala Forest	2.45	2.91	10.27
Other Landowners	0.79	1.66	4.84
Subtotal	3.24	4.57	15.11
113.82011 Middle Rockpile CalWater PWS			
Gualala Forest	7.17	9.47	22.81
Other Landowners	4.26	11.41	29.95
Subtotal	11.43	20.88	52.76

* Streams are designated by one of three classes based on the watershed acres upslope. The analysis is similar to the class designation by slope analysis completed by CalFire FRAP for the Big River watershed. Class I = Fish Bearing, Class = IIa Perennial Class II, Class IIb = Intermittent Class II.

Map 3: Gualala River Forest Detail and In-stream Monitoring Sites



NORTH FORK SPWS

The North Fork sub-basin (CalWater 2.2a 113.81, North Fork SPW) encompasses 47.9 square miles of private land in the northern region of the Gualala River Watershed. The main channel has a zig-zag pattern in response to faulting. Two major faults have influenced channel formation in the North Fork SPWS. The Tombs Creek Fault bisects the headwater channels and the San Andreas Fault runs along the lower portion of the main-stem. There are 127 miles of "blue line" streams, and five major tributaries: Little North Fork, Robinson Creek, Dry Creek, Stewart Creek, and Billings Creek. Predominant land uses include timber production, grazing, small vineyards, and some 40-acre and larger subdivisions in the headwaters.

At 7,925 acres the Gualala River Forest ownership is 26% of the North Fork basin spanning Robinson Creek, Stewart Creek and Billings Creek PWS.

The basin has the highest timber site quality in the watershed. With over 70 inches of rainfall per year within the coastal fog influence, the lower and middle reaches of the North Fork sub-basin contain prime timber growing ground for Redwood and Douglas fir. In the upper third of the North Fork sub-basin, there is an abrupt vegetation transition to the mélange clay soil type. At the base of the Billings Creek Planning Watershed (PWS) along the Tombs Creek fault, dense conifer stands give way to prairie grasslands and oak woodland.

The North Fork sub-basin had the highest road density (6.5 miles per sq. mile) in the watershed. The road network is extensive, made up of mainly private roads. The roads were built primarily to support timber operations; most were constructed during the period from the 1950s to 1970s. Due to the GRWC Restoration Program and the cooperative efforts of Gualala Redwoods, Inc. extensive road restoration projects have been completed in the Doty Creek and Robinson Creek PWS decreasing the effective road density to 4.6 miles per sq. mile.

Legacy in-stream sediment deposits are slowly transporting out of the watershed. Sediment levels, indicative of disturbance, occur along 29 of 127 miles (23%) of the blue lines streams in the sub-basin. This is a 40% reduction compared to levels in 1984. Most of the reduction is occurring in the headwater tributaries, while the lower reaches show less change (Klamt, et al 2003).

Table 1.4: North Fork Sub-basin Streams with Negative Characteristics Resulting from Excessive Sediment

North Fork Planning Watershed	Total 1:24K Streams	2000 Length Miles	2000 Total Percent	1984 Length Miles	1984 Total Percent	Percent Change 1984 to 2000
Billings Creek PWS	38.8	10.4	27%	15.5	40%	-33%
Stewart Creek PWS	27.1	9.4	35%	15.9	59%	-41%
Robinson Creek PWS	45.9	9.2	20%	14.5	32%	-37%
Doty Creek PWS	14.9	0.2	1%	2.4	16%	-92%
Total	126.7	29.2	23%	48.3	38%	-40%

Within the North Fork Basin tributaries Maximum Weekly Average Temperature (MWAT) ranges are primarily within suitable categories (13° C to 17° C) with Robinson Creek East as the outlier with temperatures at 18.7° C. The main-stem sites vary from suitable to unsuitable for summertime rearing (15.5° C to 22.0° C). There is a trend of higher water temperatures upstream in the North Fork to lower

temperatures as the stream flows towards the ocean. In the upper reaches air temperatures are generally higher and canopy density lower in the northeastern oak woodland and grassland, probably contributing to higher water temperatures. As the North Fork flows west into the coastal influence and better canopy coverage, it also receives flows from cooler tributaries and springs, combining to reduce the main-stem water temperatures (Klamt et al, 2003).

The North Fork SPWS is considered the highest priority watershed as an "Initial Focus Core Area" for restoration (NMFS, 2012 and CDFW, 2012). Two factors contribute to this ranking and the importance the sub-basin provides to the Gualala River watershed as a whole. First, it provides the highest quality salmonid refugia available in the watershed and is the only sub-basin to have possible remnant populations of coho salmon. During the past decade coho salmon have been found in the Little North Fork and its tributary Doty Creek, McGann Gulch, and Dry Creek. Second, the North Fork is an important source of base flows and cold water infusion to the lower Gualala during the late season periods when the estuary is prone to warmer temperatures and high salinity conditions. The North Fork contributes greater runoff per unit area than the other major tributaries feeding the lower river and estuary/lagoon in the summer months (ECORP Consulting, Inc. *et al*., 2005).

Lack of large wood abundance, excess sediment and deficient in-channel canopy density in the headwaters are the cause of most salmonid limiting factors in the North Fork basin (Klamt, et al 2003). In the lower basin, limiting factors are being addressed on a planning watershed scale by the upgrading of road systems and the placement of large wood through GRWC restoration programs and landowner collaboration.

Robinson Creek CalWater Planning Watershed

Robinson Creek (PW) is a 13.7 mi^2 (8,792 acres) sub-watershed that drains 45.9 miles of blue line stream of which approximately 16 miles is salmonid habitat. The three main tributaries Dry Creek, Robinson Creek and McGann Gulch within the Robinson Creek (PW) all have suitable temperatures for Coho salmon.

The Gualala River Forest owns approximately 1,982 acres (3.1 sq. miles) concentrated in the headwaters of Dry Creek. Although the ownership area is confined to two headwaters streams, these drainages are important ecosystems to Dry Creek, one of the last streams where coho have been documented in the watershed.

Robinson Creek PWS has a high road density of 6.8 miles per mi^2; a total of 43 miles of primarily private timber roads. A recent collaborative restoration effort on Gualala Redwoods, Inc. property within the planning watershed has decreased the effective road density to 3.6 miles per mi^2. It is estimated that 83% of the total erosion yield within the watershed is road related (O'Connor Environmental, 2008). Approximately 23% (21 miles) of the total road network is on Gualala River Forest property.

Implementing road related sediment source reduction strategies and the appropriate management of headwater systems will benefit downstream reaches by attenuating floods, maintaining water supplies and quality, preventing increased in-stream siltation and aggradations, and provide a steady supply of food resources.

Dry Creek Gualala

Dry Creek is a 2nd order stream and an important Class I (2.3 miles) tributary to the North Fork of the Gualala. Dry Creek drains a watershed of approximately 4,104 acres. Steelhead and coho have been historically documented within the system and it is one of the last streams to have documented coho populations in the watershed.

2001 CDFW habitat typing data lists the Rosgen channel type as a B4 for the first 8,431 ft then changing to a F4 channel type. The average bank-full width in the lower reach is 43.5 ft, narrowing to 17.5 ft in the upper watershed.

The Gualala River Forest property encompasses the headwaters of Dry Creek and starts approximately 2,900 ft above the confluence with Abieta Springs and 2.1 miles above the confluence with the North Fork. Anadromy ends close to the property line with a small amount of the stream (0.24 mile) classified as fish bearing on the ownership.

Sedimentation is a special concern in Dry Creek. GRWC trend monitoring demonstrates a consistent lowering or deepening of the thalweg streambed watershed-wide, confirming decreasing in-stream sediment loads. Dry Creek is the exception to the results. Surveys document aggradation of the thalweg started in 2006 with an increase above the 1998 baseline level by 12cm in 2012.

Water and air temperature has been monitored since 1995. Current data show Dry Creek temperatures to be fully to moderately suitable for salmonids (13.8^{o} C to 15.7^{o} C). Canopy and pool shelter are limiting factors to salmonid production. Pool depth and frequency were also found to be limiting but may not be applicable due to stream size on the Gualala River Forest (Klamt et al. 2003).

A stream enhancement project was implemented by the GRWC and Gualala Redwoods, Inc. in upper Dry Creek. Fourteen large wood pieces were placed during cable operations to enhance pool habitat.

Location Description

Dry Creek is a tributary to the North Fork Gualala River, tributary to the Gualala River. Dry Creek's legal description at the confluence with the North Fork is T11N R14W S7 and its NAD 83 coordinates are 38.81444 north latitude and 123.475766 west longitude. Elevations range from about 196 feet at the mouth to 1,600 feet in the headwaters area according to the USGS McGuire Ridge7.5 minute quadrangles.

Monitoring Sites

The GRWC Monitoring program has two installed reaches on Dry Creek. Monitoring Reach Site #211 is a reference reach and has been survey annually since 1998. It is located 1,000 ft upstream from the confluence of the North Fork. Site #212 is located 6,800 ft above the confluence with the North Fork, directly below the confluence with Abieta Springs. There are five air and water temperature sites in the Dry Creek basin; three of these sites are on Dry Creek proper (#211, #212 and #753).

Abieta Springs

The Gualala River Forest ownership starts 7,400 (ft) upstream from the confluence of Abieta Springs and Dry Creek. The stream drains a watershed of approximately 752 acres. Approximately 1.2 miles of the headwaters portion of this First order stream is within the ownership of the Gualala River Forest. A small portion on the property (0.6 miles) is potential habitat for steelhead. Steelhead have been observed in the lower portion of the stream. The stream reach on Gualala River Forest property is classified as fish bearing based on habitat not on fish observations. Stream gradient and other habitat factors most likely limit coho populations to the mainstem of Dry Creek.

Abieta Springs is a 1st order stream and in 2001 CDFW habitat typed 2,695 (ft) of the lower portion on Gualala Redwoods, Inc property. The stream from the confluence to approximately 2600 (ft) is a Rosgen F4 channel with an average bank-full width of 17 (ft.), changing to a B1 channel with an average width of 14 (ft) for the remaining distance of the survey.

Limited temperature monitoring indicates moderately suitable temperature for salmonids with a seasonal MWAT of 16.6° C (GRWC, 2009). Canopy and pool shelter are limiting factors to salmonid production. Pool depth and frequency were also found to be limiting but may not be applicable due to stream size (Klamt et al. 2003).

The headwaters should be managed for sediment control, its cold water influence on Dry Creek and food resources for salmonid populations in the lower portion of the tributary and the Dry Creek mainstem.

Location Description

Abieta Springs is a tributary to Dry Creek, tributary to North Fork Gualala River, tributary to the Gualala River. The legal description at the confluence with Dry Creek is T11N R14W S6 and its NAD 83 coordinates are 38.8323 north latitude and 123.472775 west longitude. Elevations range from about 190 feet at the mouth to 1600 feet in the headwaters area according to the USGS McGuire Ridge 7.5 minute quadrangles.

Monitoring Sites

Abieta Springs has a GRWC temperature monitoring site (#752) but there are no installed or proposed GRWC monitoring reaches. The closest reach, Dry Creek #212, is a few hundred feet downstream from the confluence of Abieta Springs and Dry Creek and is discussed in the Dry Creek description.

Stewart Creek CalWater Planning Watershed

Stewart Creek (PWS) is a 10.3 mi^2 (6585 acres) sub-watershed that drains 27.1 miles of blue line stream of which approximately 11.3 miles are class I streams, primarily concentrated in the North Fork main-stem. There are two small tributaries that feed into the North Fork; Stewart Creek and Hayfield Creek. Coho and steelhead were historically present on the North Fork main-stem according to 1960s and 1970s CDFW stream surveys.

The Gualala River Forest owns 4,392 acres (6.9 sq. miles) within the planning watershed. Representing 67% of the sub- watershed; Gualala River Forest is the largest landowner. There are approximately 6.3 miles of Class I streams on property within the planning watershed.

Stewart Creek PWS has a high road density of 7.6 miles of road per square mile; a total of 78 miles of primarily private timber roads. It is estimated that 56% of the total erosion yield within the watershed is road related (O'Connor Environmental, 2008). Approximately 68% (53 miles) of the total road network is on Gualala River Forest property. The GRWC is currently working with GRI on assessment and implementation of sediment source restoration on their 22 miles of road within the watershed. To date 17% of the GRI road network in the basin has been hydrologically disconnected.

Implementing road related sediment source reduction strategies, increasing in-stream canopy density and improving large wood abundance along the North Fork main-stem are the top priority recommendations for the watershed (Klamt et al, 2003)

North Fork

The North Fork is a 3rd order stream and within the Stewart Creek PWS and has approximately 10 miles of anadromous habitat (including tributaries). The portion of the North Fork main-stem is approximately 7.6 miles in length of which 3.4 miles are on the Gualala River Forest ownership. The Rosgen channel type is F4; the average bank-full width is 66 feet.

In-stream data is lacking for this reach of the Gualala River Forest North Fork main-stem. 2001 habitat typing stopped at the Gualala Redwoods, Inc. property boundary. GRWC has one monitoring reach and temperature site on the Gualala River Forest property along the upper North Fork which provides limited data for this stream reach.

Pool frequency is substandard with primary pools comprising only 19% of the surveyed reach. Large wood abundance is below optimal levels with only 4 pieces per 1000 ft. Center of channel canopy density is 43%.

A large wood enhancement project in collaboration between the GRWC, The Conservation Fund and The Nature Conservancy is planned for the upper North Fork that will provide habitat enhancement within the reach.

Temperature data was collected in 2004 and 2009; baseline reach data was collected in 2009 by the GRWC. Although temperatures appear to be moderately unsuitable for salmonids (MWAT 19.5^{o} C and Max 23.2^{o} C) steelhead spawning adults and redds were found in the upper North Fork reach during the 2012/2013 winter GRWC spawning surveys and preliminary snorkel surveys conducted in the main-stem on 2,800 ft above Stewart Creek have found one of the largest per mile densities of older (1+) juvenile steelhead in the North Fork basin (see Appendix 1).

Snorkel surveys are not yet completed; additional reaches on the property in the North Fork main-stem (total of 19,600 ft) will be snorkeled throughout the summer as part of a North Fork SPWS effort to evaluate the viability of coho salmon populations within the watershed.

Location Description

The North Fork's legal description at the confluence with the South Fork is T38N R123W S26 and its NAD 83 coordinates are 38.778 north latitude and 123.499 west longitude. Stream elevations range from about 40 feet at the mouth to 520 feet at the confluence of Robinson and Billings Creek.

Monitoring Sites

A temperature site (#691) and monitoring reach (#691) are established on the North Fork mains-tem within the property. Temperature data has been collected in 2004, 2009 and 2013. Reach data was collected in 2009.

Stewart Creek

Stewart Creek is a 1st order stream and has a waterfall at its confluence with the North Fork that appears to be a natural barrier to anadromy. There is approximately 2.3 miles of blue line stream that has been temporarily classified as Class I due to the possibility of a resident trout population above the waterfall.

There is no in-stream data available for Stewart Creek.

Location Description

Stewart Creek is a tributary to the North Fork Gualala River, between Lost Creek and Robinson Creek East, tributary to the Gualala River. The legal description at the confluence with the North Fork is T11N R14W S9 and its NAD 83 coordinates are 38.81759 north latitude and 123.42435 west longitude. Elevations range from about 350 feet at the mouth to 1,620 feet in the headwaters area according to the USGS McGuire Ridge and Gube Mountain 7.5 minute quadrangles.

Monitoring Sites

Stewart Creek has no established or proposed GRWC monitoring reaches or temperature sites.

Hayfield Creek

Hayfield Creek is a small 1st order stream and has approximately 2.3 miles of blue line stream. It is a tributary to the North Fork main-stem but no habitat typing or monitoring data is available for the creek. Anadromy is most likely limited to approximately 2,000 ft above the confluence with the North Fork due to an increase in slope.

Location Description

The legal description at the confluence with the North Fork is T12N R14W S28 and 34 and its NAD 83 coordinates are 38.84417 north latitude and 123.4195 west longitude. Elevations range from about 480 feet at the mouth to 1,674 feet in the headwaters area according to the USGS McGuire Ridge and Gube Mountain 7.5 minute quadrangles.

Monitoring Sites

Hayfield Creek has no GRWC established or proposed monitoring reaches or temperature sites.

Billings Creek CalWater Planning Watershed

Billings Creek (PWS) at 10,650 acres (16.6 mi^2) is the largest sub-watershed within the North Fork SPWS. The planning watershed drains 39 miles of "blue Line" streams of which approximately 17 miles are potential salmonid habitat. There are two tributaries that feed into the Billings Creek main-stem; Robinson Creek East and Palmer Creek.

The Gualala River Forest owns 1,551 acres (2.4 mil^2) within the planning watershed. There is a small portion of Billings Creek at the east property boundary but the Robinson Creek East and its tributary Bear Creek are the primary watercourses with approximately 2.7 miles of Class I streams.

Billings Creek PWS has a road density of 4.8 mi^2 representing a total of 79 miles of primarily private timber roads. It is estimated that 37% of the total erosion yield within the watershed is road related (O'Connor Environmental, 2008). Approximately 15 miles of the total road network is on Gualala River Forest property. Road related sediment should be addressed with a focus on in-stream and near-stream roads where channel braiding and/or aggradation are still persistent today (Klamt et al, 2003).

As discussed earlier the terrain changes to more open grassland at the beginning of Billings Creek and the Tombs Creek Fault Zone. Cattle grazing occurs on the east side of the property impacting Billings Creek, Robinson Creek and the lower portion of Bear Creek. Exclusionary fencing should be installed.

Large wood abundance should be augmented in the lower reaches of Robinson Creek East along with riparian restoration to provide increased bank stability and in-stream refugia habitat.

Robinson Creek East

Robinson Creek East is a 2nd order stream and does support steelhead populations (GRWC Stream Surveys, 2004, 2009). However temperatures appear to be somewhat unsuitable for coho (MWAT 18.7° C). Rosgen channel types are B2 and B3 and the average bank-full width is 31 feet. The stream drains a watershed of approximately 4,061 acres and contains approximately 3.0 miles of anadromous habitat.

GRWC has established monitoring reaches and temperature sites on the Gualala River Forest property along lower Robinson Creek, above and below the confluence with Bear Creek.

2009 data suggest pool frequency and depth are increasing; primary pools ($\geq$ 2 ft.) increased from 16% in 2004 to 39% in 2009. Canopy density mid-channel is recovering at 77% but large wood abundance is below optimal levels at an average of 9 pieces per a 1,000 (ft) and corresponding low volume levels.

Steelhead redds were found in Robinson Creek East reach during the 2012/2013 winter GRWC spawning surveys and snorkel surveys will be conducted this summer as part of a North Fork SPWS effort to evaluate the viability of coho salmon populations within the watershed.

Location Description

Robinson Creek East is a tributary to the North Fork Gualala River where it changes to Billings Creek, tributary to the Gualala River. Its legal description at the confluence with the North Fork is T11NR14W S34 and its NAD 83 coordinates are 38.84780 north latitude and 123.4111 west longitude. Elevations range from about 560 feet at the mouth to 2,240 feet in the headwaters area according to the USGS McGuire Ridge and Gube Mountain 7.5 minute quadrangles.

Monitoring Sites

Robinson Creek East has two (2) GRWC established monitoring reaches and temperature sites established in 2004 (#692 and #697).

Bear Creek

Bear Creek is a tributary to Robinson Creek East, and is a 1st order stream with about 1.6 miles of anadromous habitat. 100% of the stream is within the Gualala River Forest ownership. In-stream data is limited to temperature monitoring at one site in the lower portion of the Creek.

In 2009, water temperature was found to be fully suitable (MWAT 15.1^{o} C) for salmonids. Some in-stream restoration has occurred in the past, primarily the placement of large wood structures creating plunge pools in the lower basin.

Bear Creek is one of the few streams within the property that appears to have potential summer rearing habitat for coho salmon (GRWC, pers. observations). In addition to the restoration recommendations for Billings Creek PWS, Bear Creek should be assessed for possible spawning habitat and juvenile rearing capabilities.

Location Description

The legal description at the confluence with the Robinson Creek East is T11N R14W S35 and its NAD 83 coordinates are 38.8465 north latitude and 123.40314 west longitude. Elevations range from about 600 feet at the mouth to 1,620 feet in the headwaters area according to the USGS McGuire Ridge and Gube Mountain 7.5 minute quadrangles.

Monitoring Sites

Bear Creek has one (1) proposed GRWC monitoring reach; #693. In 2009, water temperature was recorded on Bear Creek at the proposed reach site; 3,000 feet upstream of its confluence with Robinson Creek East. Temperature data loggers were placed in 2013.

Billings Creek

This stream is synonymous with the North Fork after its confluence with Robinson Creek East. It continues from the North Fork to add about another 5.9 miles of anadromous habitat. Only a small portion (0.5 miles) of the stream is within the Gualala River Forest ownership.

In-stream data is limited to temperature monitoring. Surface water flowing from the Billings Creek headwaters into the North Fork main-stem has unsuitable temperature (MWAT 20.8^{o} C) for salmonids.

Location Description

The legal description at the confluence with the North Fork and Robinson Creek East is T11NR14W S34 and its NAD 83 coordinates are 38.8479621 north latitude and 123.4112 west longitude. Elevations range from about 520 feet at the mouth to 2,480 feet in the headwaters area according to the USGS McGuire Ridge, Gube Mountain, Zeni Ridge and Ornbaun 7.5 minute Quadrangles.

Monitoring Sites

Billings Creek has no proposed GRWC monitoring reaches within the Gualala River Forest property. Beginning in 2004, water temperature was recorded periodically at a site (#698) near the Billings Creek confluence with the North Fork and Robinson Creek East.

ROCKPILE CREEK SPWS

The 35 mi^2 (22,389 acres) Rockpile basin drains 88 miles of "blue line" streams and over 60% of the basin has a high to very high landslide potential rating. There are two major tributaries to Rockpile Creek; Horsethief Canyon and Redrock Creek.

At 5,356 acres the Gualala River Forest ownership is 24% of the Rockpile Creek SPWS. The majority of the ownership spans Redrock Creek and Middle Rockpile Creek PWS. The property boundary includes a small amount of acreage (2 acres) in Lower Rockpile Creek.

In the lower reaches of the sub-basin, streams meander slightly through narrow alluviated alleys within steep valleys. The main channel is somewhat sinuous and low gradient, with a narrow floodplain and stable point bars.

Mid century pre-1973 tractor harvesting was the dominant method used in the Rockpile basin, removing most of the old growth conifer dominated stands throughout the lower and central reaches of the basin in a comparatively narrow time frame between 1952 and 1968. Between 1952 and 1964, 65% of the area had been subject to tractor harvest operations and by the end of the first logging era in 1968, 73.5% of the basin had been harvested.

The Rockpile Creek SPWS has 169 miles of private roads. Road density is 4.6 mi^2 within the basin. The NCWAP restoration map targets the central and upper sub-basin reaches with the highest priority for future restoration work in sediment reduction.

Similar to the North Fork, stream channel morphology in the Rockpile sub-basin shows the following evolution over the last half century: (1) a high density of debris flow mounds in the active channel triggered by mid-20th-century storm events, (2) progressive abatement of the frequency of these point sources over successive decades, and (3) apparent improvement of in-stream channel conditions between 1984 and 2000 as evidenced by a reduction in the percentage of channel length that is affected by excess sediment storage or sediment sources (Klamt, et al, 2003).

Table 1.5: Rockpile Creek Sub-basin Streams with Negative Characteristics Resulting from Excessive Sediment

Rockpile Creek Planning Watershed	Total 1:24K Streams	2000 Length Miles	2000 Total Percent	1984 Length Miles	1984 Total Percent	Percent Change 1984 to 2000
Lower Rockpile PWS	9.4	3.4	36%	5.9	63%	-42%
Redrock PWS	7.4	2.9	39%	4.6	62%	-37%
Middle Rockpile PWS	28.7	6.7	23%	13.4	47%	-50%
Upper Rockpile PWS	42.7	6.7	16%	8.1	19%	-17%
Total	88.2	19.7	23%	32	36%	-38%

GRWC has eleven temperature monitoring sites throughout the basin with temperature data from 1994 to 2012. Recent temperature data show the two tributaries (Redrock and Horsethief Canyon) temperatures are in the suitable ranges for salmonids (MWAT 13.2^{o} C to 15.9^{o} C). The main-stem sites vary from moderately suitable to moderately unsuitable for summertime rearing (MWAT 17.1^{o} C to 19.1^{o} C). There is a slight trend, not as pronounced as in the North Fork, of cooling temperatures as the stream flows towards the ocean.

2001 CDFW habitat inventory data was limited in scope; only 39% of the basin was surveyed and stopped at the Gualala Redwoods, Inc. property line. Data show habitat deficiencies related to canopy cover, pool frequency/depth, and shelter cover in the areas surveyed. More recent GRWC survey results illustrate continued channel simplification in the lower reaches of the main-stem (Lower Rockpile PWS). However, pool frequency and depth do not appear to be limiting in the central watershed (GRWC, 2012).

The Rockpile Creek SPWS is considered a "Phase I Expansion Area" for salmonid restoration efforts in the Gualala River Watershed. Key limiting factors and basin recommendations are similar to the North Fork SPWS, with more emphasis on inadequate riparian composition and density in the middle and upper watershed. Lack of large wood abundance, excess in-stream sediment and deficient in-channel canopy density in the central and upper basin are key factors limiting salmonid habitat (Klamt, et al 2003).

Red Rock CalWater Planning Watershed

Red Rock Creek (PWS) at 2,219 acres (3.5 mi^2) is the smallest sub-watershed within the Rockpile Creek SPWS. The sub-basin drains 7.4 miles of "blue Line" streams of which approximately 3.2 miles are class I streams. Anadromous habitat is found in the Rockpile Creek main-stem and its tributary, Red Rock Creek. The Gualala River Forest owns 1,561 acres (2.4 mi^2) which contains 2.5 miles of Class I streams within the planning watershed. The ownership represents 70% of the basin.

Red Rock Creek PWS has a road density of 6.1 mi^2 representing a total of 21 miles of private timber roads. It is estimated that 84% of the total erosion yield within the watershed is road related (O'Connor Environmental, 2008). Approximately 15 miles (72%) of the total road network is on Gualala River Forest property. Some road related sediment reduction work has been completed but it is not known to what extent this work conforms to current standards. According to NCWAP, in the mid 1990s, extensive

streambank rehabilitation work was implemented on roads in Redrock Creek; this work was carried out by the previous landowner, CoastalForestlands, Inc.

Implementing road related sediment source reduction strategies, identify and implement riparian enhancement projects where current canopy density and diversity are inadequate along Rockpile main-stem and Redrock Creek and improving large wood abundance along the Rockpile main-stem are the top priority recommendations for the watershed (Klamt et al, 2003).

Rockpile Creek

Rockpile Creek is a 2rd order stream and within Redrock Creek PWS has approximately 1.6 miles of anadromous habitat of which 0.75 miles are on the Gualala River Forest ownership. The Rosgen channel type is F4; the average bank-full width is 59 feet.

In-stream data is limited for this specific section of the Rockpile Creek. However, GRWC has one monitoring reach and temperature site (#701) on the Buckeye River Forest property directly below the property line and another temperature site in the Gualala River Forest property on Redrock Creek.

Pool frequency is optimal with primary pools comprising 58% of the surveyed reach. Large wood abundance is below optimal levels with 34 pieces per 1,000 ft. and a volume level of 2,961 ft^3. Center of channel canopy density is 60%. Although temperatures appear to be moderately unsuitable for salmonids (MWAT 19.5^o C and Max 23.6^o C) steelhead young of the year and older are found in the system.

Location Description

Rockpile Creek – Redrock PWS sub-section: The legal description at the downstream (property-line) end is T11N R14W S27 and its NAD 83 coordinates are 38.7767 north latitude and 123.4056 west longitude. Elevations at the property line range from about 130 feet at the downstream end to 150 feet at the upstream end according to the USGS McGuire Ridge and 7.5 minute quadrangle.

Monitoring Sites

Temperature data (#701) was collected in 2008 and 2009; baseline reach data (#701) was collected in 2006 by the GRWC.

Red Rock Creek

Red Rock Creek is a small 1st order stream and has approximately 1 mile of blue line stream. It is a tributary to the Rockpile Creek main-stem but no habitat typing is available. Anadromy is most likely limited to approximately 2,000 ft above the confluence with Rockpile due to an increase in slope.

In 2009, water temperature was found to be fully suitable (MWAT 15.1^o C) for salmonids. Some sediment source restoration has occurred along the creek.

Location Description

The legal description at the confluence of Rockpile Creek is T11N R14W S22 and its NAD 83 coordinates are 38.77961 north latitude and 123.40754 west longitude. Elevations range from about 140 feet at the mouth to 1,863 feet in the headwaters area according to the USGS McGuire Ridge 7.5 minute Quadrangle.

Monitoring Sites

The GRWC Cooperative Monitoring Program has two (2) proposed reaches for Red Rock Creek; #678 and #679. Temperature data (#678) was collected in 2009.

Middle Rockpile CalWater Planning Watershed

Middle Rockpile Creek (PWS) is a 12.8 mi^2 (8,165 acres) sub-watershed that drains 29 miles of blue line stream of which approximately 11.4 miles are class I streams. Anadromous habitat is found in the Rockpile Creek main-stem and its tributary, Horsethief Canyon. The Gualala River Forest ownership is 3,793 acres (46%) of the 5.9 mi^2 basin, and has 7.2 miles of Class I streams within the planning watershed.

Historically, streamside roads and landings were densely concentrated at the base of steep ravines in Middle Rockpile Creek planning watershed. Throughout Horsethief Canyon, heavy tractors cut into the steep sidebanks at the base of the streams, making the near vertical cut banks along these roads prone to failure during winter storms. The 1963 and 1981 air photos showed a high density of road debris slides accessing streams in the Middle Rockpile PWS (Klamt et al, 2003).

The planning watershed has a road density of 5.5 mi^2 representing a total of 70 miles of private timber roads. It is estimated that 38% of the total erosion yield within the watershed is road related (O'Connor Environmental, 2008). Approximately 35 miles (50%) of the total road network is on Gualala River Forest property.

Implement road related sediment source reduction strategies, identify and implement riparian enhancement projects where current canopy density and diversity are inadequate along Rockpile main-stem and Redrock Creek and improving large wood abundance along the Rockpile main-stem are the top priority recommendations for the watershed (Klamt et al, 2003).

Rockpile Creek

Rockpile Creek is a 2rd order stream with approximately 6.3 miles of class I stream of which 5.7 miles are on the Gualala River Forest ownership. This portion of the Rockpile main-stem is primarily low gradient (0-1%) with some interspersed reaches with steepening valleys increasing the gradient to over 1%.

In-stream data is limited for this section of the Rockpile Creek. GRWC has two temperature monitoring sites (#680, #683). Current temperatures (MWAT 19.5^{o} C and 19.1^{o} C) are moderately unsuitable for salmonids.

Location Description

The legal description at the downstream end of the Middle Rockpile planning watershed is T11N R14W S23 and its NAD 83 coordinates are 38.7861 north latitude and 123.40015 west longitude. Elevations range from about 150 feet at the downstream end to 380 feet at the upstream end at the property line according to the USGS McGuire Ridge and Gube Mountain 7.5 minute quadrangles.

Monitoring Sites

The GRWC has one (1) proposed monitoring reach for Rockpile Creek (#680). Temperature data (#680 & #683) were collected in 2009 and 2004.

Horsethief Canyon

Horsethief Canyon is a 1st order stream with approximately 0.75 mile of class I stream of which all is on the Gualala River Forest ownership.

No DF&G habitat typing data is available. GRWC has one temperature monitoring site installed in a proposed monitoring reach (#681). Current temperature (MWAT 15.1^{o} C) is fully suitable for salmonids.

The headwaters (not on the property) of Horsethief Canyon are comprised of some of the few remaining stands of old growth redwoods and Douglas fir within the watershed. The possibility of managing the Gualala River Forest property within the Horsethief Canyon watershed for late seral growth and designating the stream as a reference reach for the Gualala River watershed should be explored.

Location Description

Horsethief Canyon's legal description at the confluence of Rockpile Creek is T11N R14W S24 and its NAD 83 coordinates are 38.78691 north latitude and 123.37995 west longitude. Elevations range from about 200 feet at the mouth to 1,600 feet in the headwaters area according to the USGS McGuire Ridge and Gube Mountain 7.5 minute Quadrangles.

Monitoring Sites

The GRWC Cooperative Monitoring Program has two (2) proposed reaches for Horsethief Canyon; #681 and #682. In 2009 and 2004, water temperature was recorded on Horsethief Canyon at site #681.

Restoration Enhancement and Monitoring

Management of species' populations and biological diversity requires a landscape-scale perspective and recognition that the complexity and function of any particular location is influenced heavily by the nature of the landscape that surrounds it.

To implement aquatic management, we must develop strategies that incorporate long-term planning and commitment, while recognizing the need to make short-term decisions.

Many studies have been conducted on the Gualala River Watershed documenting the adverse conditions limiting salmonid populations. They consistently recommend four priority management strategies to enhance beneficial uses and improve watershed health; 1) reduce upslope Non Point Source (NPS) sediment inputs through road upgrades, repairs and decommissioning, 2) increase in-stream habitat diversity through Large Woody Debris placement, 3) riparian enhancement and 4) continue and expand the GRWC monitoring program to increase understanding of watershed processes and evaluate resource management strategies.

Many factors affect the health of watershed habitat. No single factor is responsible, but time is of the essence to provide viable habitat for salmonid populations. The focus must be on remediating the major impacts we can quantify and have the tools to fix.

When planning projects, multiple restoration objectives should be met to increase cost-efficiency, the quality of the project, and minimize associated impacts. Implementing reach scale restoration projects planned on watercourses adjacent to and in conjunction with timber harvest plans or other land use activities are recommended. For example, restoration actions often utilize heavy equipment and open road networks found in timber harvest operations. This minimizes their ecological impact (e.g. opening new roads and tractor activity) and has many advantages.

Sediment

Erosion control and erosion prevention work is the first and perhaps the most important step to protecting and restoring watersheds and their anadromous fish populations. This is especially true for the Gualala River watershed. Unlike many watershed improvement activities, erosion prevention and "storm-proofing" has an immediate benefit to the streams and the aquatic habitat of the basin. Roads are a major source of erosion and sedimentation on most managed forest and ranch lands (Weaver and Hagans, 1997).

In 2003 the TSD estimated that the Gualala River watershed's present erosion rate was 1,220t/mi^2/yr, with a background erosion rate of 380t/mi^2/yr. Newer sediment source assessments conducted at the scale of planning watersheds in the Gualala are consistent with the TSD findings. The goal of the Gualala TSD and the GRWC is to lower anthropogenic sediment loads to 25% above the background erosion level (475t/mi^2/yr). The TSD states that road related erosion accounted for 58% of the total estimated watershed erosion rate and 85% of the human-caused (controllable) portion of the estimated erosion rate.

Thresholds

The National Marine Fisheries Service (1996) guidelines for salmon habitat characterize watersheds with road densities greater than 3 miles of road per square mile of watershed area (mi/sq mi) as "not properly functioning", while "properly functioning condition" was defined as less than or equal to 2 mi./sq. mi., with no or few stream side roads. The Final Recovery Plan for Central California Coast coho

salmon states that road density and streamside road density are the greatest overall source of impairment to watershed processes (NOAA, 2012).

By following the protocols developed by Hagans & Weaver roads can be 95% hydrologically disconnected from streams, reducing delivery of sediment from road sources by as much as 95% and potentially decreasing the human-caused erosion by 80%.

Relating site-specific sediment reductions to watershed scale estimates is complex, however; road restoration contributes significantly to meeting load reductions. It specifically meets many of the TSD Short-Term numeric targets including reducing hydrologic connectivity to < than 5%, stream diversion potential to < 1%, Stream Crossing Failures < 1% and all road related Mid-Term and Long-Term numeric targets.

Desired Salmonid Freshwater Habitat Conditions for Sediment-Related Indices (NCRWQCB, 2006) specifies that turbidity should not increase more than 20 percent above naturally occurring background levels and the suspended sediment load and suspended sediment discharge rate of surface waters should not adversely affect beneficial uses. Due to a lack of turbidity baseline information in the Gualala River watershed turbidity monitoring is not being recommended at this time.

Planning and Implementation

The Gualala River Forest 139 mile road network has an overall road density of 6.68 mi/mi^2. For the purposes of project planning, sub-basins and their road networks are prioritized based on sediment source analysis, road densities, roads proximate to streams, potential salmonid habitat.

Estimated costs are based on present day costs for road assessment and implementation costs within the watershed. Only High and Medium priority roads are included in implementation, as a result a 20% reduction has been applied to all road mileage within the planning watershed. This percentage was derived by the GRWC to represent Low priority roads based on an average of comparable work already completed

Time frames for sediment are based on a ten year time table and along with potential funding cycles. Cost efficiency or funding availability may dictate a different schedule. Watersheds are listed in order of priority.

Recent timber harvest plan coverage is extensive on the property. To reduce assessment costs the GRWC recommends aggregating existing road information available in relevant THPs into a road database before assessment plans are finalized.

The GRWC Sediment Reduction Program has hydrologically disconnected from the stream channels 263 miles of road in five high priority CalWater planning watersheds comprising 38,524 acres or 18% of the watershed. To assist landowners in management planning the GRWC has developed has developed a number of computer based tools that were used to develop recommendations for management.

One option is to use the GRWC Geographic Information System (GIS) coverage and watershed road network database. The extensive database includes road networks, restoration, and monitoring watershed-wide. The road network inventories road systems by unique road number (routes), distance (mile posting) and specific site numbers. The road inventory contains site specific information including, road number, site identifying number, mileage, site problem, site solution, hours of equipment, cost, sediment yield, sediment saved and monitoring photos. This will allow planning at the ownership, planning watershed and watershed-wide level (see Appendix 1).

Map 4: Road Network and Culvert Sizing

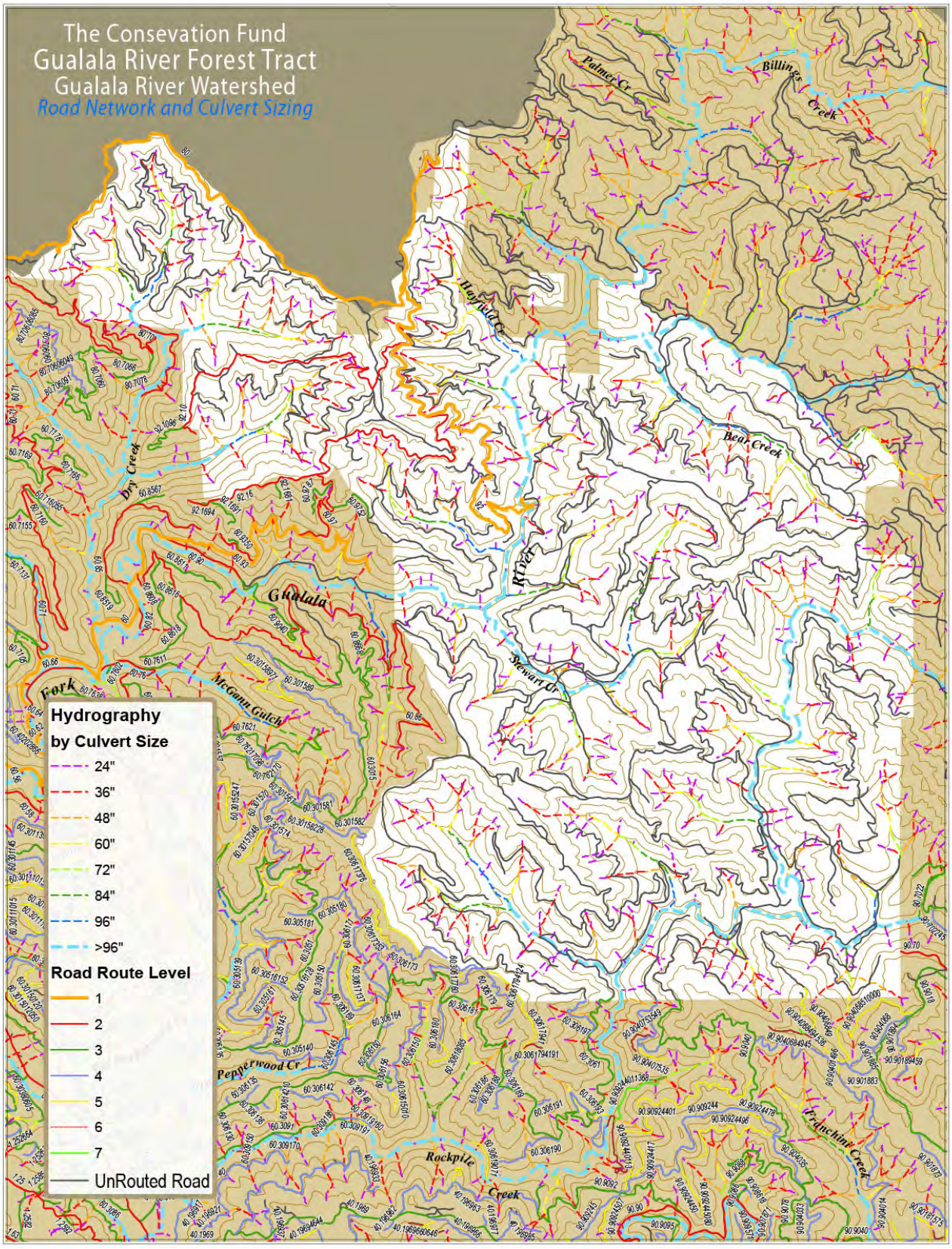


Table 2.1: Road Restoration Planning Watersheds

Priority List of Planning Watersheds for Road Restoration	Time Frame	Per Mile Cost	Total
Robinson Creek PWS (21 total road miles)			
Road assessment on 16.8 miles Medium & High priority roads in upper watershed.	2014 to 2016	$1,500.00 to $2,500.00	$25,200.00 to $42,000.00
Road Implementation in upper watershed based on assessment mileage.	2016 to 2019	$20,000.00 to $25,000.00	$336,000.00 to $420,000.00
Stewart Creek PWS (53 total road miles)			
Road assessment on 42 miles Medium & High priority roads in upper watershed.	2014 to 2016	$1,500.00 to $2,500.00	$63,000.00 to $105,000.00
Road Implementation in upper watershed based on assessment mileage.	2017 to 2020	$20,000.00 to $25,000.00	$840,000.00 to 1,050,000.00
Billings Creek PWS (15 mi total)			
Road assessment on 12 miles Medium & High priority roads in upper watershed.	2016 to 2018	$1,500.00 to $2,500.00.00	$18,000.00 to $30,000.00
Road Implementation in upper watershed based on assessment mileage.	2018 to 2021	$20,000.00 to $25,000.00	$240,000.00 to $300,000.00
Red Rock Creek PWS (15 mi total)			
Road assessment on 12 miles Medium & High priority roads in upper watershed.	2017 to 2019	$1,500.00 to $2,500.00	$18,000.00 to $30,000.00
Road Implementation in upper watershed based on assessment mileage.	2019 to 2022	$20,000.00 to $25,000.00	$240,000.00 to $300,000.00
Middle Rockpile Creek PWS (35 mi total)			
Road assessment on 28 miles Medium & High priority roads in upper watershed.	2018 to 2020	$1,500.00 to $2,500.00	$42,000.00 to $70,000.00
Road Implementation in upper watershed based on assessment mileage.	2020 to 2013	$20,000.00 to $25,000.00	$560,000.00 to $700,000.00

LARGE WOOD

The Gualala River Watershed Assessment Report (Klamt, et al., 2003) determined that pool depth, pool frequency and pool shelter are the leading limiting factors to salmonids throughout the North Fork and Rockpile Creek SPWS. The highest restoration priority to remediate these limiting factors is in-stream structure enhancement.

The positive role that large wood plays creating suitable salmonid habitat in riverine ecology is well documented (Martin and Benda 2001). In forested streams large wood is associated with the majority of pools and the amount of large wood in the channel has a direct affect on pool volume, pool depth and

the percentage of pool area. (Elliot 1986; Murphy et al 1986; Carlson et al 1990; Beechie and Wyman 1992). Woody debris benefits all life stages of salmonids (Bisson et al. 1987, Sullivan et al. 1987). Large wood augmentation increases channel and habitat complexity and provides both cover and high-flow refugia for juvenile and adult salmonids.

The 1997 Coastal Forestlands Aquatic Assessment found that stream reaches lack essential habitat provided by LWD. Two indices measured for the survey, LWD pieces per bank-full width and LWD volume index fell short of criteria established by Peterson et al (1992). The Gualala Synthesis Report states that past land management involving logging and associated practices such as splash dam log transportation, as well as previous CDFG projects that removed migration barriers throughout the watershed, have led to the dearth of salmonid habitat provided by LWD (Klamt et al, 2003).

In 2001 the GRWC developed the Large Wood In the Stream program to remediate the effects of legacy anthropogenic sediment sources by creating summer and winter salmonid habitat, increasing floodplain connectivity, and re-establishing salmonid migration corridors by supplementing natural large wood levels. Since 2001 the GRWC has placed over 700 logs, rootwads and live conifers in eleven (11) tributaries within the watershed.

Based on channel and riparian suitability the GRWC has developed four methods that are recommended for large wood placement in the Gualala: (1) tractor and skidder placement of cull logs and rootwads, (2) trees directly felled or pushed into the channel, (3) trees and cull logs placed during cable harvest operations, and (4) logs partially buried in the channel. Placement attempts to mimic nature and allow project wood to adjust by hydraulic forces under natural conditions. Site locations favor specific areas where sufficient wedging opportunities exist amongst riparian roughness elements e.g., existing trees, stumps, or boulders or areas that have downstream pinch points, to maximize retention within the system. Site selection is based on natural wood inventory levels, stream order, size of sub-watershed drainage, channel form, shelter ratings, Rosgen channel type, and accessibility.

Thresholds

Literature suggests a number of different targets for large wood loading levels to achieve optimum habitat response. All are based on stream size and/or drainage area and include numeric targets for large wood piece and volume levels or quantity of key large wood pieces.

The Final Recovery Plan for Central California Coast coho salmon recommends increasing large wood abundance to a minimum of 1.3 to 4 key pieces (minimum diameter 0.55m and length 10m, or a volume 2.5m^3) every 100 meters in 10 to 100 meter BFW streams. For streams with a BFW width of 0 to 10 meters the recommendation is 6 key pieces every 100 meters (NOAA, 2012).

Recommendations

A large wood program plan that outlines specific reaches, large wood staging sites and defined access points similar to or in conjunction with the GRWC Wood In the Stream program could be developed. This will allow for an adaptive management approach for wood placement based on equipment and large wood availability. As in the case of the GRWC program where existing permits cover multiple planning watersheds, large scale permits should be acquired for planning watersheds within the ownership or consideration should be given to including or amending THPs to include large wood placement projects.

Costs and time-frames were not developed and need to be based on the availability of equipment for implementation. Combining wood projects with either road restoration projects or timber harvest plans dramatically decreases both the implementation costs and permitting fees. Current wood placement costs through the GRWC Wood In the Stream program are $300.00 per log or $400.00 per log with

effectiveness monitoring (excluding permit development and fees). In Table 2.2 planning watersheds and streams are listed in order of priority.

Table 2.2: Large Wood Placement Streams

Gualala River Forest Designated Streams for Large Wood Enhancement	Reach Distance Miles	Comment
Stewart Creek PWS Stream Reaches North Fork Gualala main-stem	2.7	Large wood project is planned for 2013/2014. Sixty trees placed in 1 mile of the upper reach. Monitoring reach is installed for effectiveness monitoring.
Billings Creek PWS Stream Reaches Robinson Creek East	2.0	
Red Rock PWS Stream Reaches Rockpile Creek main-stem	1.5	GRWC Wood Project established in Lower Rockpile Creek Planning Watershed (not on property).
Middle Rockpile Creek PWS Stream Reaches Rockpile Creek main-steam	5.9	
Total	12.1	

RIPARIAN

Portions of all stream reaches within the ownership lack areas of sufficient canopy density and are recommended for riparian enhancement (Klamt, et al., 2003). Restoration efforts to increase canopy may decrease stream temperatures over the long-term. However, stream temperatures in the Gualala main-stems trend towards warmer temperatures in the headwaters and appear to be already unsuitable before entering the property.

In addition to mediating steam temperatures, the riparian zone provides habitat for many types of wildlife. There are several features of riparian forest that indicate its value as habitat and as part of the stream system. The density and diversity of plant species, the width of the riparian corridor beyond the edge of the creek scour channel, the size of the trees in the corridor and the occurrence of dead trees, vines, downed wood and other features, all determine the habitat quality for birds, mammals, reptiles, amphibians and salmonids.

In 1997, Coastal Forestlands Aquatic Assessment found canopy conditions below average on stream reaches within the ownership. An analysis using aerial photography conducted during the NCWAP synthesis compared 1942, 1968, and 1999 bank to bank exposure. Streams within the ownership did show improved canopy conditions from 1968 but they still contained areas with canopy limitations (Klamt et al, 2003). Literature suggests that an optimal canopy density should is 80% or greater.

The Final Recovery Plan for Central California Coast coho salmon recommends for most stream reaches on the property that riparian enhancement projects should be identified and implemented where current canopy density and diversity are inadequate and site conditions are appropriate to: initiate tree

planting, thinning, and other vegetation management to encourage the development of a denser more extensive riparian canopy in all streams within the property (NOAA, 2012).

Thresholds

Literature suggests that an optimal canopy density is 80% or greater and conifer regeneration be encouraged in the riparian zones.

Recommendations

Appropriate riparian forest management along with grazing exclusionary fencing (Robinson Creek East) will promote riparian growth throughout the property. Further discussions and planning using the bank-to-bank canopy GIS coverage (Klamt et al, 2003) augmented by current data (aerial photography, in-stream and riparian monitoring data and field observations) could be initiated to develop specific strategies for riparian restoration.

MONITORING

Management that acknowledges the significance of biological diversity is made all the more daunting by the fact that such diversity is itself a dynamic property of ecosystems affected by variations in spatial and temporal scale. Monitoring contributes to the understanding of complex ecological systems and is essential in documenting watershed trends and restoration performance. It is a critical component of restoration planning and adaptive management and can be used to identify and correct watershed problems as they occur.

In 2000, the GRCW developed a watershed based monitoring program designed to evaluate long-term trends at the watershed scale and also study restoration effectiveness at the tributary level. Data collected on the physical and biological condition of the watershed allows us to evaluate ecological events, watershed trends, the use of Best Management Practices and the effectiveness of restoration projects.

The GRWC Quality Assurance Project Plan for Monitoring Sediment Reduction was approved by the North Coast Regional Water Quality Control Board, State of California Water Resources Control Board and the California EPA. Metrics that are surveyed and analyzed are water temperature, channel morphology, riparian composition & large wood recruitment potential, in-stream large wood abundance, and canopy density. Additional metrics at selected reaches include snorkel and spawning surveys and macro invertebrate sampling.

In 2004, the GRWC installed six (6) temperature monitoring sites on the Gualala River Forest along with a reach site on Robinson Creek East. In 2009, GRWC added three (3) more temperature sites and installed two (2) more reaches; one on lower Robinson Creek East and one on the North Fork main-stem. Temperature sites are in both the North Fork and Rockpile Creeks basins (see GRWC database Stream Monitoring Report, Appendix 2).

Due to the listing status of salmonids and their significance as a keystone or indicator species of water quality, quantified salmonid population estimates are valuable. In 2012, with assistance from Sean Gallagher (CDFW) the GRWC developed a plan for spawning survey reaches in the North Fork basin that conforms to protocols developed by the Coastal Monitoring Program (CMP) and will result in adult salmonid population estimates for the North Fork basin. The plan has been a collaborative effort between the GRWC, landowners and agency personnel. The long-term goal is to include the Gualala River watershed in the CMP program and to expand efforts to develop salmonid population estimates for the watershed as a whole. A one (1) mile spawning and snorkel survey reach was installed in the upper North Fork on the Gualala River Forest. The reach was surveyed in the 2012/2013 winter and

snorkeled in the 2013 summer (see database GRWC Biological Report, Appendix 2). Although this is not sufficient for property-wide adult population modeling it will be valuable for baseline information.

In addition, through another collaborative effort, the GRWC, NMFS and the NCRWQCB are conducting snorkel surveys in the North Fork basin to develop a comprehensive assessment of the viability of coho populations in the watershed. This effort includes the Gualala River Forest North Fork main-stem. During snorkel surveys steelhead population data is also collected. The intention is to continue this study for three (3) years to cover any possible coho cohorts still present in the North Fork basin. This is a precursor step to evaluating the merits of starting a coho salmon brood stock program in the Gualala.

Thresholds

A significant factor influencing the quality of salmonid habitat is the area of primary pool habitat within a stream reach length. The generally accepted target is >40% of a reach length should be comprised of primary pools.

To quantify channel complexity a Variation Index (VI) for the thalweg is developed for each monitoring site using a model designed by Mary Ann Madej (USGS and Redwood National Park). Simply stated, the 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. The formula used for analysis is: ([Variation Index 02]![SD]/[Variation Index 02]![GRWC BF Depth])*100.

The VI target for recovery is considered to be '20' (Madej, 1999) and channels with a VI index of > 20 are believed to be in recovery from excessive sediment loads.

Literature concerning stream temperatures for coho and steelhead indicates that suitable temperatures for these salmonids occur within the range of 10^0 to 17.5° C (50-63.5° F) gauged from a seven-day rolling average of the daily average temperatures (Welsh, 2001, Sullivan, 2000). The maximum of the weekly averages is referred to as MWAT and is often used as a single point metric to evaluate stream temperature. The GRWC uses thresholds developed by NCWAP (Klamt, et al, 2003) for the Gualala watershed (Table 2.3).

Table 2.3: Temperature Thresholds

NCWAP Thresholds	MWAT
Fully Suitable	10-15.6^o C
Moderately Suitable	15.7-16.7^o C
Somewhat Suitable	16.8-17.2^o C
Undetermined	17.3-17.8^o C
Somewhat Unsuitable	17.9-18.9^o C
Moderately Unsuitable	19-19.9^o C
Fully Unsuitable	$\geq$ *20^o C*

Recommendations

TEMPERATURE

Temperature monitoring should be continued on an annual basis. Current temperature data is limited with only 3 years of data (2004, 2009 and 2013). Once sufficient baseline data has been collected, it may not be necessary to survey all sites annually and a rotational monitoring plan could be developed. Monitoring sites could be expanded to capture temperature in Rockpile Creek at the upper end of the property line to evaluate temperature entering the property, as in the North Fork, and additional sites may be added for project specific monitoring.

Air & water temperature site estimated cost (includes data management): New site $500.00 (includes equipment cost) - Existing site $325.00 GRWC has match funding available for landowners participating in the Cooperating Monitoring Program.

SEDIMENT, IN-STREAM HABITAT AND LARGE WOOD

The GRWC Cooperative Monitoring Program is designed and approved to monitor sediment reduction within the Gualala River watershed. The design of the reach monitoring protocol also allows for quantitative data collection on metrics that define habitat quality, including large wood abundance. Gualala River Forest could continue monitoring either in collaboration with the GRWC or using the established protocols. In addition to the three reaches already installed on the property the GRWC has (6) proposed reaches not installed. Monitoring could be continued and expansion should focus on the installation of a the GRWC monitoring reach in Bear Creek (#693) of the North Fork and the proposed Rockpile Creek main-stem reach (#683). Consideration should also be given to the possible addition of one to two more reaches in the Rockpile main-stem planned primarily to monitor project effectiveness and the proposed reach (#681) in Horsethief Canyon.

Monitoring reach estimated cost (includes data management): New site $4,000.00 (includes equipment cost) - Existing site $3,000.00. GRWC has matched funding available for landowners participating in the Cooperating Monitoring Program.

In 2001 approximately 100 miles of the Gualala River watershed was habitat typed during the NCWAP assessment process. Although there is some conflict in the mapping extant of the data, stream reaches within the property were not included in the assessment. Habitat typing can be used as a coarse indicator of potential limiting factors, to determine general habitat conditions and to provide specific restoration prescriptions. While habitat typing provides a useful inventory it is not a valid monitoring tool (Poole et al., 1997). Consequently, repeated habitat typing is not a valid way to monitor change in stream habitats over time (Krisweb). Habitat typing the smaller tributaries where monitoring reaches are not installed (Stewart Creek, Hayfield Creek, and Red Rock Creek) may be useful to determine their overall fisheries value and limits of anadromy.

BIOLOGICAL ASSESSMENT

As discussed earlier, spawning and snorkel surveys are being conducted in the Gualala River watershed and on a limited basis within the Gualala River Forest. Since salmonid data is limiting in Rockpile Creek snorkel surveys could be conducted when/if reach sites are installed to determine over-summer juvenile relative abundance. It is unlikely there are still viable coho salmon populations in Rockpile Creek but determining steelhead juvenile abundance and distribution could be a valuable tool for land use adaptive management, restoration project planning and effectiveness monitoring.

Monitoring reach estimated cost (includes data management): $300.00

Increasing spawning surveys in the Rockpile basin to determine population estimates could be considered when the Gualala River watershed-wide CMP frame work is adopted.

The quality and diversity of benthic communities can be an indicator to evaluate environmental quality and stream health. The State Waterboard (SWQCB) is in the process of developing a work plan for *DEVELOPING BIOLOGICAL OBJECTIVES FOR PERENNIAL WADEABLE STREAMS IN THE STATE OF CALIFORNIA* to develop numeric objectives for biota within streams in forested watersheds. Although not yet approved, it appears that the proposed sampling protocols are sufficiently different from protocols used in past sampling efforts; consequently the data will not be comparable. There also appears to be some ambiguity on whether the costs will be borne by the landowner or a regulatory agency. Expanding monitoring to sampling macro invertebrates should be postponed until these issues are resolved.

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Gualala River Watershed Technical and Scientific Studies, Assessments and Reports Table			
Author	**Document Name, Year Published**	**Reference**	**Document Description and location**
GRWC	GRWC Monitoring Program Status Report, 2013	(GRWC, 2013)	Lists GRWC
NOAA	Final Recovery Plan for Central California Coast coho salmon (Oncorhynchus kisutch) Evolutionarily Significant Unit, 2003	(NOAA, 2012)	Assessment and recovery strategies. http://swr.nmfs.noaa.gov/recovery/
GRWC	GRWC Strategic Plan 2010	(GRWC, 2010)	
Ecorp Consulting	Gualala Estuary and Lower River Enhancement Plan	(ECORP Consulting, Inc. *et al*., 2005)	Fisheries assessment of the Gualala River Estuary. http://grwc.info/Assets/Reports/Gualala-River-Estuary-Report-05.pdf
Multi Agency	2003 North Coast Watershed Assessment Program (NCWAP) Gualala River Synthesis Report, 2003	(Klamt, et al., 2003)	Multi-agency assessment of the Gualala River Watershed. http://grwc.info/Assets/Reports/cdfg-ncwap-summary.pdf
GRWC	GRWC Quality Assurance Project Plan for Monitoring Sediment Reduction, 2002	(GRWC, 2002)	Project effectiveness monitoring quality assurance plan. http://grwc.info/Assets/Reports/grwc-qapp-ver-3-1.pdf
North Coast Regional Water Quality Control Board	Gualala River Technical Support Document for Sediment (TSD), 2001	(NCRWQCB, 2001)	TMDL Technical Support Document, evaluating sediment source inputs into the Gualala River Watershed http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/gualala_river
Stillwater Sciences	Preservation Ranch Limiting Factors Analysis	(Stillwater, 2008)	Steelhead Trout Limiting Factor analysis on Buckeye Creek and the Wheatfield Fork, Gualala River Watershed
O'Connor Environmental	THALWEG PROFILE ANALYSIS, GUALALA RIVER WATERSHED ASSESSMENT & COOPERATIVE MONITORING PROGRAM	(O'Connor Environmental, 2006)	Statistical study on channel elevations in the Gualala watershed based on measuring aggradation using a thalweg profile analysis.
O'Connor Environmental	Sediment Source Analysis	(O'Connor Environmental, 2008)	Sediment Source analysis extrapolated to a planning watershed scale.

California Department of Fish and Game	California Salmonid Stream Habitat Restoration Manual Volume II, January 2004.	(CDFG, 2004)	Describes several components of watershed restoration including sediment production and delivery, upslope erosion assessment, analysis and reporting of assessment data, implementing restoration work, quality control, documentation of projects, and project monitoring. http://www.dfg.ca.gov/fish/resources/habitatmanual.asp
Hagans and Weaver	Handbook for Forest and Ranch Roads, 1994	(Hagans, et al., 1994)	Technical road restoration manual http://www.krisweb.com/biblio/gen_mcrcd_weaveretal_1994_handbook.pdf
North Coast Regional Water Quality Control Board	Water Quality Control Plan for the North Coast Region, State of California, February 1993	(NCRWQCB, 1993)	Document describes protection of beneficial uses, and wastewater discharge guidelines http://www.swrcb.ca.gov/northcoast/water_issues/programs/basin_plan

Appendix 1

Gualala River Watershed Road Restoration Status

Gualala River Watershed - Road Upgrading

Owner	Acres	Abandoned		Deacti-vated	Not Connected	Storm Proofed	Upgraded	Improved Total	Miles Total	Percent Disconnected	Road Miles/Square Mile	
		Fixed	Left								Total*	Connected*
WAA Name *NF Gualala*												
Planning Watershed *Billings Creek*												
Other	8,217							0.0	60.6	0.0%	4.7	4.7
Wheeler	882							0.0	3.8	0.0%	2.8	2.8
Gualala River Forest	1,551							0.0	14.7	0.0%	6.1	6.1
Billings Creek	10,650							0.0	79.1	0.0%	4.8	4.8
Planning Watershed *Doty Creek*												
Gualala Redwoods, Inc.	3,568			2.0		36.7	0.0	38.7	44.4	87.2%	8.0	1.0
Other	689					0.7		0.7	9.9	7.1%	9.2	8.6
Mendocino Redwood Co	370	0.2				1.0		1.3	5.6	22.6%	9.7	7.5
Doty Creek	4,628	0.2		2.0		38.5	0.0	40.7	60.0	67.9%	8.3	2.7
Planning Watershed *Robinson Creek*												
Mendocino Redwood Co	509			0.9				0.9	6.7	12.6%	8.4	7.4
Gualala River Forest	1,982			0.1				0.1	21.4	0.3%	6.9	6.9
Gualala Redwoods, Inc.	5,898	0.3	0.6	7.8	3.2	16.2	13.7	41.8	61.0	68.5%	6.6	2.1
Other	402			0.1		0.0		0.2	3.7	4.4%	5.8	5.6
Robinson Creek	8,792	0.3	0.6	8.9	3.2	16.3	13.7	42.9	92.8	46.2%	6.8	3.6
Planning Watershed *Stewart Creek*												
Other	249							0.0	2.4	0.0%	6.1	6.1
Gualala River Forest	4,392							0.0	52.6	0.0%	7.7	7.7
Gualala Redwoods, Inc.	1,944			1.3		0.8	1.9	4.0	22.8	17.4%	7.5	6.2
Stewart Creek	6,585			1.3		0.8	1.9	4.0	77.8	5.1%	7.6	7.2
NF Gualala	30,654	0.5	0.6	12.2	3.2	55.5	15.7	87.5	309.7	28.3%	6.5	4.6
WAA Name *Rockpile*												
Planning Watershed *Lower Rockpile Creek*												
Preservation Ranch	561				0.0			0.0	6.8	0.4%	7.8	7.8
Other	12			0.0				0.0	0.1	0.0%	5.0	5.0
Gualala River Forest	2					0.0	0.0	0.0	0.2	9.8%	54.4	49.1
Gualala Redwoods, Inc.	2,371		0.5	1.3	2.4	2.9	1.7	8.8	22.8	38.8%	6.1	3.8
Lower Rockpile Creek	2,946		0.5	1.3	2.5	2.9	1.8	8.9	29.9	29.7%	6.5	4.6
Planning Watershed *Middle Rockpile Creek*												
Other	3,428							0.0	26.7	0.0%	5.0	5.0
Preservation Ranch	248							0.0	2.8	0.0%	7.2	7.2
Gualala River Forest	3,793							0.0	34.9	0.0%	5.9	5.9
Howlett	697					0.0		0.0	6.0	0.2%	5.5	5.5
Middle Rockpile Creek	8,165					0.0		0.0	70.4	0.0%	5.5	5.5

** Occasional very high road miles per square mile are the result of a very small acreage owned in a watershed with a road across it.*

Owner	Acres	Abandoned		Deacti-	Not	Storm	Upgraded	Improved	Miles	Percent	Road Miles/Square Mile	
		Fixed	Left	vated	Connected	Proofed		Total	Total	Disconnected	Total*	Connected*
Planning Watershed *Red Rock*												
Gualala Redwoods, Inc.	9				0.0	0.1		0.1	0.2	48.0%	17.4	9.1
Gualala River Forest	1,561				0.0			0.0	14.7	0.0%	6.0	6.0
Other	4							0.0	0.0	0.0%	2.9	2.9
Preservation Ranch	645							0.0	6.1	0.0%	6.0	6.0
Red Rock	2,219				0.0	0.1		0.1	21.0	0.6%	6.1	6.0
Planning Watershed *Upper Rockpile Creek*												
Other	2,091							0.0	13.7	0.0%	4.2	4.2
Gualala River Forest	2,457							0.0	13.0	0.0%	3.4	3.4
Wheeler	438							0.0	2.3	0.0%	3.4	3.4
Foppiano	4,088							0.0	18.3	0.0%	2.9	2.9
Upper Rockpile Creek	9,073							0.0	47.4	0.0%	3.3	3.3
Rockpile	22,403		0.5	1.3	2.5	3.1	1.8	9.0	168.7	5.3%	4.8	4.6
WAA Name *Buckeye*												
Planning Watershed *Flat Ridge Creek*												
Other	2,465							0.0	12.7	0.0%	3.3	3.3
Preservation Ranch	4,063							0.0	40.4	0.0%	6.4	6.4
Flat Ridge Creek	6,529							0.0	53.1	0.0%	5.2	5.2
Planning Watershed *Grasshopper Creek*												
Other	1,955					1.2	0.2	1.3	22.3	6.0%	7.3	6.9
Preservation Ranch	3,811						1.0	1.0	40.5	2.5%	6.8	6.6
Grasshopper Creek	5,766					1.2	1.2	2.4	62.8	3.8%	7.0	6.7
Planning Watershed *Harpo Reach*												
Other	1,323					0.0		0.0	6.9	0.6%	3.3	3.3
Preservation Ranch	786					0.2		0.2	7.4	2.2%	6.0	5.9
Howlett	613					2.0		2.0	7.9	26.0%	8.2	6.1
Harpo Reach	2,722					2.2		2.2	22.2	10.1%	5.2	4.7
Planning Watershed *Little Creek*												
Preservation Ranch	1,256					0.0	0.0	0.0	19.3	0.1%	9.8	9.8
Gualala Redwoods, Inc.	2,410	0.3		0.6	1.2	4.5	7.5	14.1	33.4	42.3%	8.9	5.1
Other	2,202							0.0	28.2	0.0%	8.2	8.2
Little Creek	5,868	0.3		0.6	1.2	4.5	7.5	14.1	80.8	17.5%	8.8	7.3
Planning Watershed *North Fork Osser Creek*												
Gualala River Forest	226							0.0	0.7	0.0%	2.0	2.0
Other	4,673							0.0	31.0	0.0%	4.2	4.2
North Fork Osser Cree	4,899							0.0	31.7	0.0%	4.1	4.1
Buckeye	25,784	0.3		0.6	1.2	7.9	8.7	18.7	250.6	7.5%	6.2	5.8

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Owner	Acres	Abandoned		Deacti-	Not	Storm	Upgraded	Improved	Miles	Percent	Road Miles/Square Mile	
		Fixed	Left	vated	Connected	Proofed		Total	Total	Disconnected	Total*	Connected*
WAA Name *Wheatfield*												
Planning Watershed *Annapolis*												
Other	2,279			0.0		0.1		0.1	24.1	0.5%	6.8	6.7
Mendocino Redwood Co	3,121			0.1		2.2		2.3	34.1	6.6%	7.0	6.5
Gualala Redwoods, Inc.	2,179	0.7	0.5	5.5		1.3	0.1	8.2	27.5	29.8%	8.1	5.7
Annapolis	7,579	0.7	0.5	5.6		3.6	0.1	10.6	85.7	12.3%	7.2	6.3
Planning Watershed *Britain Creek*												
Other	4,220							0.0	22.3	0.0%	3.4	3.4
Soper Wheeler	2,488							0.0	13.7	0.0%	3.5	3.5
Britain Creek	6,708							0.0	36.0	0.0%	3.4	3.4
Planning Watershed *Buck Mountain*												
Preservation Ranch	4							0.0	0.1	0.0%	17.8	17.8
Other	8,185							0.0	41.0	0.0%	3.2	3.2
Buck Mountain	8,189							0.0	41.1	0.0%	3.2	3.2
Planning Watershed *Fuller Creek*												
Mendocino Redwood Co	885					2.0		2.0	7.2	27.3%	5.2	3.8
Other	2,784		0.1			13.5		13.5	27.9	48.3%	6.4	3.3
Preservation Ranch	3,370	1.2	1.1	3.3		2.1		7.8	38.9	20.0%	7.4	5.9
Fuller Creek	7,039	1.2	1.2	3.3		17.6		23.3	74.0	31.4%	6.7	4.6
Planning Watershed *Haupt Cr*												
Mendocino Redwood Co	614		0.6			0.2		0.7	5.1	14.6%	5.3	4.5
Soper Wheeler	32							0.0	0.3	0.0%	6.1	6.1
Other	3,955							0.0	18.0	0.0%	2.9	2.9
Ohlson	1,443							0.0	9.0	0.0%	4.0	4.0
Haupt Cr	6,043		0.6			0.2		0.7	32.3	2.3%	3.4	3.3
Planning Watershed *House Creek*												
Soper Wheeler	3,139							0.0	10.1	0.0%	2.1	2.1
Other	2,155							0.0	14.7	0.0%	4.4	4.4
House Creek	5,293							0.0	24.8	0.0%	3.0	3.0
Planning Watershed *Pepperwood Creek*												
Soper Wheeler	4,371							0.0	18.5	0.0%	2.7	2.7
Other	1,870					0.0		0.0	9.2	0.0%	3.1	3.1
Pepperwood Creek	6,241					0.0		0.0	27.7	0.0%	2.8	2.8
Planning Watershed *Tobacco Creek*												
Other	2,705					1.5		1.5	18.8	8.2%	4.4	4.1
Soper Wheeler	279							0.0	1.0	0.0%	2.3	2.3
Preservation Ranch	2,174							0.0	19.4	0.0%	5.7	5.7
Ohlson	569					0.3		0.3	4.0	8.5%	4.5	4.1
Mendocino Redwood Co	2,334	1.6				6.8		8.4	18.2	46.4%	5.0	2.7
Tobacco Creek	8,061	1.6				8.7		10.3	61.4	16.8%	4.9	4.1

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Owner	Acres	Abandoned		Deacti-	Not	Storm	Upgraded	Improved	Miles	Percent	Road Miles/Square Mile	
		Fixed	Left	vated	Connected	Proofed		Total	Total	Disconnected	Total*	Connected*
Planning Watershed *Tombs Creek*												
Silva Ranch	1,373					7.3		7.3	13.1	55.3%	6.1	2.7
Other	4,865					0.0		0.0	21.6	0.0%	2.8	2.8
Tombs Creek	6,237					7.3		7.3	34.8	20.9%	3.6	2.8
Planning Watershed *Wolf Creek*												
Soper Wheeler	1,577							0.0	6.7	0.0%	2.7	2.7
Preservation Ranch	2,733							0.0	22.0	0.0%	5.1	5.1
Silva Ranch	2,782					2.3		2.3	11.6	19.5%	2.7	2.2
Other	3,009							0.0	17.6	0.0%	3.7	3.7
Wolf Creek	10,101					2.3		2.3	57.8	3.9%	3.7	3.5
Wheatfield	71,492	3.5	2.3	9.0		39.5	0.1	54.4	475.7	11.4%	4.3	3.8
WAA Name *SF Gualala*												
Planning Watershed *Big Pepperwood Creek*												
Other	678	0.0						0.0	9.9	0.1%	9.3	9.3
Gualala Redwoods, Inc.	5,853	1.5	1.2	4.3	2.5	23.3	14.3	47.0	74.1	63.5%	8.1	3.0
Big Pepperwood Cree	6,531	1.5	1.2	4.3	2.5	23.3	14.3	47.1	84.0	56.0%	8.2	3.6
Planning Watershed *Lower Marshall Creek*												
Other	6,016							0.0	35.2	0.0%	3.7	3.7
Lower Marshall Creek	6,016							0.0	35.2	0.0%	3.7	3.7
Planning Watershed *Middle South Fork Gualala Ri*												
Mendocino Redwood Co	3							0.0	0.2	0.0%	38.9	38.9
Other	7,907							0.0	44.2	0.0%	3.6	3.6
Middle South Fork Gu	7,910							0.0	44.4	0.0%	3.6	3.6
Planning Watershed *Mouth of the Gualala River*												
Gualala Redwoods, Inc.	3,516	0.6		0.1	0.3	6.1	13.2	20.2	45.5	44.3%	8.3	4.6
Other	1,788							0.0	21.3	0.0%	7.6	7.6
Mouth of the Gualala	5,305	0.6		0.1	0.3	6.1	13.2	20.2	66.8	30.2%	8.1	5.6
Planning Watershed *Upper Marshall Creek*												
Other	6,619					14.3		14.3	40.4	35.5%	3.9	2.5
Upper Marshall Creek	6,619					14.3		14.3	40.4	35.5%	3.9	2.5
Planning Watershed *Upper South Fork Gualala Ri*												
Soper Wheeler	4							0.0	0.0	0.0%	0.1	0.1
Other	8,399					8.1		8.1	57.1	14.2%	4.4	3.7
Upper South Fork Gua	8,403					8.1		8.1	57.1	14.2%	4.4	3.7
SF Gualala	40,783	2.0	1.2	4.3	2.7	51.9	27.5	89.7	327.8	27.3%	5.1	3.7

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Owner	Acres	Abandoned		Deacti-	Not	Storm	Upgraded	Improved	Miles	Percent	Road Miles/Square Mile	
		Fixed	Left	vated	Connected	Proofed		Total	Total	Disconnected	Total*	Connected*
WAA Name	*Coastal Gualala*											
Planning Watershed	*Black Point*											
Other	3,493					0.0		0.0	47.9	0.0%	8.8	8.8
Gualala Redwoods, Inc.	1,128					3.6	0.4	4.0	14.0	28.6%	7.9	5.7
Black Point	4,621					3.6	0.4	4.0	61.9	6.5%	8.6	8.0
Coastal Gualala	4,621					3.6	0.4	4.0	61.9	6.5%	8.6	8.0
Grand Total	195,737	6.3	4.6	27.3	9.6	161.3	54.2	263.4	1,594.3	16.5%	5.2	4.4

** Occasional very high road miles per square mile are the result of a very small acreage owned in a watershed with a road across it.*

Appendix 2

Gualala Forest Database Stream Report

Gualala River Forest Database Biological Report

North Fork Planning Watershed Monitoring Map

Rockpile Creek Planning Watershed Monitoring Map

Stream Monitoring Report

Ownerships: Gualala River Forest
Visit Purpose: All
Planning Watersheds: All

Station Number	Name	Miles Up Stream	Year	Temperature: Seasonal Maximum	Temperature: MWAT	LWD Bank Full (>6 In & >4 Ft or >10 CuFt): CuFt/ 1000'	LWD Bank Full: Pieces/ 1000'	Substrate: >0.85 mm	Substrate: D50	Streambed (Thalweg): Slope	Streambed: VI	Streambed: A/D	Riparian Zone: Canopy % WLPZ	Riparian Zone: Canopy % Cr.	Riparian Zone: Basal Area	Riparian Zone: Tree Ht.	Fish or Redds per Mile: Coho	Fish or Redds per Mile: SH (1+)	Fish or Redds per Mile: Redds	Aquatic Macroinvertebrates: Richness	Aquatic Macroinvertebrates: Hilsenhoff	Aquatic Macroinvertebrates: % Dominant	Aquatic Macroinvertebrates: Simpson	Aquatic Macroinvertebrates: Russian R Index
Hydrologic Unit																								
Stream			**Bear Creek**																					
693		0.57	2009		17.1	15.1																		
Bear Creek			**Avg**		**17.1**	**15.1**																		
Stream			**Billings Cr**																					
698	Bil	0.00	2004		25.2	21.6																		
698	Bil	0.00	2009		26.0	20.8																		
Billings Cr			**Avg**		**25.6**	**21.2**																		
Stream			**North Fork Gualala**																					
328	NFGRF	10.30	2013															2,084	15					
691	NFG5	12.22	2004		24.4	21.0																		
691	NFG5	12.22	2009		23.2	19.5	227	4		20	0.3%	43		50%	43%									
North Fork Gualala			**Avg**		**23.8**	**20.2**	**227**	**4**		**20**	**0.3%**	**43**		**50%**	**43%**			**2,084**	**15**					
Stream			**Robinson Cr East**																					
327	RobE	0.00	2013																8					
692	Rbn2	0.00	2004		20.6	17.9																		
692	Rbn2	0.00	2009		21.0	18.2	153	8		44	1.6%	65		73%	77%									
697	Rbn1	0.47	2004				622	7		26	0.6%	23												
697	Rbn1	0.47	2009		23.0	18.7	690	11		33	0.6%	35	-0.39											
Robinson Cr East			**Avg**		**21.5**	**18.3**	**488**	**9**		**34**	**0.9%**	**41**	**-0.4**	**73%**	**77%**				**8**					
Hydrologic Unit NF Gualala			**Avg**		**22.6**	**19.1**	**423**	**8**		**31**	**0.8%**	**42**	**-0.4**	**62%**	**60%**			**2,084**	**11**					
Hydrologic Unit																								
Stream			**Horsethief Canyon**																					
681	Hor1	0.00	2004		17.5	17.0																		
681	Hor1	0.00	2009		16.4	15.9																		
Horsethief Canyon			**Avg**		**16.9**	**16.4**																		
Stream			**Red Rock Creek**																					
678		0.19	2009		15.6	15.1																		
Red Rock Creek			**Avg**		**15.6**	**15.1**																		

Station Number	Name	Miles Up Stream	Year	Temperature		LWD Bank Full >6 In & >4 Ft or >10 CuFt		Substrate		Streambed (Thalweg)			Riparian Zone				Fish or Redds per Mile			Aquatic Macroinvertebrates		
				Seasonal Maximum	MWAT	CuFt/ 1000'	Pieces/ 1000'	>0.85 mm	D50	Slope	VI	A/D	Canopy % WLPZ	Canopy % Cr.	Basal Area	Tree Ht.	Coho	SH (1+)	Redds	Richness	Hilsenhoff Simpson	% Dominant Russian R Index
Stream			**Rockpile Creek**																			
680	Roc	7.77	2004	24.8	21.2																	
680	Roc	7.77	2009	23.6	19.5																	
683	Roc5	8.71	2004	24.0	20.6																	
683	Roc5	8.71	2009	23.2	19.1																	
Rockpile Creek			**Avg**	**23.9**	**20.1**																	
Hydrologic Unit Rockpile			**Avg**	**20.7**	**18.3**																	
			Avg	**21.7**	**18.7**	**423**	**8**		**31**	**0.8%**	**42**	**-0.4**	**62%**	**60%**			**2,084**	**11**				
			Min	**15.6**	**15.1**	**153**	**4**		**20**	**0.3%**	**23**	**-0.4**	**50%**	**43%**			**2,084**	**8**				
			Max	**26.0**	**21.6**	**690**	**11**		**44**	**1.6%**	**65**	**-0.4**	**73%**	**77%**			**2,084**	**15**				
Old Growth Watersheds (HRSP)				18.5	16.6			21.6%	62											26.2	0.89	
Poor-Normal-Good											>20									26-35	.8-.89	4.6-3.1 12-17 39-15
NCWQCB Target				18.3	16.8			<14%														

Temperature

- Seasonal Maximum – The highest water temperature recorded during the summer.
- Maximum weekly average temperature (MWAT) - The highest average temperature for any seven day rolling average

Large Woody Debris (LWD)

- LWD must be at least 6 inches on the small end and longer than 4 feet.
- Cubic Feet per 1,000 feet – The cubic volume of LWD located between the bankfull lines.
- Pieces per 1,000' – The number of LWD pieces per 1000'

Stream Substrate

- <0.85mm – The percent fines less than 0.85 millimeters in a McNeal sample.
- D50- The pebble size of the median pebble of a 100 pebble sample. Three sample sites on each reach are averaged.

Fish Surveys

- Presence/absence snorkel surveys also estimate fish numbers per mile.
  - Coho – Coho salmon any age.
  - SH (1+) – Steelhead one year old or older.
- Redds - Number of salmon spawning nests found per mile during the season.

Streambed (Thalweg) Survey

- Slope – the slope of the channel
- VI – The variation index is the [(SD of residual depth/bank full depth) *100]. This is a way of quantifying roughness and hence suitability for fish. Greater than 20 is a good indication of recovery.
- A/D – The change in elevation of the channel (aggradation or degradation) relative to the first year of measurement.

Riparian Condition

- Canopy Cover percent as measured with a spherical densiometer. Every 200', canopy percent is measured in the center of the channel. And at bank full and 50' into the riparian zone from bankfull on both sides of the channel. Four measurements are averaged at each point.
- WLPZ (Watercourse and Lake Protection Zone) – The average of all the measurements taken on either side of the channel 50' into the riparial zone.
- Cr. – The average of all the measurements taken in the center of the channel.
- Riparian inventory plots were locate both sides of the channel every 200'
- Basal Area – Is the average basal area in square feet of all the riparian plots
- Tree Ht. – Is the average height of the 100 tallest trees per acre.

Macroinvertebrates

- Richness – Total number of Genuses represented.
- Simpson Diversity Index – Measures the evenness of species diversity
- Hilsenhoff – This is a locally modified Hilsenhoff index. It indicates levels of organic pollution
- Russian River Index – A localized index that combines several standard metrics
- Percent Dominant Taxon – this is a species distribution index

Thalweg Report

Ownerships: Gualala River Forest

Planning Watersheds: All

Stream	Station			Distance up Stream (Feet)	Drainage Area (Acres)	Slope	Streambed Agradation Degradation (Feet)	Variation Index	Pools						Max Depth	Longitudinal Cross Sectional Area of Pools >1' Deep (Sq Ft/1,000')
	Name	#	Visit ID	Year					>1'	%	>2'	%	>3'	%		
Watershed	NF Gualala															
NF Gualala	NFG5	691	1194	2009	64,500	12,160	0.32%		43.5	3	49%	2	38%	1	19%	5.5	652
Robinson E	Rbn2	692	1192	2009	10	4,061	1.64%		65.3	11	56%	3	29%	2	19%	7.2	718
Robinson E	Rbn1	697	686	2004	2,500	3,022	0.59%		22.8	6	41%	2	16%	1	13%	3.1	325
Robinson E	Rbn1	697	1193	2009	2,500	3,022	0.61%	-0.39	35.0	6	52%	4	36%	2	17%	4.3	585

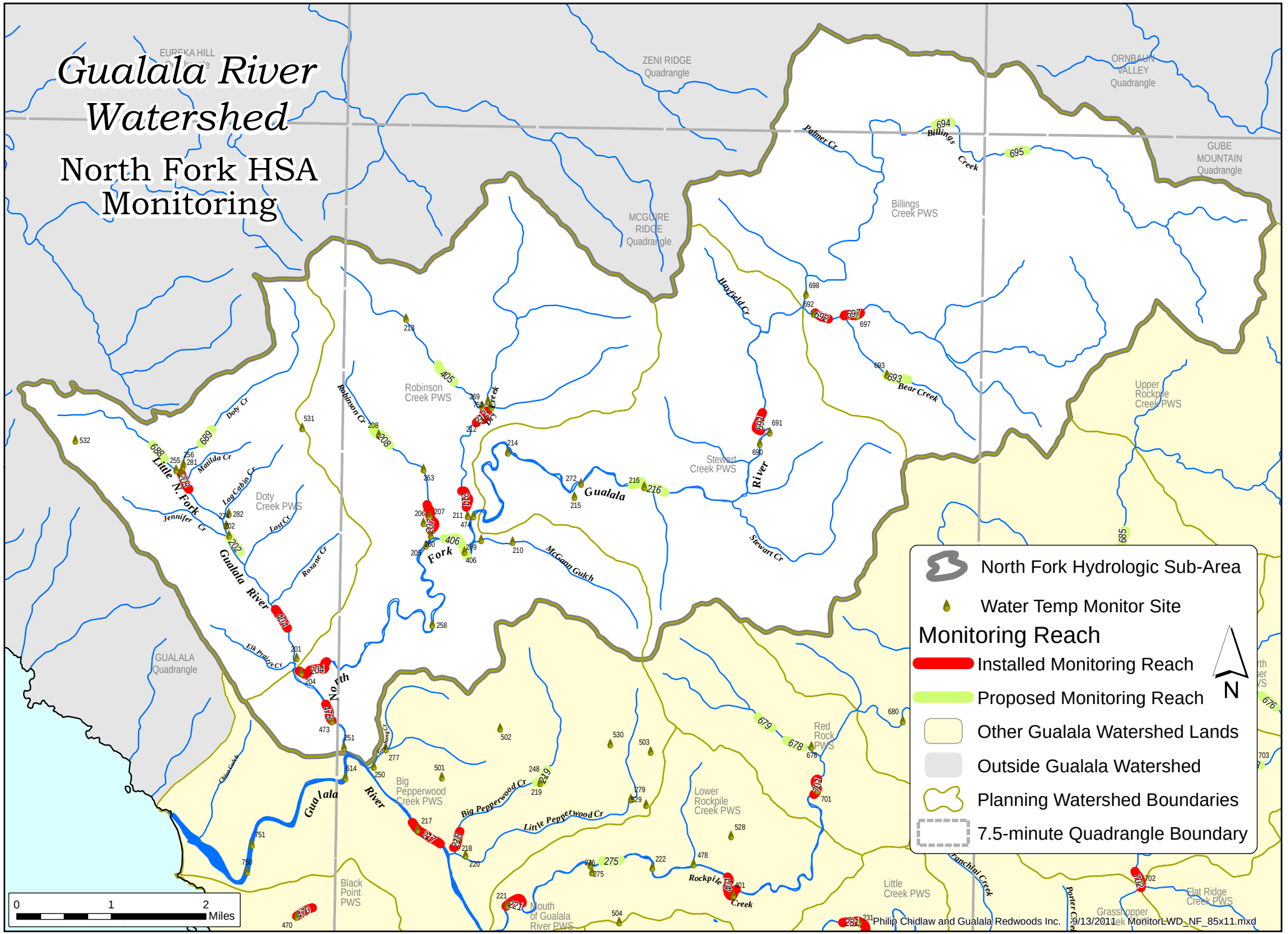
Total Station Visits: 4

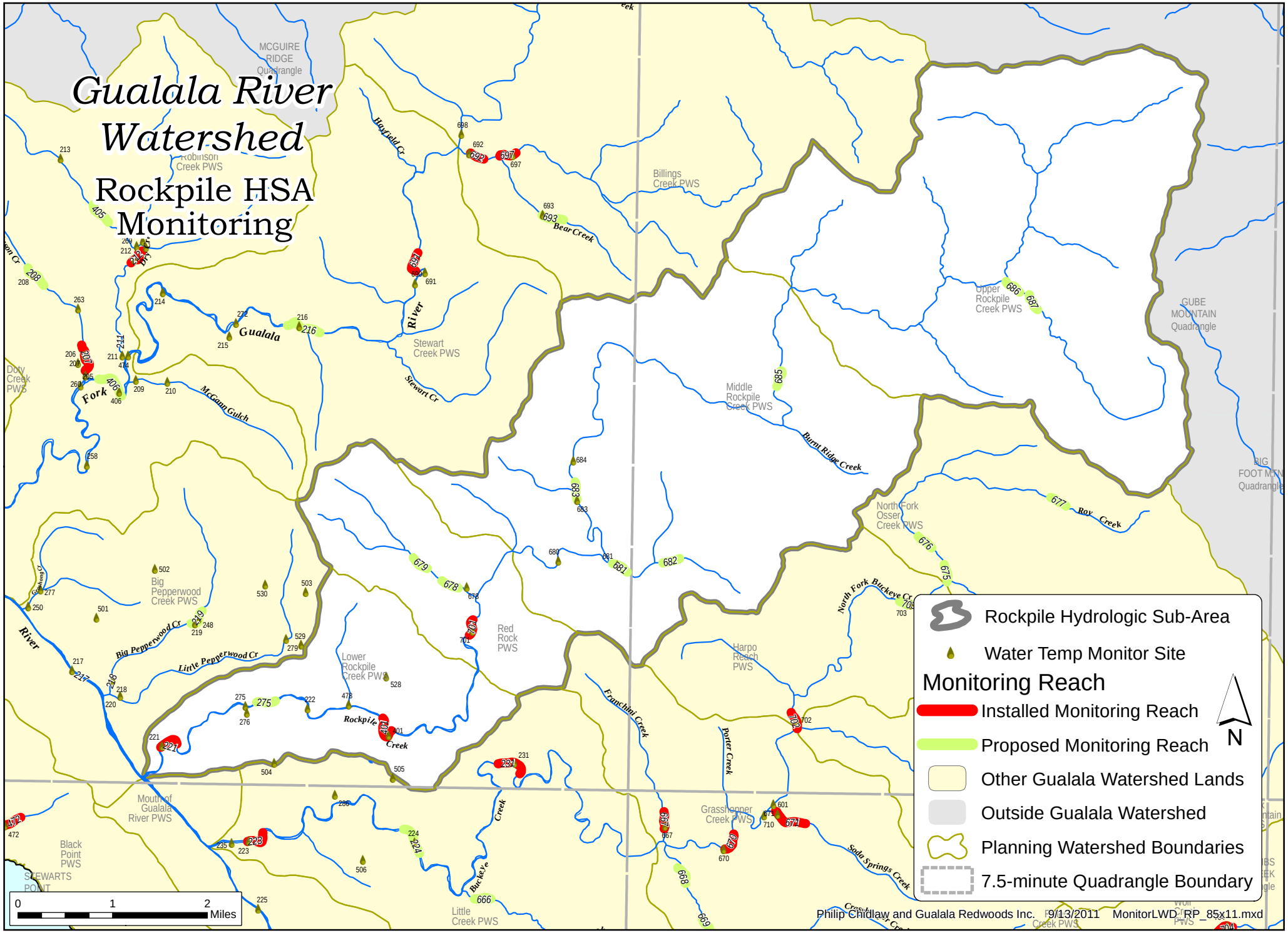
Biological Report

Ownerships: Gualala River Forest
Visit Purpose: All
Planning Watersheds: All

Stream	Station Name	#	Year	Distance up Stream (Feet)	Reach Length (Feet)	Purpose	Fish or Redds per Mile				Benthic Macroinvertebrates (BMI)					
							Adult Fish SH	Redds	Coho Fry	Steel-head Parr 1+	Rich-ness	Simp-son	ETP Taxa	% Dom-inant	Russian River Index	North Coast IBI
Watershed: NF Gualala																
NF Gualala	NFGRF	328	2013	54,401	19,600	Fish Pool Dive				2,084						
NF Gualala	NFGRF	328	2013	54,401	7,600	Spawner Survey	5.6	14.6								
Robinson E	RobE	327	2013	0	2,000	Spawner Survey	0.0	7.9								

Total Station Visits: 3


Gualala River Watershed
North Fork HSA Monitoring
EUREKA HILL Quadrangle
ZENI RIDGE Quadrangle
ORNBAUN VALLEY Quadrangle
GUBE MOUNTAIN Quadrangle
MCGUIRE RIDGE Quadrangle
GUALALA Quadrangle
Billings Creek PWS
Robinson Creek PWS
Doty Creek PWS
Stewart Creek PWS
Upper Rockpile Creek PWS
Red Rock PWS
Lower Rockpile Creek PWS
Little Creek PWS
Flat Ridge Creek PWS
Grasshopper Creek PWS
Black Point PWS
Mouth of Gualala River PWS
Big Pepperwood Creek PWS
Palmer Cr
Billings Creek
Hayfield Cr
Bear Creek
Robinson Cr
Doty Cr
Matilda Cr
Log Cabin Cr
Jennifer Cr
Lost Cr
Roxane Cr
Little N. Fork
N. Fork
Fork
Gualala River
Elk Prairie Cr
McGann Gulch
Stewart Cr
Big Pepperwood Cr
Little Pepperwood Cr
Rockpile Creek
Zanchini Creek
Potter Creek
0 1 2 Miles
North Fork Hydrologic Sub-Area
Water Temp Monitor Site
Monitoring Reach
Installed Monitoring Reach
Proposed Monitoring Reach
Other Gualala Watershed Lands
Outside Gualala Watershed
Planning Watershed Boundaries
7.5-minute Quadrangle Boundary
N
Philip Chidlaw and Gualala Redwoods Inc. 9/13/2011 Monitor-WD_NF_85x11.mxd


Gualala River Watershed
Rockpile HSA Monitoring
MCGUIRE RIDGE Quadrangle
Robinson Creek PWS
Billings Creek PWS
Stewart Creek PWS
Upper Rockpile Creek PWS
Middle Rockpile Creek PWS
North Fork Osser Creek PWS
GUBE MOUNTAIN Quadrangle
Doty Creek PWS
Big Pepperwood Creek PWS
Lower Rockpile Creek PWS
Red Rock PWS
Harpo Reach PWS
Mouth of Gualala River PWS
Black Point PWS
STEWARTS POINT
Little Creek PWS
Grasshopper Creek PWS
Gualala River
Big Pepperwood Cr
Little Pepperwood Cr
McGann Gulch
Bear Creek
Burnt Ridge Creek
Ray Creek
North Fork Buckeye Cr
Franchini Creek
Porter Creek
Soda Springs Creek
Buckeye Creek
Rockpile Creek
Hayfield Cr
Stewart Cr
Rockpile Hydrologic Sub-Area
Water Temp Monitor Site
Monitoring Reach
Installed Monitoring Reach
Proposed Monitoring Reach
Other Gualala Watershed Lands
Outside Gualala Watershed
Planning Watershed Boundaries
7.5-minute Quadrangle Boundary
N
0 1 2 Miles
Philip Chidlaw and Gualala Redwoods Inc. 9/13/2011 MonitorLWD_RP_85x11.mxd

APPENDIX E

THE CONSERVATION FUND

North Coast Forest Conservation Program Policy Digest
August 2010; updated annually

TABLE OF CONTENTS

North Coast Forest Conservation Program Policy Digest Overview
The Conservation Fund's North Coast Forest Conservation Program
Primary authors: Jenny Griffin, Evan Smith
August 2010, updated September 2012

Introduction

The following summary of The Conservation Fund's North Coast California forest management policies was prepared to facilitate review and provide links for more information in a single source document.

Program Background

The Conservation Fund's Mendocino County forest properties were acquired as part of the Fund's North Coast Forest Conservation Initiative, which is dedicated to the permanent protection and restoration of coastal forests in the Redwood Region of northern California. The strategic foundation for the Initiative is described in "Conservation Prospects for the North Coast"[1] prepared in 2005 by The Conservation Fund for the California Coastal Conservancy. This study noted the extraordinary biological diversity and economic productivity of the coastal forests of the Redwood Region and recommended that conservationists "move quickly to establish 'working landscape' conservation management on large, strategically located forest …. properties in Humboldt, Mendocino and Del Norte counties."

The Conservation Fund acquired the 23,785-acre Garcia River Forest in February, 2004. In October 2006, The Conservation Fund acquired an additional 16,100 acres in two tracts – the 11,707-acre Big River Forest and the 4,204-acre Salmon Creek Forest. In December 2011, The Fund acquired the 13,537 acre Gualala River Forest. Most recently, The Fund acquired the 177 acre Hardell property, adjacent to Salmon Creek, in September of 2012. The Hardell property will be managed as part of the Salmon Creek tract. The Conservation Fund and its partners developed an Integrated Resource Management Plan (IRMP) for each acquisition[2] to guide the management and restoration plan for these properties. Partners include the State Coastal Conservancy, Wildlife Conservation Board, State Water Board, North Coast Regional Water Quality Control Board, David and Lucile Packard Foundation, Nature Conservancy, and National Fish and Wildlife Foundation. These properties represent a collective capital investment of almost $97 million.

By acquiring these properties, the Fund and its partners hope to demonstrate that these large tracts of intensively managed coastal forest can gradually be returned to sustainable timber production and ecological vitality through the use of innovative financing and patient management by a nonprofit organization in partnership with private and public agencies and community stakeholders.

Property-specific Background

The Conservation Fund owns four forests in Mendocino County as part of its North Coast Forest Conservation Program: Salmon Creek, Big River, Garcia River and Gualala River. While there is one overall program, each property has some unique management requirements. Management of the Garcia River Forest is governed by the Garcia River Forest Integrated Resource Management Plan (GRF IRMP) published in August 2006. Management of the Big River and Salmon Creek Forests is governed by the Big River and Salmon Creek Integrated Resource Management Plan (BR/SC IRMP) completed in August 2009. A document outlining management of the Gualala River will be completed in 2013. All reference documents are available at

[1] Available at: http://www.conservationfund.org/north_coast_forests
[2] ibid

http://www.conservationfund.org/north_coast_forests/documents and at the Fund's North Coast Office.

There are a number of planning differences between the various forests (these are described in more detail in the Forest Management Policies):

1. Because of the different funding sources and loan agreements, each program has its own accounting records and revenue-sharing requirements. Some expenses such as staff time are shared between the accounts but are tracked and reported separately.
2. The Garcia River Watershed has an approved Total Maximum Daily Load (TMDL) Action Plan developed by the EPA and adopted by the North Coast Regional Water Quality Control Board. In compliance with the action plan TCF has developed an ownership-wide program to meet the TMDL requirements through implementation of an approved Site-Specific Management Plan and Erosion Control Plan. Water quality protection is an objective across all of the properties, but because of the TMDL status, the reporting, monitoring and specific policies for the Garcia River Forest are slightly different. [A very small portion of the Gualala Forest is also within the Garcia watershed and subject to the TMDL requirements—these will be addressed in site-specific project prescriptions.]
3. While a key objective on all properties is to increase the volume and quality of the timber inventory, the Annual Allowable Cut levels are different between the forests, primarily because of the different initial inventory conditions and partially because of the loan repayment obligations for BR/SC.
4. The Nature Conservancy holds perpetual conservation easements on the Garcia River and Gualala River Forests which, among other things, protects the land from future development. There is an established Ecological Reserve Network that comprises 35% of the Garcia River Forest where management is limited to techniques that advance the desired ecological goals, namely late-seral forest development and protection.
5. BR/SC also have permanent conservation restrictions, but in a slightly different form. Use of the BR/SC property is limited to conservation purposes (including forest management) and the State Coastal Conservancy and the Wildlife Conservation Board are responsible for ensuring the conservation objectives are met.

Program Goals

The North Coast Forest Conservation Program shall be guided by the following objectives:

- Acquire forestland with high conservation values that is under threat of loss or degradation because of human development and protect those properties for continued forest management and restoration.
- Manage the forests sustainably [and profitably], increasing the economic productivity and ecological health, while providing meaningful local employment and recreation opportunities.
- Respect the local community by operating honestly, transparently and efficiently; soliciting and responding to feedback; hiring local services and purchasing local goods; and holding ourselves to the highest standards for professional, safe and courteous conduct.
- Work collaboratively with local businesses, civic institutions, and other organizations and landowners to increase the understanding, appreciation, and value of the region's forest systems.

Unified Management

All properties that are acquired as part of the North Coast Forest Conservation Program (including Garcia River, Big River, Salmon Creek, Gualala River, and any new acquisitions) are to be managed consistent with the TCF Forest Management Policies, the property-specific management plan, and the North Coast Forest Conservation Program Goals. In addition, TCF is committed to the Principles and Criteria of the Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI) and to maintaining our annual independent certification under those systems. The Management Policies and Program Goals and their implementation will be reviewed every year as part of the Annual Program Review and updated as necessary; the management plans will be reviewed and updated on a ten-year cycle. This document and all management plans and policies are intended to be publicly available.

Policies

Existing stand alone policy documents (attached):
TCF Forest Management Policies, revised September 2012
Road Management Policies, revised September 2012
Commitment to Safety and Health, revised September 2012
HCVF RSA Program Memo, revised September 2012
Social Benefit/Impact Assessment, revised September 2012
Certified Product Chain-of-Custody Program, revised September 2012
Herbicide Application and Hardwood Management Policy, revised September 2012

Policies on the following topics are detailed within the respective IRMPs:
Ecological Reserve Network (GRF IRMP, pgs. 41-50)
Aquatic habitat restoration (GRF IRMP pgs. 51-66; 259-274; BR/SC IRMP pgs. 63-64, 108-192)
Invasive species management (GRF IRMP pgs. 66-68; BR/SC IRMP pg. 67; see also July 15, 2010 Draft "Invasive Plant Management Plan for the Salmon Creek Forest")
Water Quality (GRF IRMP pgs. 69-73; 110-117; 145-166; 254-257; 259-274; BR/SC IRMP pgs. 29-37; 58-64; 108-192)
Community Use and Involvement (GRF IRMP pgs. 105-108; BR/SC IRMP pgs. 80-84)
Monitoring (GRF IRMP pgs. 110-117; BR/SC IRMP pgs. 77-79; 258-265, 274)

FSC/SFI Standards:
In addition, FSC and SFI Standards are available at:
http://www.fscus.org/images/documents/standards/FSC-US%20Forest%20Management%20Standard%20v1.0.pdf and
http://www.sfiprogram.org/files/pdf/sfi_requirements_2010-2014.pdf

FOREST MANAGEMENT POLICIES
For The Conservation Fund's North Coast Forest Conservation Program
Principal authors: Evan Smith, Scott Kelly, Jenny Griffin
August 2010; expanded annually

Contents

I. Program Overview

These forest management policies have been developed to guide management of The Conservation Fund's Mendocino County forest properties. These properties were acquired as part of the Fund's North Coast Forest Conservation Initiative, which is dedicated to the permanent protection and restoration of coastal forests in the Redwood Region.

The strategic foundation for the Initiative is described in "Conservation Prospects for the North Coast" prepared in 2005 by The Conservation Fund for the California Coastal Conservancy. This study noted the extraordinary biological diversity and economic productivity of the coastal forests of the Redwood Region and recommended that conservationists "move quickly to establish 'working landscape' conservation management on large, strategically located forest…properties in Humboldt, Mendocino and Del Norte counties."[1]

This recommendation is based on two key findings:

1. Population growth, increasing land values, depletion of timber inventories and global competition in the commodities markets are putting increasing pressure on traditional resource-based land uses, making land use conversion increasingly likely as landowners look for more profitable uses of their land.[2]
2. The traditional approach of public acquisition and preservation of forest and range lands is not sufficient to meet this challenge: there is not nearly enough public money to purchase or manage such large properties and local communities are concerned about the fiscal and economic impacts of taking working lands out of production.

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1 The Conservation Fund, 2005, *Conservation Prospects for the North Coast, A Review and Analysis of Existing Conservation Plans, Land Use Trends and Strategies for Conservation on the North Coast of California* at page 134.

2 Id. at page 131.

In furtherance of this strategy, The Conservation Fund acquired the 24,000-acre Garcia River Forest in February, 2004, thereby establishing the first non-profit owned "working forest" in California. An Integrated Resource Management Plan (IRMP) for the property was collaboratively developed over a two-year planning period to meet the following general objectives:

- Restore and protect a productive and relatively natural coastal California forest ecosystem.
- Protect fish and wildlife habitat associated with this ecosystem, in particular the oak woodlands, serpentine grasslands, redwood/-Douglas-fir forests, and spawning habitat for coho salmon and steelhead trout.
- Protect significant water resources, springs and the water quality thereof.
- Maintain the capacity of the Property for productive forest management, including the long-term sustainable harvest of high quality forest products, contributing to the economic vitality of the state and region.
- Provide outdoor recreational opportunities, as appropriate.

In October 2006, The Conservation Fund acquired an additional 16,100 acres in two tracts – the 11,700-acre Big River Forest and the 4,400-acre Salmon Creek Forest. A similar management and restoration plan for these new properties was completed in August 2009 (Big River and Salmon Creek Integrated Resource Management Plan). This plan identifies and describes in detail the following specific management goals:

- Improve ecological conditions by protecting and enhancing water quality.
- Improve ecological conditions by protecting and enhancing terrestrial and aquatic habitat on the Forests.
- Generate sufficient revenue to cover SRF loan and the Packard loan payments (the latter from non-timber revenue, such as the sale of carbon offsets, and only after the accrued SRF obligations are fulfilled), property taxes, on-site maintenance, management, and restoration projects.
- Develop and implement conservation-based forest management greenhouse gas reduction projects under the California Climate Action Registry's Forest Project Protocol version 2.1.
- Practice continual improvement through adaptive management based on monitoring of water quality and forest health against specific objectives described in the Plan.
- Support the local business community by utilizing local contractors and suppliers.
- Involve the local community by seeking input on management of the Forests, including review of this Plan and timber harvest plans implemented under the Plan, and providing compatible public access, educational, and recreational opportunities.

In 2011, The Conservation Fund acquired the 13,900 acre Gualala River Forest. A management plan is underway but all activities on the property shall be in conformance with these Forest Management Policies and all other organizational policies and commitments.

These three acquisitions combined (54,000 acres) represent a collective capital investment of almost $97 million. By acquiring them, the Fund and its partners hope to demonstrate that these large tracts of intensively managed coastal forest can gradually be returned to sustainable timber production and ecological vitality through the use of innovative financing and patient management by a nonprofit organization in partnership with private and public agencies and community stakeholders.

Guiding these properties from their current forest conditions (which reflect a legacy of clear cutting or excessive harvesting resulting in young and in some cases understocked timber stands) to the desired future condition of economic stability and ecological integrity will take decades. Along the

way we will need to overcome many challenges, including relatively low current timber volumes, the unnatural predominance of hardwoods in places, the burden of maintaining and improving extensive road systems, and the uncertain economic, regulatory and political environment affecting the timber economy as a whole.

At the same time, there is broad awareness that North Coast forests are at an historic crossroad, with one road leading to fragmentation and loss of forest productivity and ecological integrity, the other leading to intact watersheds, recovering fish and wildlife, and a sustainable timber economy for the region. With the cooperation and goodwill of the community and public and private stakeholders, we are optimistic that we are setting off down the latter, more hopeful road.

II. Policy Introduction

These guidelines and policies apply to management and operations on the Garcia River, Gualala, Big River, and Salmon Creek properties. This document is a "work-in-progress" and will be revised and refined based on the experience and perspective of our project foresters, program partners, and agency staff as we all develop increasing familiarity with the properties and the forests' response to the silvicultural and other management measures described here, in the Garcia IRMP (2006), and in the management plan for Big River and Salmon Creek (2009) (both plans are available at http://www.conservationfund.org/north_coast_forests/documents).

III. Forest Management General Strategy

[Taken, without editing, from the Garcia River Forest IRMP and also detailed in the Big River and Salmon Creek IRMP]

- Our silviculture will be primarily uneven-aged, to develop and maintain a range of tree sizes and ages within a stand, with the goal of producing valuable sawtimber and utilizing natural regeneration.
- We have a responsibility to manage the properties to generate reasonable revenue for loan payments, re-investment in the property (e.g. restoration projects, road upgrades) and, potentially, for conservation projects elsewhere in the region.
- Our harvest levels will be significantly less than growth rates over the next few decades so as to increase the timber inventory.
- We are providing for increased riparian buffers on our Class I streams so as to improve riparian habitat conditions and provide late-seral connectivity across the landscape.
- Special attention will be given to critical wildlife habitat features, such as snags, down wood, and trees of significant size.
- We recognize that because of past practices the forest contains smaller trees and more hardwoods than would have occurred naturally and we will work to more closely approximate natural conditions.
- There are no old growth stands on the properties; there are individual trees that may be residual old growth—these and other very large trees and true oaks will be maintained.
- We anticipate no need to clearcut; we may use even-aged variable retention harvests (that retain large trees and habitat features) to rehabilitate conifer sites now dominated by hardwood or in future salvage situations; group selection will likely be used on Douglas-fir sites; and all regeneration harvests will encourage natural regeneration.
- We have committed to certification of our forest management under the Forest Stewardship Council and Sustainable Forestry Initiative standards and to reporting our carbon sequestration through the California Climate Action Registry.

IV. Critical Landscape Features

Most of these policies are intended to guide the management of those areas of the property which will support commercial timber harvesting operations. However, one of the most important steps in determining how to manage a forest is recognizing which areas have unique ecological values that outweigh their potential contribution from a commercial harvest perspective. For example, oak woodlands are fairly geographically limited and support a very different set of birds and small mammals than dense coniferous forest. Likewise, springs, seeps, and small wetlands occupy only a very small portion of the property but probably support more amphibians than the rest of the forest. The protection of these features is critical to achieving the program objectives of restoring habitat for species of concern and increasing the ecological health of these forests. Specific policies to address these areas include the following:

- All pygmy forest and true oak (Quercus spp.) woodlands and native grasslands are to be preserved.
- Springs, seeps, and small wetlands shall receive protection measures at least equivalent to Class 3 WLPZ. [There are no large wetlands on the properties.]
- Riparian forests, particularly along Class 1 streams, will be managed to provide for closed canopy mature forest with a high component of down logs and other late-seral features. [Some removal of timber can be consistent with this objective - see WLPZ Protection Measures for more detail in Section XIV, below.]
- Other features that are fairly rare on the landscape and may have unique habitat value include cliff faces, alder thickets, and recently-burned areas. These will be mapped and receive site-specific protection measures when they are within or adjoining a potential timber harvest area.

V. Harvest Levels

Careful determination of appropriate harvest levels is critical to ensuring sustainability and achieving the conservation and economic objectives for the properties we manage. As described below, each project has slightly different harvest levels because of the differing starting inventories and financial responsibilities.

In the **GRF** IRMP, we committed to harvesting not more than 35% of growth on the working forest (non-reserve) portion of the Garcia River Forest (GRF) for each of the first two decades (measured on a rolling ten-year basis). The net harvest level calculations are based on conservative growth assumptions and result in an annual allowable harvest of 1.5 mmbf (million board feet) for the first decade (2006-2015). [To compensate for no harvest in 2006, the harvest levels will likely average slightly over 1.5 mmbf for the following nine years.] Over the next two decades this should result in an increase in standing timber volume on the non-reserve portion of the property from 5.6 mbf (thousand board feet) per acre to 10.41 mbf per acre (reaching 20 mbf per acre around 2065). Actual harvest volumes in 2007 were 1.4 mmbf; 0 in 2008 and 2009.

[Notes on GRF modeling: As described in the GRF IRMP allowable harvest was calculated as a percent of anticipated growth. We chose to use percent of anticipated growth because it served as an easily communicable approach while also being readily scalable as forest conditions change in the coming decade. We started with 35% limit because it seemed to offer an appropriate balance between covering property expenses and allowing recovery of the forest. Anticipated growth was determined by an knowledgeable local forester with experience managing uneven-aged redwood forests as they rebuild inventory. A simple growth percentage was applied by decade to determine future inventory increases. Subsequent modeling and re-inventory indicates the growth predictions were conservative. A future revision of the IRMP will update the modeling and inventory projections (while maintaining the 35% restriction). Until then, harvest is limited to an average of 1.5 mmbf for 2006-2015.]

In the **BR/SC** IRMP we committed to an annual net harvest level for each of the first two decades of 4.65 million board feet (the MOU restriction is for not greater than 5.1 million board feet and the appraisal estimated that the FPR would allow harvest of 8.5 million board feet). Actual harvest volumes in 2007 were 3.3 mmbf; in 2008 3.5 mmbf; and in 2009 1.48 mmbf. An average annual harvest level of 4.65 million board feet on the Forests is projected to result in overall inventory increases of 34 percent over the next two decades, consistent with the objective of increasing the average size and overall stocking of the forest. More recent modeling done for the purposes of carbon sequestration projections indicates that an annual allowable cut of 4.65 million board feet (net) represents about 1.3 percent of the inventory, or 23 percent of the annual growth, which should allow for a significant increase in the size and stocking of the forest in the next two decades. Ultimately, however, the goal is not to achieve a specific number (forest inventory is an inexact science) but to achieve a more natural species balance (i.e., less tanoak), with greater stocking and greater average tree size.

[Notes on BR/SC modeling: As described in the BRSC IRMP allowable harvest was determined as a function of a growth & yield study conducted by Forest Systems prior to acquisition. We asked them to determine if we could meet certain revenue objectives (to payback loans) while continuing to meet specific forestry expectations (selection forestry, entries no more frequent then every 10 years, harvest of not more then 35% of basal area, expanded protection of streams and NSO activity centers, and increase property-wide stocking). The harvest schedule prepared did not seek to maximize revenue or optimize the variables, merely to confirm that the objectives could be met. The modeling was based on inventory information provided by the Campbell Timberland and was modeled in CRYPTOS, a forest projection software program designed for the redwood region. The Fund has not closely followed the harvest schedules, because they were not spatially-optimized and field conditions often necessitate site-specific prescription. However the scale and type of harvest we have conducted is entirely consistent with the growth and yield study assumptions. A future revision of the IRMP will re-visit the projected growth and harvest levels, taking advantage of improved forest inventory information and more experience with our applied silviculture; the long-term objectives, such as to increase stocking and forest structure, will not be changed.]

For the Gualala Forest, growth forecasting and harvest scheduling is underway as part of development of the Option A for the ownership. In the interim, annual harvest is not to exceed 1.5mmbf for the first decade, which is based on being comparable in size and composition to the Garcia (non-reserve). This should be no more than 35% of expected growth and allow the forest to significantly increase in stocking. In practice, we expect harvests on Gualala to be minimal (under 2mmbf total) over the first decade.

[Notes on species composition of allowable harvest volumes: The IRMPs for both properties have annual allowable cuts established without limitation on the species composition. The goal on all properties is to increase conifer dominance while at least maintaining the redwood percentage, so as to respond to historical management practices that shifted species composition. Because of the differential value of species and the dynamic marketplace, not to mention the sometimes irregular nature of stand composition and structure, it is important to retain flexibility in harvest by species. Nevertheless we do not want to create the perception that the forests are being high-graded. Flexible limits on harvest by species shall be based on the existing forest composition (percent conifer volume), with no more then 25% variance. Maximum average annual allowable cut calculations are:

> Garcia: Redwood (40%) 750 mbf/yr, Douglas fir (45%) 844 mbf/yr, pine/fir (15%) 281 mbf/yr.

BR/SC: Redwood (71%) 4119 mbf/yr, Douglas fir (25%) 1439 mbf/yr, pine/fir (4%) 254 mbf/yr
Gualala: Redwood (37%) 697 mbf/yr, Douglas fir (40%) 750 mbf/yr, pine/fir (23%) 428 mbf/yr.

These are to be averaged on a decadal basis, and the overall harvest volume limits still apply.]

VI. Silvicultural Objectives

Our goal is to grow large high-quality trees and be able to perpetuate that through selective harvests. We want to maximize value growth and develop and maintain important late-seral habitat characteristics for wildlife and non-timber forest vegetation. Our "crop tree" target diameters are 30-36" for redwood and 26-28" for Douglas-fir (most high-quality trees below this diameter range will be retained while most non-wildlife trees above this diameter range will be removed). Generally, we are not trying to mimic old-growth or late-seral stand conditions, we are trying to ensure that late-seral ecological functions and processes are present within a managed forest. For example we will be seeking to develop stands that have high canopy closure, some large mature trees, and a high degree of structural diversity. In time we may elect to allow certain stands to return to old growth, once they are on an appropriate trajectory.

The success of our initiative and these acquisitions depends on our ability to generate revenue to support ongoing management and restoration projects and repay loans for the acquisition of the properties in a manner that over time achieves our stated silvicultural and ecological objectives. In consultation with project foresters and biologists, we will continually strive to balance our harvest levels and methods to carefully meet our financial and management obligations while improving ecological health and vitality. We will not fixate on the silvicultural semantics of "uneven-aged," "all-aged" or "multi-aged" or the coefficient of the "reverse J-shaped curve," but on the question of whether we are growing high-quality trees and maintaining desired habitat conditions. More detailed performance monitoring metrics are available in the BR/SC IRMP (Section 4.4.9.2, Long-term Forest Monitoring) and in the GRF IRMP (Section IV, Adaptive Management and Information Systems). In addition we have the broader objectives of engaging the local community and businesses in what we do, which relates back to how we conduct harvesting operations.

This silvicultural strategy is also aligned with what we understand about historical disturbance patterns and evolutionary forces in the redwood region. To generalize from many years of complementary academic research, including the Proceedings from the past two Redwood Forest Science Symposiums, it is safe to say the pre-European settlement conditions were very different than the processes of today. Most forests were quite old, in the 500-2000 years in the canopy, with a modest amount of tanoak (10-15% of basal area), with occasional small (under 1000 acre) patches of younger and brushier forest, and relatively limited bareground or early seral stage conditions (caused by flooding, landslides or extreme fires). Fires were frequent (10-20 year recurrence) and low intensity, likely driven by Native American burning as much as lightning strikes. Individual tree mortality was limited, mostly due to self-thinning (competition-induced) and occasional windstorm damage. In general, the redwood forest was fairly stable at large temporal and spatial scales. Our silvicultural practices follow these patterns, emphasizing low-intensity but extensive single-tree selection harvests, similar to what would occur under self-thinning stages of stand development. Our group selection harvests are probably similar in size (1-2 acres) to openings created by landslides, flood scouring or higher intensity fires. Variable retention harvests, especially because we utilize this approach on dryer sites, are probably similar to conditions after a more intense fire. In short, our silviculture should restore and maintain more natural forest conditions and simulate natural disturbance patterns, with the exception that development of true late seral stage characteristics will

only occur in the Ecological Reserve, riparian buffers and NSO habitat core areas-- and not across the managed forest.

VII. Silvicultural Decisions

To the extent that it is possible to generalize types of stands and approaches, we have attempted to describe likely decision pathways below. Forests are highly variable so it is impossible and unwise to prescribe "one-size fits all." Further, each of the forests reflects a management legacy that limits our silvicultural options. For example, prior management of the Garcia River Forest has left very young stands with limited commercial volumes. For the most part, these stands are growing well—they just have limited silvicultural options in the short-term. On Big River and Salmon Creek, a history of clear-cuts forces difficult choices between the remaining well-stocked stands and stand classes that are several years away from supporting our preferred silvicultural methods. Additionally many of the partial harvests of the past did not always leave the high-quality trees we desire. Finally, we are learning more every day about how to manage forests for both economic and environmental objectives and our approaches will change with future scientific research and operational realizations.

Our preferred silviculture is high retention (150 sf/acre basal area) single tree selection with re-entries every 10-20 years to remove most trees that exceed the target crop-tree size and thin the smaller size classes. Stands that have reached this condition (referred to as stand condition A) will be maintained indefinitely through thinning, individual tree selection, and small group selection harvests. Most stands are not anywhere near the desired stand condition A. Some stands may consist of smaller diameter classes or be less dense but generally have good form and growth (referred to as stand condition B). These stands might be dense even-aged stands of 40-60 years or they may be more open stands of indeterminate age that have had past selection harvests; regardless, the key silvicultural criteria is that they have good material to work with. (The Garcia LNF THP, the BR Riverbends THP, and the selection units of LSC THP are good examples of B conditions.) B stands are in an excellent position because they can support commercially-viable selection harvests and with a few decades of growth and just one or two intermediate harvests that maintain high-quality trees and increasing stocking, they will reach A condition. The silviculture to go from B to A is similar to the selection silviculture to maintain A (although in B we are not particularly concerned with creating a new age class). These are "easy" decisions, because the stands have good stocking and growth and the pathway to the desired conditions is evident and readily achievable.

However because of past harvesting practices, very few stands are currently in A or B condition (because of lower stocking, smaller diameters and/or poorer-quality trees). Most stands will take several decades to reach this steady-state condition with multiple intermediate harvest entries to guide this development. Until we reach the ideal steady-state condition, the silviculture focus will be on creating and/or building stands of higher quality and better growth potential. Many stands (especially on Big River) are young and even-aged, from clearcuts or aggressive selection harvests in the last thirty years (referred to as stand condition C). C stands are, for the most part, growing quickly and with good-quality stems—but they are small in diameter (average 12" or less) and lack structure from a habitat perspective. C stands will receive thinnings to accelerate stand development and concentrate growth on high-quality stems. These selective harvests will occur every 10-20 years with the long-term objective of moving the C stands into B and then A condition. These thinnings will yield low harvest volumes and small average piece sizes so they will need to be carefully-designed to be economically-viable. These low-value harvests will be a good source of employment in the local community and will also allow us to shape the stand at an early age to better achieve our long-term growth and habitat objectives. (The better-stocked parts of the Jack's Opening THP fit this generalization.) In some cases pre-commercial thinning will be considered.

A different category of stands (condition D) has resulted from the merchantable trees having been excessively "picked over;" most of the dominant trees were removed leaving uneven regeneration, a low-quality overstory and often a high degree of tanoak competition. The overstory may be of average to large diameter but the entire stand is usually less than 100 square feet of basal area per acre and not comprised of the high-quality stems we desire (and therefore not growing in value). In most of these cases the younger "regeneration" age classes exhibit good growth, height, form and stocking. Harvests in D stands need to balance the removal of the poor-quality overstory (to accelerate the development of the higher-quality regeneration and pole-sized trees) with the need to maintain habitat structure and late-seral elements. (The "seed tree removal" units in the LSC THP and the variable retention units in the Jarvis Camp THP fall into this category.) This is not "easy" silviculture as it will feel like an aggressive harvest. The residual stand will be open-looking and often we will need to reduce hardwood competition and/or plant additional conifers. A good indication for this type of harvest is that given twenty years without harvest the stand would not be appreciably improved (hence the need for an intervention). In the short-term it is easy to think, "maybe it would be better to not harvest here," but it should be obvious that in the long-term the stand and the program will benefit from this harvest. These D harvests result in a good-quality young stand that is growing well and has some late-seral elements. Given two to three decades to develop without commercial harvest they will become C and B stands.

Of course not all stands fit these generalizations. In some stands, especially on the east side of the Garcia, it is more appropriate to manage primarily for Douglas-fir than redwood and since Douglas-fir lacks redwood's remarkable abilities to release and sprout, these will likely have long-term management through group selection, although the first couple of entries will look more like B thinnings. And some stands, again on the east side of Garcia, are completely dominated by tanoak. While it might be better ecologically and financially to be growing more conifers on these sites the short-term cost of such a rehabilitation will likely preclude much action.

VIII. THP Operational Realities

The complexity of forest regulations and the high cost of harvesting operations impose additional constraints on our operations, beyond simply what silviculture we want to apply. For example, almost all of our harvests are some type of thinning (a selective harvest not designed to introduce another age class) but under the Forest Practice Rules (FPR) they may need to be called Selection, Group Selection, Commercial Thinning, Transition, Variable Retention, Rehabilitation, or Alternative Prescription because of the differing requirements for initial and post-harvest stocking and tree diameter requirements defined in the FPR for each specific silvicultural treatment listed above. And in the Timber Harvest Plan (THP) document we will commit to meeting only the FPR stocking requirements (rather than a voluntary higher standard) to avoid risk of violation in areas where initial stocking is low prior to harvest. Regardless of what the prescription is called, we will only implement the silviculture that enables us to meet our long-term project goals and follows the retention requirements and tree marking guidelines below.

Another operational reality relates to the distribution of THPs across the landscape. Our THPs will need to be fairly large (200-500 acres) and geographically-concentrated because of the high costs of THP development and maintenance. The goal is to increase operational efficiency by concentrating planning and road costs. We will try to treat all the eligible stands within a selected area (rather than cherry-picking across the property). Thus THPs will often include several types of FPR silviculture but almost all of them will meet stocking requirements immediately following the harvest. In the future we will not use amendments to increase THP area (unless there is a significant market or regulatory shift) but in 2007 as part of adapting the approved LSC THP to our preferred approach we used an amendment as an expedient means. Another important economic constraint is that currently

we have limited ability to cable-thin young Douglas-fir stands because of high logging costs and low Douglas-fir prices.

IX. THP Development and Review Process

Our goal is to develop clear and consistent THPs that incorporate the concerns of the public and conservation partners before they are submitted to the state agencies. THPs are, by requirement, cumbersome documents and long-term legal obligations; we do not expect to revolutionize THP writing. We have adopted the following procedures for the development and review of THPs:

1. General harvest locations will be informed by harvest scheduling plans and reviewed by Scott Kelly (TCF's Senior Forester).
2. Field foresters will review past materials and field conditions, decide on likely unit layout, silvicultural prescriptions, access needs, road improvements, etc., and consult with project consultants and partners on habitat and restoration implications and opportunities.
3. Evan and Scott will field review harvest unit selections and general operation strategies.
4. Field foresters will coordinate necessary surveys and access (geologist, botanist, NSO).
5. Field foresters will begin unit layout and stand marking.
6. "Field Consultation"-- staff, contract foresters and advisors will discuss, in the field, the proposed operation.
7. Garcia only—notice to TNC will be provided and field review scheduled if desired.
8. Stakeholder tour. Tours will be offered just prior to CAL FIRE submittal (when all the potential THP issues are well-identified and resolved). Holly Newberger, Office Manager, will coordinate.
9. Field foresters will complete drafting of the THP.
10. THPs will be submitted to Scott for review.
11. Field foresters will prepare final version and submit to CAL FIRE, with copy for TCF office.

Field Consultations are a very important step in our review process because they leverages the combined experience of our foresters and biologists to ensure that only sound and well-planned THPs that reflect TCF goals and objectives go forward and because it offers an opportunity for everyone to learn from each other, thus helping our program grow efficiently.

X. Retention Requirements

[Quoted from the Big River and Salmon Creek IRMP - with edits italicized and in brackets - and equally applicable to all properties]

Within a harvest area, the Fund will permanently retain or recruit downed wood, snags, and trees with high wildlife value given their recognized ecological role and ability to enrich the surrounding stand. The following policies for downed wood, snags, and wildlife trees are meant to implement this strategy by providing clear rules and numerical targets for certain types of features. [The FPR do not categorically address general wildlife habitat retention trees (although there are some requirements for protection of active raptor nests), but additional guidance is available from DFG.] Retention trees will be painted ("W") or tagged by the field foresters as they are marking the timber harvest to communicate the value of these features not just to the loggers but also the public and future foresters. Because a harvest can include over a thousand retention trees, they are not mapped or recorded unless they are suspected NSO nest trees. And while maintaining trees with high wildlife value is important, it is also critical to recognize the wildlife value of the surrounding stand and the conserved landscape, and not expect the harvest stand to mimic or contain all features which may be better represented in other areas of the property.

Downed Wood

Target: two pieces per acre (at least one conifer, 18 inch minimum diameter and ten feet minimum length).

Actions:

- Retain existing downed wood except in situations of recent windfall or fire outside of WLPZ. (In most stands this should be sufficient to meet the target.)
- Retain snags and mark trees for recruitment snags to eventually become downed wood.
- Redistribute cull logs from the landing (unless used for firewood or instream restoration).

Snags and Wildlife Trees

Target: four per acre on average across stand. [*While every effort shall be made by the Licensed Timber Operator (LTO) to retain all snags, it is understood that some snags may be cut for safety considerations by the LTO with the project foresters approval (e.g. snags near active landings which may fall into the landing if bumped by logging equipment or snags used to anchor yarder guy lines or tail holds).*]

Criteria for mandatory retention:

- Snags (all should be retained but only those greater than 18-inch DBH and 20 foot height shall count towards the retention targets);
- Conifers greater than 48-inch DBH;
- Old-growth trees (use MRC definition if in question – see Appendix K [*of Big River/Salmon Creek IRMP*]);
- Raptor nest trees (active or likely to be re-used);
- Any hardwood [*tanoak, true oak, madrone, chinquapin, and alder*] over 20 inches;
- Murrelet habitat trees (use MRC definition if in question – see Appendix K [*of Big River/Salmon Creek IRMP*]);
- Den trees (cavity greater than three inch diameter and greater than ten feet above ground);
- Trees with basal hollows or other significant features (cavities, acorn granaries, significant burn scars, significant or unusual lichen accumulation, signs of deformity, decadence, unusual bark patterns, or other unique structure or features).

Actions:

- Retain all mandatory [*retention*] trees and snags except where necessary to fall for operator safety, and protect with screen trees if appropriate.
- If below the target number, mark and retain additional recruitment trees. [*Additional wildlife trees will likely be marked in the future from the surrounding stand as it develops.*]
- [*At the discretion of the project forester live trees may be designated for girdling to accelerate snag recruitment within a THP area.*]

XI. Retention General Guidelines

- Marked wildlife trees…are not intended for future harvest and are allowed to grow beyond the crop tree target size.
- In the absence of mandatory retention trees, on average at least one conifer per acre should be retained from the largest ten percent of the diameter distribution of the stand.
- Marking of the wildlife trees (with paint or tags) is intended to communicate the recognition of the importance of that stem to future foresters, agency reviewers, and the public.
- For the next 20 years some preference for snag and downed log creation and wildlife tree recruitment will be given to cull trees and whitewoods (because of their low financial value) even though they may have a shorter lifespan.

- All retention is subject to operational considerations; the felling of any tree is permitted when necessary for operator safety, road right of way, or yarding corridors. Field foresters will attempt to avoid locating yarder corridors where they would conflict with mandatory retention wildlife trees.
- Targets shall be assessed across the entire harvest stand, not on an individual acre basis.
- Preference is for spatial grouping (clumps of downed wood, snags, and/or wildlife trees).
- The above criteria shall apply to selection harvests. When marking variable retention harvests extra screen trees may be appropriate.

All of the foregoing requirements and guidelines are subject to further review and amendment as the science and practice of forest management evolves and new research is developed and applied. Because of past practices, some portions of the Forests do not have sufficient wildlife features and the initial targets set forth above are intended to guide the long-term retention and recruitment of these features.

Two or three of anything per acre is an admittedly arbitrary number chosen to put our forestlands on the right trajectory for the development and maintenance of late-seral habitat characteristics within a managed forest; achieving some of these targets will likely take more than one entry. These distribution and size targets are not expected to be the ultimate value but merely what is appropriate to select and recruit in the next twenty years; the development of late-seral habitat elements is a long-term process and will be shaped over several harvest entries. In addition, it is unclear how the establishment of Sudden Oak Death (documented on GRF) will affect the Forests.

XI.I. Habitat Retention

When encountered, rare plants, animals and their associated habitat will be protected per the guidelines established by CalFire, USFWS or CDF&G. Established general habitat retention guidelines for the Northern Spotted Owl, Marbled Murrelet and California Red Legged Frog are followed. In the absence of pre-established guidelines, protection measures developed in consultation with CalFire, CDF&G and/or USFWS will be implemented. Habitat protection measures for coho salmon and steelhead trout are embedded in the forest practice rules and included in the "Specific Watercourse and Lake Protection Zones (WLPZ)" described below. Other rare species are generally protected on a case by case basis during the timber harvest planning and review process.

XII. Hardwoods

Hardwood species, including tanoak, true oaks, madrone, chinquapin, and alder, are an important ecological component of North Coast forests. Past management practices have resulted in an unnaturally high abundance of tanoak in many areas that historically were dominated by conifers. Mixed hardwoods account for 18 percent of the basal area on the Salmon Creek Forest, 23 percent on the Big River Forest, and 47 percent on the Garcia River Forest; in some stand types in Salmon Creek and Big River it is as high as 46 percent, and on the Garcia up to 83 percent. For comparison, old growth conifer stands in the area often have ten percent or less of the basal area in hardwood species. On Salmon Creek and Big River, stands with greater than 25 percent of the basal area in hardwood species account for 23 percent of the forested acres. On the Garcia, stands with greater than 25 percent of the basal area in hardwood species account for 91 percent of the forested acres, and stand with greater than 50 percent of the basal area in hardwood species account for 45 percent of the forested acres.

In addition to the ecological imbalance, the high concentration of tanoak significantly reduces conifer growth and stocking and therefore the future financial value of the properties, since tanoaks have

effectively no commercial value (it costs more to log and deliver than they are worth as firewood). The long-term goal is to maintain an appropriate level of tanoak and other hardwoods (probably around ten percent on average). It is important to not try to eliminate tanoak—merely to increase conifer site occupancy over time. To achieve these objectives, the following management measures will be implemented:

- All true oak (*Quercus* spp.) woodlands are to be preserved [*these occur on GRF but have not been identified on Big River or Salmon Creek*].
- All hardwood wildlife trees are to be retained (which includes all hardwoods 20 inches or greater), except where removal is required for safety concerns or necessary for yarding or road corridors.
- Where the post-harvest hardwood basal area would exceed 30 square feet of basal area per acre (averaged across the stand), tanoak shall be controlled through manual falling or girdling or herbicide treatment through direct basal injection ("hack-and-squirt") or stump treatment to provide a post-harvest hardwood basal area of 15 to 30 square feet per acre. This may take more than one entry to achieve.
- Most tanoak reduction will be achieved within a selection or thinning harvest by selective falling (of tanoaks) to release existing conifers. While the tanoak stumps will likely re-sprout, the conifers should have established dominance and will eventually shade-out most of the sprouts. In this type of incremental treatment (selective falling), clumps of hardwoods and individual hardwoods which do not compete with desirable conifers will be left alone. [*This treatment occurred to varying degrees in almost all of THPs prepared to date, the best example of which might be the Jack's Opening THP on GRF.]*
- There are many stands where selective tanoak felling would not be sufficient to meet the desired level of conifer site occupancy. In these situations, a more aggressive treatment will be utilized through an herbicide treatment that kills a majority of the tanoak to release either existing conifers or seedlings planted shortly before or after the tanoak treatment. Even within these prescriptions, smaller areas of intact hardwoods would be intentionally retained (for biodiversity reasons). Preference for hardwood retention will be given to large trees (greater than 20 inches), true oaks, chinquapins and madrones, and groups of hardwoods. Rehabilitation treatments (including the use of herbicides) are intended to be one-time interventions and should not need to be repeated because of the decreased openings and ground disturbance associated with subsequent harvests. [*An example of this treatment occurred within the Variable Retention units of the Jarvis Camp THP on Big River.*]
- The only herbicide to be used in tanoak control treatments currently is imazapyr (tradename Arsenal). Only licensed and insured contractors with a good track record for safety and compliance may apply herbicides. All herbicide application must be in conformance with label guidelines and applicable laws. Additional herbicides may be considered in the future as they are developed and tested and reviewed with respect to Forest Stewardship Council and Sustainable Forestry Initiative standards.
- Any planned use of herbicide will be clearly identified in the THP and THP summary.
- Reduction in the use of herbicides is an important objective; alternatives to herbicide treatment have been and will continue to be evaluated on a periodic basis. A comparison of herbicide treatment and logging of tanoaks for commercial firewood was evaluated as part of the Jarvis Camp THP. Monumented plots will allow for long-term evaluation of effectiveness but the initial impressions are that the logging method resulted in increased cost and site

disturbance (exposed soil and damage to the residual stand). That said, a commercial market for tanoak would be pursued if it develops. Areas with well-established and good quality hardwoods will likely be managed for mature hardwoods instead of attempting to re-establish conifer.

- There will be no tanoak control with herbicides in WLPZs; manual falling or girdling of small tanoak may be used, but only as part of a riparian shade enhancement project (likely with conifer underplanting).
- Priority for rehabilitation treatments will be given to high site, tractor-operable ground, with existing desirable redwood growing stock. Herbicide treatments will be less than 100 acres annually (on a rolling average basis) on Big River. A similar threshold will be developed for Garcia following additional review.
- Tanoak control measures will be reviewed periodically and revised as appropriate based on knowledge and experience gained in the field over the next several years. Herbicides will likely also be used to control certain exotic invasive plants, primarily jubata grass and broom. No other uses of herbicides or pesticides are anticipated.

XIII. Pre Commercial Thinning

Pre commercial thinning involves the selective cutting of small trees and brush that are not subsequently processed into forest products. PCT is generally done in stands of young, 10-15 year old plantations with the purpose of accelerating stand development and promoting conifer dominance. Vigorous growth of small trees and brush in the early stages of stand development following clear cutting often leads to intense competition for a site's resources including water, soil nutrients and sunlight. By selectively cutting brush and small trees we can focus more of a site's resources on fewer tree stems. This increases individual tree growth and promotes sustained vigorous growth across the stand and into the future. Trees selected for retention are generally in the upper 25% of stem diameters within the stand and have full crowns and straight stems without crooks, forks, dead, or broken tops. The ideal spacing between conifer stems is generally 15 feet, though additional trees may be left around the edges of small openings as they are encountered. When thinning redwood stump sprouts, 2-3 sprouts are left around each stump, trees sprouting from the root collar are favored over trees spouting from the top of the stump. Tanoak and other miscellaneous brush species are cut wherever they are competing with conifer regeneration. Thinning is also used for "species control" in which desirable commercial species are favored to remain on site. Wherever possible redwood is favored as a leave tree, Douglas-fir and Grand-fir are retained where no redwood trees exists or where hotter, dryer site conditions dictate that Douglas-fir be left in favor of redwood. To retain structural and compositional diversity, clumps of brush and hardwood species that are not competing with conifers are left uncut.

Pre commercial thinning is implemented in young stands with chainsaws and no heavy equipment is used therefore, impacts to non timber resources including wildlife habitat, rare plants and water quality are assumed to be negligible. Conifer and Hardwood trees identified for retention with an orange stripe by the previous owner(s) are retained for wildlife habitat. TCF does not remove or burn slash generated from PCT, slash is lopped such that it is contact with the ground to promote decomposition and return nutrients to the soil. Habitat values for some species of birds and rodents can be improved by the slash accumulation associated with PCT which provides ground cover necessary for those species. It is felt that forage values for deer and bear are generally unaffected by thinning slash accumulations.

If PCT is to be implemented between February 1st and July 10th of any year the most recent NSO call records are reviewed to ensure that our operations are more than ¼ mile from an active NSO nest. One quarter mile is the recommended distance to avoid auditory harassment of NSO during the breeding season. The stands targeted for PCT are too young (to small) to be considered nesting habitat for NSO or other raptors. It has been shown that NSO do forage in clear cuts for wood rats which prefer heavy slash accumulations for nesting. It is assumed that PCT does not negatively impact forage for NSO and it may improve wood rat habitat by replenishing the available downed material.

XIV. Timber Marking Guidelines

Timber marking (designating individual trees for harvest) is the art of shaping future forest stand conditions by extracting merchantable forest volume while protecting and enhancing wildlife habitat such that the end result is a well-stocked, rapidly-growing, and healthy forest with abundant and diverse wildlife habitat features. Approaches to timber marking vary by stand condition and silvicultural objective and it is difficult to identify a universal prescription.

Because of the thousands of individual judgment calls that are made while marking a stand, even individual foresters with the same objective would inevitably make slightly different decisions. The general goal of timber marking by the Fund is relatively simple: current (pre-harvest) conditions should be improved by the time of re-entry (typically ten to twenty years) while also increasing net growth. “Improved” is a subjective term but for our purposes it means increased values for conifer basal area, merchantable volume, snags and downed logs per acre. These are also some of the values that will be used to monitor forest trends across the properties.

Below is a summary of The Fund’s timber marking criteria incorporating recommendations from two experienced local foresters (Jim Able and Craig Blencowe). These guidelines strive to capture some of the art of achieving the desired balance between habitat recruitment and retention while removing sufficient conifer volume to satisfy the economic needs of the project. Timber marking will be conducted with these criteria in mind. One of the purposes of the Field Consultations (both pre- and post- harvest) is for the forestry team to discuss the timber marking, particularly in riparian stands, understocked areas, and near NSO activity centers.

Timber marking criteria

Marking can vary according to two criteria: the type of stand and the management objectives. These two factors permit flexibility to the extent that the marking adheres to the overall management goal of maintaining a productive sustainable forest.

To this end, what we leave is more important than what we cut. Following a harvest, a stand should have a higher proportion of high-quality trees with well-developed crowns (high potential for increased growth). The key question we must answer before marking a tree is, “What is the potential for the tree to grow in the future?” Trees with little or no potential to grow (i.e. put on recoverable volume) should be removed [unless they are retained for wildlife trees]. The difficult questions arise when a tree’s potential is not readily apparent (often in the case of co-dominants). For this reason, beginning timber markers (and even experienced ones) benefit from boring trees and comparing recent growth with crown size, color, and form.

There are factors other than maximum growth which determine which trees we mark. We place as much emphasis upon high quality and high future value as we do upon maximizing growth rate. For that reason, trade-offs exist and while our stands may be maximizing annual value growth, they may not necessarily be growing at the maximum rate.

In addition to the wildlife tree retention requirements, our “normal” marking scheme for selection harvests involves the following:

- Retained trees should be thrifty and of good quality (e.g. minimum 30% crown ratio). Leave best formed trees regardless of diameter and spacing.
- Focus on attaining “target sizes” of 30-36” in redwood and 26-28” in Douglas-fir. This means that you must be very cautious about marking in the 24-28” dbh classes (redwood) and the 22-24” dbh classes (fir), since these will be your “crop trees” at the next entry.
- Assume that 20% of the trees are doing 80% of the growing so it’s not which trees to cut, it’s which trees should be left to grow. Figure out which of the trees are in this 20% grower category, and leave them. (Percentages will vary from stand to stand.)
- Green culls, conk-infected fir, and large rough wolf trees are usually retained for wildlife.
- Trees that have reached ‘crop tree” size should be harvested, along with other suppressed and intermediate trees to capture mortality and improve the growth of the residual stand. Perpetuate the development of a new age class or the growth of existing advance regeneration at each entry by introducing sunlight to the forest floor. Without the new age classes sustainable selection silviculture will not work!
- You can always opt to allow trees to grow larger than crop size; however, when leaving trees 40” dbh +, you must carefully weigh your decision. Are they to be a legacy tree? Remember trees greater than 48” are to be permanently retained and many large trees with large crowns may reduce the growth of seedlings and future crop trees. Suggest no more than 4 large legacy trees per acre in addition to other trees retained for wildlife and snag recruitment.
- Removal of suppressed and intermediate trees with little or no growth potential. Severely suppressed trees (even redwood) do not release significantly (volume wise) or at least should not be counted on to add significant growth. Cutting suppressed trees does not generally benefit growth and timber recovery, but it will significantly increase logging costs. Cut a few with each entry.
- Removal of grand-fir overstory trees to specifically release viable redwood and Douglas-fir understory is appropriate. We will be managing for mixed-species stands but we do need to guard against encouraging grand-fir in the understory - it is shade tolerant and can dominate a redwood forest in the absence of periodic wildfires. Alternatively, grand-fir can be designated for girdling for accelerated snag recruitment (especially in poor market conditions). These treatments are designed to mimic the high natural mortality rate of grand-fir in an unmanaged forest.
- Removal of 25-35% of the stand volume with a re-entry of 10-15 years. In the field, this usually works out to marking perhaps 30-50% of the volume in a redwood clump, and leaving the well-formed trees growing in the open..
- In windy areas, we try to remove less volume and leave some kind of a wind buffer on the windward side of the stand (usually these trees are wind-beat anyway).
- Where only one large tree (e.g. 26”dbh+) occurs in a clump of smaller (12-14” trees), we mark it, especially if it is on the south side of the clump. Cutting one large high-quality tree is preferable to generating the same value by cutting three or four small high-quality trees.

- Spacing improvement becomes more important when we are returning for the 2nd or 3rd time to a stand because the trees are larger and the crowns need room to expand to maintain high growth rates.
- Do not “give up” WLPZ areas and mark them to the extent it is appropriate and consistent with WLPZ Measures in Section XIV, below.
- Mark hardwoods for removal where small redwood or Douglass- fir trees or a sprouting redwood stump will receive more light.
- It is sometimes necessary to have logistics trump silviculture (e.g. we may have to mark the tree that can be physically felled or yarded, even though it may not be the one we really want to cut). This is especially true in WLPZs
- Group selections work in places where there are few if any good trees to leave or where you need to cut volume across a low-to-medium volume stand. Better to lose the growth on 2.5 acres than to over cut 50 acres.
- Likewise, aesthetics may also trump silviculture in given locations (e.g. along county roads).
- Do not become "hung up" on whether you are doing "all age" or "even age" management. If you are truly selecting the best trees to retain for the future and perpetuating the development of the next age class you are probably doing both.

XV. Watercourse and Lake Protection Zone (WLPZ) Measures

TCF places a very high priority on protecting and improving water quality and aquatic and riparian habitat. On the Garcia River Forest, a detailed Site Specific Management Plan (SSMP) required under TMDL regulations was submitted to and approved by the North Coast Regional Water Quality Control Board (NCRWQCB). The GRF SSMP is available from TCF or RWQCB staff; all of the harvesting and road maintenance operations on the Garcia River Forest must be in compliance with the SSMP. For Big River and Salmon Creek, we were required to develop a Water Quality Management and Restoration Plan, which was incorporated into the management plan for BR/SC and included in its entirety as an appendix. WLPZ Protection Measures are based primarily on the framework established in the Forest Practice Rules (FPR). We have chosen to supplement the FPR requirements for our policies in Gualala, Big River and Salmon Creek rather than creating entirely new requirements (e.g. the GRF SSMP) so as to provide for greater consistency and clarity with existing expectations and professional practices. In all of our operations we and our contractors will comply with all applicable regulations and TCF-imposed obligations.

The California Forest Practice Rules and other requirements of the NCRWQCB and DFG provide extensive and complex protections for watercourses. By most estimations, combined they are the world’s most comprehensive and restrictive regulations governing forestry operations near watercourses. These rules are designed to protect against changes in sediment delivery, shade, large wood recruitment, late seral wildlife habitat, bank stability, and many other issues. The rules were developed in response to major declines in salmonid habitat conditions over the last three decades.

In general, aquatic conditions seem to be slowly recovering from the past practices and current regulatory protective measures should prevent further degradation. But it is unclear whether aquatic conditions are recovering quickly enough to recover and sustain salmonids, particularly in light of human impacts on other life stages. The acceleration of both aquatic and terrestrial restoration measures proposed in this Plan is intended to improve the prospects for the recovery and maintenance of salmonids in TCF’s Forests.

As stated above, improvement of spawning and migration habitat for salmonid species is a key management goal for the Fund and one of the principal motivations for the acquisition of the Forests. Prohibiting development and agricultural uses on the properties will preclude the largest possible impacts on water quality, followed by comprehensive property-wide road assessments to identify and prioritize sites with sediment delivery potential (the treatment of which will occur over the next ten to fifteen years at an estimated expense of over $5 million). In addition, the following silvicultural practices …also will be implemented to improve water quality:

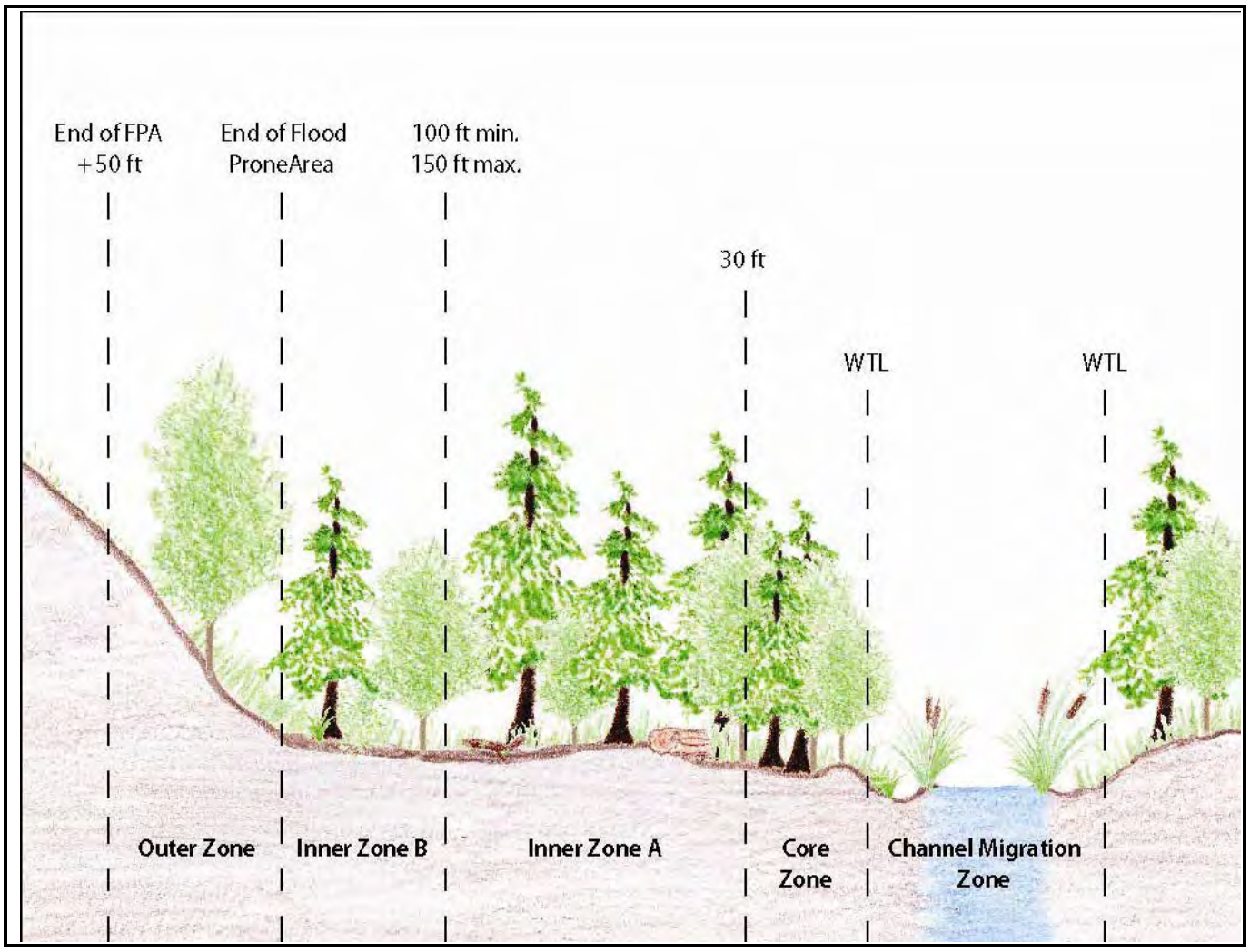
1. Upslope silviculture. Practicing principally uneven-age single-tree selection silviculture to maintain a mature forest across the Forests with minimal openings will reduce the potential hydrologic impacts of even-aged management, which studies at Caspar Creek (http://www.fs.fed.us/psw/topics/water/caspar/) have linked to temporary increases in peak flows, sediment yields, and ambient temperature. Uneven-aged management does, however, require more frequent entries and increased road infrastructure, which is why the next strategy is so important.
2. Increased riparian protection. In addition to standard Watercourse and Lake Protection Zone measures, forest management may, as noted below, include increased canopy retention across all classes of streams.

Class 1 Watercourses:

Timber operations within the Class I WLPZ have been designed and will be conducted to protect, maintain, and contribute to restoration of properly functioning salmonid habitat and listed salmonid species. To achieve this goal, timber operations will:

- Prevent significant sediment load increase to a watercourse system or lake
- Prevent significant instability of a watercourse channel or of a watercourse or lake bank.
- Prevent significant blockage of any aquatic migratory routes for any life stage of anadromous salmonids or listed species.
- Prevent significant adverse effects to stream flow.
- Protect, maintain, and restore trees (especially conifers), snags, or downed large woody debris that currently, or may in the foreseeable future, provide large woody debris recruitment needed for instream habitat structure and fluvial geomorphic functions.
- Protect, maintain, and restore the quality and quantity of vegetative canopy needed to provide shade to the watercourse or lake to maintain daily and seasonal water temperatures within the preferred range for anadromous salmonids or listed species where they are present or could be restored; and provide a deciduous vegetation component to the riparian zone for aquatic nutrient inputs.
- Prevent significant increases in peak flows or large flood frequency.

Profile View of Class I WLPZ in flood prone areas and channel migration zones (not to scale)



Channel Migration Zone: When a CMZ is present upslope of the WTL it is incorporated into the Core Zone. No timber harvesting is proposed in this zone.

Core Zone: The primary objective for this zone is streamside bank protection to promote bank stability, wood recruitment by bank erosion, and canopy retention. Timber operations are generally excluded from this zone and limited to actions which meet the objectives stated above or improve salmonid habitat consistent with 14 CCR 916.9 subsections (a) and (c). The width of the Core Zone is 30 feet measured from the watercourse transition line or lake transition line. No timber harvesting is proposed within the 30 foot wide core zone. *TCF has elected to increase the required core zone from 30 feet to 50 feet in Big River and Salmon Creek.*

Inner Zone A: The primary objective for this zone is to develop a large number of trees for large wood recruitment, to provide additional shading, to develop vertical structural diversity, and to provide a variety of species (including hardwoods) for nutrient input. This is accomplished through the establishment of high basal area and canopy retention by retaining or more rapidly growing a sufficient number of large trees. Additional specific objectives include locating large trees retained

for wood recruitment nearer to the Core Zone and maintaining or improving salmonid habitat on flood prone areas and CMZs when present. Timber operations within WLPZs are limited to those actions which meet the objectives stated above or to improve salmonid habitat consistent with 14 CCR 916.9 subsection (a) and (c).

The Inner Zone A generally encompasses the portion of the flood prone area from 30 feet beyond the WTL (Core Zone perimeter) up to 150 feet from the WTL. The minimum width of the Inner Zone A shall be the greater of the area from the landward edge of Core Zone to the landward edge of the Inner Zone B or 70 feet. The maximum width is 120 feet. **Within Inner Zone A harvesting is subject to the following additional restrictions:**

- The silvicultural method in this area is single tree selection.
- The post harvest stand shall have a minimum 80% overstory canopy cover.
- The post harvest canopy may be composed of both conifers and hardwood species and shall have at least 25% overstory conifer canopy.
- The post harvest stand shall retain the 13 largest conifer trees (live or dead) on each acre of the area that encompasses the Core and Inner Zones.
- Large trees retained shall be the most conducive to recruitment to provide for the beneficial functions of riparian zones (e.g. trees that lean towards the channel, have an unimpeded fall path toward the watercourse, are in an advanced state of decay, are located on unstable areas or downslope of such an unstable areas, or have undermined roots) are to be given priority to be retained as future recruitment trees.
- Harvesting is planned so that the QMD of the flood prone area timber stand will increase.

When no floodplain or Channel Migration Zone is present the maximum width of the WLPZ is 100 feet, the harvest restrictions in the core zone and inner zone A apply.

Inner Zone B: The Inner Zone B is applicable when there are very wide flood prone areas. The Inner Zone B encompasses the portion of the flood prone area from the landward edge of the Inner Zone A (i.e.150 feet from the WTL) to the landward edge of the flood prone area. The landward edge of the Inner Zone B (i.e. the landward perimeter of the flood prone area) shall be established in accordance with flood prone area. Timber operations are permitted in this zone when conducted to meet the goals of this section, including those for the Inner Zone as follows: The primary objective for this zone is to develop a large number of trees for large wood recruitment, to provide additional shading, to develop vertical structural diversity, and to provide a variety of species (including hardwoods) for nutrient input. This is accomplished through the establishment of high basal area and canopy retention by retaining or more rapidly growing a sufficient number of large trees. Additional specific objectives include locating large trees retained for wood recruitment nearer to the Core Zone and maintaining or improving salmonid habitat on flood prone areas and CMZs when present. Timber operations within WLPZs are limited to those actions which meet the objectives stated above.

Within Inner Zone B harvesting is subject to the following additional restrictions:

- The silvicultural method in this area is single tree selection.
- The post harvest stand will retain the 13 largest conifer trees (live or dead) on each acre of the Core and Inner Zones.
- Postharvest stand shall have a minimum 50% overstory canopy cover.
- The post harvest canopy may be composed of both conifers and hardwood species and will have at least 25% overstory conifer canopy.
- Harvesting is planned so that the QMD of the flood prone area timber stand will increase.

Outer Zone: There is no outer zone due to application of uneven aged silvicultural practices on Big River and Salmon Creek.
The Gualala CE requires a 200' WLPZ for class I streams therefore an outer zone between 50 and 100 feet applied at the outer edge of inner zone A on the ground in which the silvicultural systems for harvesting are limited to the use of commercial thinning or single tree selection modified to meet the following requirements:
1. Postharvest stand shall have a minimum 50% overstory canopy cover. The postharvest canopy may be composed of both conifers and hardwood species and shall have at least 25% overstory conifer canopy.
2. Priority shall be given to retain wind firm trees.
The Garcia CE requires a 200-300' WLPZ on class I streams in which the area outside of the inner zone A shall be managed to develop late seral stage forest characteristics.
1.Silviculture within the expanded zone shall consist of light selection and thinning from below to promote large tree retention and development.

(D) Preferred Management Practices in the Inner and Outer Zones: When timber operations are considered pursuant to 14 CCR §§ 916.3 [936.3, 956.3], subsection (c) and 916.4 [936.4, 956.4], subsection (d), the following Preferred Management Practices should be considered for inclusion in the Plan by the RPF and by the Director:
1. Preflagging or marking of any skid trails before the preharvest inspection;
2. Heavy equipment should be limited to slopes less than 35% with low or moderate EHR;
3. Use feller bunchers or hydraulic heel boom loaders which do not drag/skid logs through the zone;
4. Minimize turning of heavy equipment which would result in increased depth of ground surface depressions; and
5. Use mechanized harvesting equipment which delimb harvested trees on pathway over which heavy equipment would travel.

Slope Class	Class II-S WLPZ Zone Width (feet) Core/Inner Zones	Class III ELZ Width (feet)	Wet Area ELZ Width (feet)
<10%	0 / 50	30	30
10 - 30%	15 / 35	30	30
30 - 50%	15 / 60	50	50
>50%	15 / 85	50	50

Class II Watercourses:
All Class II WLPZs shall be composed of two zones regardless of the watercourse type: a Core Zone and an Inner Zone. The Core Zone is nearest to the water; the Inner Zone is contiguous to the Core Zone and is furthest from the water. The width of the Core and Inner Zones vary depending on the following three factors: (i) side slope steepness in the WLPZ, (ii) whether the watercourse is a Class II-S or Class II-L watercourse type, and (iii) whether the watercourse is within a watershed in the coastal anadromy zone or outside the coastal anadromy zone *(all watercourses within TCF ownership are within the coastal anadromy zone).*

Class II Large:
Core Zone: *30 feet in which no harvest may occur.*

Inner Zone: The widths of the Inner Zone is 70 feet and adjacent to the core zone forming a total zone of 100 feet for all class II L streams. Harvesting within the inner zone is allowed providing the 13 largest trees per acre are retained and at least 80% canopy is retained. Silvicultural systemsfor harvesting are limited to the use of commercial thinning or single tree selection.

Class II Standard:
Core Zone: Variable zone (0-15 feet) based on slope in which no harvesting can occur. *On the Garcia River Forest the Core zone is 25 feet regardless of slope.*

Inner Zone: Variable zone (35-85 feet, *25-75 feet on Garcia)* based on slope at least 50% of the total canopy covering the ground shall be left in a well distributed multi-storied stand configuration composed of a diversity of species similar to that found before the start of operations. The residual overstory canopy shall be composed of at least 25% of the existing overstory conifers.

Class III streams: Using the variable width Equipment Limitation Zone (ELZ) defined by the FPR, where there are no overstory retention requirements under the FPR, the Fund will retain at least 50 percent canopy, and a minimum of 25 percent overstory conifer.

[Note: conformance with all canopy requirements will be measured as an average across not less than a 200-foot lineal WLPZ segment—the same as the FPR.]

The Fund believes these three simple measures of increased retention (one per stream class) a) complement the project goals and the process and review requirements of the existing regulations; b) are efficient for foresters to implement in the field; and c) offer higher confidence that aquatic habitat conditions will improve.

In acquisition funding agreements for Big River and Salmon Creek, the Fund committed to management practices that, among other things, "establish riparian buffers that are wider than required under the Forest Practice Rules." The Fund's forest management policies meet that requirement by providing greater canopy retention within the WLPZ and increased basal area and canopy retention upslope from the WLPZs. A specific example of the wider buffer is the no-cut buffer along Class I streams which has been expanded from 30 feet to 50 feet from the stream—a significant expansion. Additionally, the predominant silviculture beyond the formal WLPZ buffers will be single-tree selection which substantially extends the effective riparian buffer width.

XVI. Harvesting Operations

One of the key planning aspects for timber harvest operations is choice of yarding method—ground or tractor-based and cable or skyline systems. The yarding method choice for a specific harvest unit should be based on the silvicultural system, and the site-specific topography and access. The two primary yarding methods most commonly employed are tractor yarding and cable skyline yarding. Tractor yarding includes tractors with winches and chokers, tractors equipped with grapples or rubber tired skidders with grapples or winches. Tractor yarding is generally used on gentle terrain up to 55% slope. Tractors may be used on steeper slopes where cable yarding is infeasible due to access problems or on long corners where deflection for skyline logging is inadequate. Cable skyline yarding consists of a running skyline or preferably a standing skyline with a carriage, either system should be capable of elevating the logs above the existing tree canopy. Cable logging is used on steep

slopes, generally over 50%, where slopes are long and planer or concave. Cable yarding on convex slopes can result in a ground lead situation which can cause unnecessary damage to residual timber or the logging equipment. The key to successful cable yarding is to ensure that there is adequate deflection in the logging unit to suspend the logs above the ground and tree canopy.

The decision to use cable or tractor logging systems is generally an easy one to make. The coast range is very steep and highly dissected with many drainages which make for easy cable logging settings and the ridge tops are reserved for tractor logging. There is a range of slopes between 50-65% where either method may be judged to be adequate in the eyes of the forester laying out the timber harvest unit. Cable logging may be used on shallow slopes were the logs would otherwise be adverse skidded to a landing above the harvest area and conversely tractors may be employed where there are adequate roads and landings downhill of the harvest area. The decision to use one method over the other in this "gray" area is generally made by using the equipment that is required on the rest of the job for example a shallow slope may be cable logged if the rest of the job is predominately cable logging. Or tractors may be used on steeper slopes if there is so little steep ground that bringing in a cable yarding machine for a few acres is deemed infeasible or uneconomical. Tractor long lining is a common practice where winch lines are pulled down hill and the logs are winched up to the tractor sitting in a stationary position. This technique is generally used when the slopes are very short and do not justify the expense of a cable machine and the tractor itself does not operate on the steep slope. Other methods which are suitable for unevenage management techniques are helicopter or balloon yarding which are used when access is limited or there is no access because of excessive road construction or stream crossings requirements to get road access to a harvest unit.

Yarding method decisions are reviewed by the Senior Forester and are discussed in the field consultations. Yarding method and any unusual access situations are described in THPs and are also included in our more readily-available THP summaries.

XVII. Contractor Selection

TCF will utilize contractors in several roles in the management of these properties—from forestry and wildlife surveys to logging and road maintenance. There are several reasons for this—as a relatively new enterprise TCF is not in a position to take on significant staff obligations and many of the most experienced professionals already have contract businesses set up. Additionally we can not guarantee year-round work in some areas. We will strive to use the highest quality professionals available—from owl calling to bridge repair. At least initially we will put most logging jobs out to bid, although we will select the firm that offers the best combination of price, performance, and experience. Other contracts, such as for road maintenance and security, will likely be negotiated directly with the professionals who have the most experience in the area and want the work. Especially for logging, road, and security contracts, ensuring safe working conditions and selecting contractors with good safety records will be an important concern. Additional forestry project work (e.g. owl surveys, preparing and supervising a THP) will be drawn from the area's experienced consulting biologists and foresters. In those situations we will seek to utilize the consultant as a full team member to solicit their ideas on how to meet our objectives. In all roles we have a strong preference for local expertise because it helps support local communities and the timber-based economy. We are concerned about the relative lack of young professionals in the field and will seek to create opportunities that encourage viable business opportunities for young loggers and technicians. In all our efforts we will strive to pay a good and fair wage, to reward performance, and to encourage professional development.

XVIII Staff Training

The Conservation Fund has taken advantage of the high quality of local contractors and chosen to keep our staff relatively small. TCF recognizes that staff will need training in specific areas, appropriate to their positions. Training will be provided as deemed necessary by a supervisor as the staff person's responsibilities grow, or as requested by the staff person. TCF will train staff to encourage individual strengths. TCF recognizes that the SFI 2010-2014 Standard, Objective 16 and FSC US Forest Management Standard, C4.1b encourages employees to improve their skills in sustainable forestry practices through appropriate training and education sufficient to their roles and responsibilities. Each employee has an annually updated job description outlining individual responsibilities and participates in an annual performance review.

Staff Training Expectations

	Timberlands Manager	Registered Professional Forester	Forestry Technician	Office Manager	Forest Carbon Analyst
Participate in SFI Implementation Committee and other forestry associations	x	x			
Sustainable forestry principles and SFI & FSC standards	x	x	x	x	x
Best management practices: specific to streamside and road management	x	x	x		
Principles related to reforestation, invasive plants and animals, forest resource conservation and aesthetics	x	x	x		
Responsibilities under the US Endangered Species Act, Salmonid Protocol, NSO Protocol and Red Legged Frog Protocol	x	x	x		
Safety precautions	x	x	x	x	x
OSHA regulations	x				
Business Management	x				
Public Outreach	x			x	
Emerging Technologies	x	x	x	x	x
Forest carbon quantification and verification					x
Road engineering	x	x			

XVIV. Forest Certification

The Conservation Fund has committed to seeking dual certification under the Forest Stewardship Council and Sustainable Forestry Initiative programs. All properties are to be managed in compliance with the 2010-2014 SFI Standard, Section 2 and the FSC US Forest Management Standard, v1.0 (available at www.sfiprogram.org and www.fscus.org respectively). The Conservation Fund supports the efforts of the SFI Implementation Committee (SIC) by actively participating in the California SIC meetings and programs and retains records of the SICs submittal of annual data to SFI, Inc. regarding inconsistent practices.

An initial scoping audit was completed on the Garcia River Forest in May 2006. A full audit and annual surveillance audits were successfully competed on the Garcia River, Big River, and Salmon Creek forests in all subsequent years, with a full recertification audit to take place in November 2012 that will include the Gualala River Forest.

XVV. Community Engagement

TCF seeks involvement from the local community at several stages of its activities. A public meeting was held to review the management plan for BR/SC, much like a meeting was held in Point Arena to review the GRF IRMP prior to adoption. Interested parties are invited to participate in a tour of each THP either before or shortly after submission, and again following completion of the operation. In addition, TCF staff is available to respond to questions or concerns raised by the local community. TCF prepares and broadly disseminates an Annual Report that describes major activities on the properties, changes to policies, and monitoring results. Should a dispute arise between TCF and a local citizen, neighbor, partner organization, current or potential contractor, or other interested entity, TCF will first seek to resolve the dispute through open communication, prior to more formal dispute resolution through mediation or litigation. Records of disputes will be made available to the lead certification auditor. In all situations, TCF strives to be a good neighbor and fair employer, and will hold itself to high professional standards in its dealings with the local community, contractors, Native American tribes, public agencies, and all other interested parties.

PROGRAM ON HIGH CONSERVATION VALUE FORESTS, IMPERILED SPECIES, AND REPRESENTATIVE SAMPLE AREAS
The Conservation Fund's North Coast Forest Conservation Program
Primary author: Evan Smith
Original version December, 2008; expanded September 2010, 2011, and 2012

Document background

This program description was prepared to assist the audit team in evaluating compliance with the requirements of the SFI & FSC forest certification systems and to guide the forest planning and monitoring conducted by The Conservation Fund. It builds on an earlier version (12/28/2008) with expanded sections detailing Imperiled Species and Representative Sample Areas. This document references and expands upon the "*Garcia River Forest Integrated Resource Management Plan*," the "*Big River and Salmon Creek Forests Integrated Resource Management Plan*," and "*Conservation Prospects: A review and analysis of existing conservation plans, land use trends and strategies for conservation on the north coast of California*." All three plans are available in the reference documents section of the North Coast Program website-- http://www.conservationfund.org/north_coast_forests. While some of the material in this summary is duplicative of the management plans it provides additional detail that is of specific interest to FSC/SFI auditors; this is intended to be a stand-alone policy applicable across all properties (and any additional acquisitions in Mendocino County, CA).

Introduction

The Conservation Fund (TCF) is required to identify areas that because of significant conservation values should have special management practices. This requirement is imposed by TCF's internal forest management planning approach (see Forest Management Policies section IV, Critical Landscape Features) and by the requirements for sustainable forest management certification. For consistency purposes this document will primarily reference language from the Forest Stewardship Council (FSC) US Forest Management Standard, especially Principle 9; we prefer the term "features" over "forest" because many of the highest priority conservation elements are the non-forested features within a forested landscape. This discussion is also linked to Sustainable Forestry Initiative Standard, Section 2, Indicator 4.1.3. The basis for most of this program comes from two important conservation planning exercises, "*Conservation Prospects for the North Coast"* and the Conservation Action Planning assessment in the *"Garcia River Forest Integrated Resource Management Plan,"* described in more detail below.

Conservation Prospects

In August 2005, after two years of research and review, TCF completed "*Conservation Prospects for the North Coast: a review and analysis of existing conservation plans, land use trends, and strategies for conservation on the North Coast of California*." This plan was prepared under a contract for the California State Coastal Conservancy. The principal author of the plan was Jenny Griffin, then a consultant to TCF. "*Conservation Prospects*" systematically identifies the highest conservation values for the region based on a broad set of past conservation plans and develops recommendations for future conservation efforts. The two principal recommendations are to:

- Move quickly to establish "working landscape" conservation management on large, strategically located forest and agricultural properties in resource-rich watersheds in Humboldt, Mendocino and Del Norte counties.
- Focus other fee or easement acquisitions on unique resources that are essential to conserving high-priority coastal resources, such as coastal estuaries, old-growth redwood forest stands, coho salmon refugia, floodplains, and California Coastal Trail segments.

In addition to these general recommendations, the report reviews and catalogs 154 individual conservation plans for the region and provides a detailed spatial synthesis assessment of the seven plans deemed to be the most broadly relevant and instructive. The seven plans were chosen on the basis of data quality, scientific principles, format, and mandate and consist of:

1. *California North Coast Ecoregion Aquatic Conservation Strategy Recommendations,* The Nature Conservancy of California, Fall 2003;
2. *California North Coast Ecoregional Plan,* The Nature Conservancy of California, June 2001;
3. *Completing the California Coastal Trail,* California State Coastal Conservancy, January 2003;
4. *Mendocino County Coastal Conservation Plan,* Mendocino Land Trust, April 2003;
5. *A GIS-Based Model for Assessing Conservation Focal Areas for the Redwood Ecoregion,* Conservation Biology Institute and Save-the-Redwoods League, 1999;
6. *Recovery Strategy for California Coho Salmon,* California Department of Fish and Game, 2004; and
7. *Strategic Plan Update,* Pacific Coast Joint Venture, 2004.

The 13-page chapter of "*Conservation Prospects"* on the Mendocino Coast Hydrologic Unit (which contains all of the TCF properties) draws from 15 local plans in addition to the seven core regional plans. In general, "the Mendocino Coast HU is consistently one of the most highly valued regions of the North Coast" by the conservation plans synthesized. Specific features that are recognized as of high conservation value include pygmy forest, coastal dunes, coastal estuarine wetlands, seabird rookeries, spawning areas for anadromous fish, and old growth forests (note that redwood-Douglas fir and tanoak forests were not identified as high conservation value).

The report was developed over a 24 month period in collaboration with state agencies and conservation groups; 41 organizations or individuals provided technical review for the assessment. The report is frequently cited by newer conservation plans and initiatives on the North Coast.

Garcia River Forest Conservation Action Planning

Occurring nearly simultaneous with the development of "*Conservation Prospects*" was a much more targeted exercise in conservation planning for the Garcia River Forest (GRF) led by The Nature Conservancy and utilizing their "Conservation Action Planning" process (also known as "5-S"). As described in the GRF Integrated Resource Management Plan (Section II, Identification of Conservation Targets and Associated Indicators) this was "designed to help identify conservation targets, develop strategies to protect those targets, take action, measure success, and adapt." Among the numerous features evaluated, five were identified as Conservation Targets: anadromous fish bearing stream, redwood/Douglas-fir forest, oak woodland/grassland, non-riverine wetlands, and Northern spotted owl.

Each conservation target has identified indicators with quantitative monitoring metrics relating to distribution, viability, and quality. For example, the selected indicators for anadromous fish bearing streams include percent fines less than .85mm (spawning sites); percent fines less than 6.5mm (spawning sites); mean weekly average water temperature (Class I streams); mean pool shelter rating (Class I streams); primary pool frequency (Class I streams); riparian canopy cover (Class I streams). Nine additional indicators were identified for further evaluation.

The primary references used in the Conservation Action Planning process were:

- Low, Greg. 2003. *Developing Strategies, Taking Action & Measuring Success. Landscape – Scale Conservation: A Practitioner's Guide*. The Nature Conservancy, Arlington, Virginia.
- The Nature Conservancy. 2005. *Conservation Action Planning Workbook, Version 4b*. The Nature Conservancy. Arlington, Virginia.

The Conservation Action Planning process is the premier tool for conservation and restoration planning within a conservation biology framework. It has been used at thousands of sites across the world.

As part of the GRF Integrated Resource Management Plan (IRMP), the Conservation Action Planning process was led by Mark Reynolds and Jen Carah, ecologists with The Nature Conservancy. The GRF planning team included an additional twelve experts from the fields of forest management, land conservation, and watershed restoration. A well-attended public meeting to solicit comment on the draft plan was held in nearby Point Arena, CA, and numerous additional consultations were provided by recognized experts and the local community. The plan has been approved by the State Coastal Conservancy, the California Department of Fish and Game, and The Nature Conservancy.

Land Acquisition Evaluations

In order to document the conservation values of the property, TCF prepared a Land Acquisition Evaluation prior to commitment of acquisition funding from the state agencies. These documents include detailed descriptions of vegetation types and species occurrences, as well as more general information about physiographic features and local ecology. They are developed in consultation with staff from the California Department of Fish & Game (DFG) and need to be approved by DFG. Land Acquisition Evaluations prepared for the Garcia River Forest and Big River / Salmon Creek have formed the basis on ongoing ecological monitoring and planning. Relevant information from the Land Acquisition Evaluations is excerpted below in the sections on specific conservation features.

HCVF definition from the FSC-US Forest Managment Standard (v1.0)

FSC defines High Conservation Value Forests as those that possess one or more of the following High Conservation Values (HCVs):

1. HCV forest areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g., endemism, endangered species, refugia), including RTE species and their habitats;
2. HCV forest areas containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance;
3. HCV forest areas that are in or contain rare, threatened or endangered ecosystems;
4. HCV forest areas that provide basic services of nature in critical situations (e.g., watershed protection, erosion control);
5. HCV forest areas fundamental to meeting basic needs of local communities (e.g., subsistence, health); or,
6. HCV forest areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).

[note: this definition was updated by FSC in 2010, the change in the FSC HCVF definition does not result in changes to the TCF HCVF definition.]

TCF Definition of HCVF

The Garcia River, Big River, Salmon Creek and Gualala River properties were acquired by TCF expressly because of their conservation value. The properties possess significant conservation values, as documented in the Land Acquisition Evaluations prepared for the property, including habitat for numerous endangered species. It could be argued that all of the North Coast should be considered High Conservation Value Forests, but more realistically only the most exceptional and sensitive areas of this exceptional and sensitive landscape should be classified as HCVF. The TCF team used this exercise to identify those elements that deserve more than just recognition and protection as part of a conserved working forest but are truly critical conservation values, significant at a regional level. Based on the analysis done as part of *Conservation Prospects* and the GRF IRMP, TCF has identified the following areas as High Conservation Value Forest features:

a) Oak woodlands and grasslands
b) Pygmy cypress forest

c) Old growth coniferous forest
d) Salmonid spawning streams.

Grasslands and salmonid spawning streams are obviously not "forest," but occur within or on the edge of forests and are recognized as HCVF features because of their critical importance and sensitivity to management practices.

In addition to this list, many additional areas and elements were considered. All portions of the properties have some degree of ecological value—whether it is habitat for the Northern spotted owl or ability to support carbon storage. And all of the properties are used for recreation, public education, and to a limited extent, foraging. And there are many fine-scale elements that have significant conservation value—snags, trails, etc. The above definition is designed to recognize those elements that are regionally-significant and deserve special management attention. The definition also considers the degree of threat—many of the above-listed elements are still vulnerable under current laws and regulations. Public drinking supplies are not present on the property but probably would not be considered as a separate HCVF element because they would likely be correlated with and enveloped by the salmonid spawning area designations and because of the high degree of existing stream and watershed protections under the Forest Practice Rules, Regional Water Quality Control Board requirements, and TCF Forest Management Policies.

TCF Inventory of HCVF

Oak woodlands and grasslands. Oak woodlands and grasslands were mapped on the Garcia River Forest as part of the planning process for the Ecological Reserve Network (ERN). All significant areas (>10 acres) were included in the ERN and are to be managed solely for their ecological value. More fine-scale mapping of the hardwood and grassland community types was completed in 2008 by The Nature Conservancy under a research grant from the USDA Forest Service related to the distribution and control of Sudden Oak Death. This digital imagery-based vegetation mapping has been groundtruthed by TNC staff and represents a significant advancement in the field of plant community mapping. Currently we track 233 acres of Oak Woodland and 480 acres of Grasslands on the Garcia in our GIS—not all Grasslands are natural meadows, a small portion are probably old landings. Big River / Salmon Creek is situated farther west than Garcia and consequently is primarily a coniferous forest with less of these arid forest types. No oak woodlands or grasslands were identified as part of the forest stand typing (using aerial photos) completed by John Nickerson in 2007. Analysis of the Department of Fish & Game California Vegetation database (CalVeg) indicates 6 acres of Canyon Live Oak vegetation type on the Big River tract and 523 acres of Annual Grass/Forbs on Big River and 24 acres on Salmon Creek. CalVeg is notorious for overstating oak and grassland areas because of the difficulty in using remote sensing to differentiate oak from tanoak and early seral forest conditions from native grasslands. Based on initial field review these sites are not true oak woodlands or grasslands, but brushy former clearcuts and landings. Currently we track 0 acres of Oak Woodland and 0 acres of Grasslands on BR/SC in our GIS. Gualala contains 109 acres of Grassland and does not contain any designated Oak Woodland-- although we suspect some small patches (less than 5 acres) may be uncovered through field work, in which case they will be added to this inventory and protected.

Pygmy cypress forest. Salmon Creek contains the only known occurrence (on TCF properties) of this rare natural community type, which are limited to former marine terraces with thin, nutrient-poor, acidic soils underlain by a hardpan. According to CalVeg, there should be 122 acres of pygmy forest on Salmon Creek but the entire area was assessed as part of the field work for the Lower Salmon Creek THP and amendment and only stands 57718 and 57719 (reported as 11 gross acres, but 3 acres of roads/landings) were identified as having pygmy cypress forest characteristics. This community type does not usually grade into commercial forest types; typically there is a fairly sharp demarcation, but field staff are knowledgeable of the characteristics of pygmy forest and will readily observe any additional stands if they are present. If field surveys reveal additional pygmy forest areas, they will be added to this

inventory. Currently we track 8 acres of Pygmy Cypress Forest in our GIS, a single location on Salmon Creek near the Iron Gate access point.

Old growth coniferous forest. Unfortunately, due to the extensive logging of coastal Mendocino County, there are no old growth stands on the property. Old growth stands are defined as having the majority of the canopy in trees established prior to 1800—even if harvest or other disturbance has occurred within the stand. Individual old growth trees do occur on these properties—although to a very limited extent. They usually result from the release in the early to mid-1900s of suppressed trees when the old growth overstory was removed. They are not mapped but are fully protected under the wildlife tree retention requirements (see TCF Forest Management Policies). Currently we track 0 acres of Old Growth in our GIS.

Salmonid spawning streams. While there is excellent mapping of fish-bearing streams (Class 1 watercourses) and there is decent understanding of salmonid distribution within these watersheds, there has not been a detailed assessment of individual spawning areas. Precise location of spawning areas is not critical to the HCVF policies but will likely be the subject of future monitoring. Surveys by Department of Fish & Game, The Nature Conservancy, and North Coast Regional Water Quality Control Board have indicated coho presence in North Fork, Signal, Blue Waterhole, and Inman creeks on the Garcia River Forest (as well as the mainstem), whereas steelhead are widely documented (assume they are using just about every Class 1 stream on our properties). On Big River, coho are documented in the mainstem, Two Log, North Fork and Laguna Creek. Coho are documented along most of the length of Salmon Creek and Hazel Creek. On Gualala River, coho are documented on the North Fork Gualala River and Dry Creek. Currently we use our GIS to track the number of miles of Class I stream (36 on Garcia, 24.5 on Big River, 10 on Salmon Creek, 16 on Gualala); this approach slightly overstates the amount of actual salmonid spawning streams, because some portions of Class I streams are above fish passage barriers, but is the best information currently available. The most significant barrier is a waterfall and logjam in the upper North Fork of Garcia; other barriers (usually culverts, but a couple of waterfalls as well) typically restrict less than a few hundred yards of potential spawning habitat.

TCF Protection Measures for HCVF

General measures. The most significant threats to any HCVF element would be residential development, forest fragmentation, vineyard conversion or grazing—all have been prohibited by TCF's acquisition and the permanent conservation restrictions on the properties. This limits the number of potential threats to the much smaller subset of forest management, road building and/or maintenance, recreation, trespass and neglect. Appropriate protection measures for HCVF are incorporated in the TCF Forest Management Policies, as described below. New road building projects carefully reviewed by TCF staff (both because of its expense as well as the potential environmental impact) and are included in proposed THP's or Department of Fish and Game projects such as Fisheries Restoration Grant Projects. Guidelines for road construction and maintenance are described in the TCF Road Management Plan. Recreation policies have been developed for these properties, to date we have a pedestrian and equestrian access permit system for Big River and Salmon Creek. Garcia is favored for hunting and a small number of permits to hunt are issued each year, primarily to neighbors. Trespass is a major concern on the property, particularly as it relates to illegal marijuana cultivation. All the properties are actively patrolled by TCF staff and contractors and thoroughly gated to discourage trespass. Fortunately, marijuana cultivation is not common in pygmy cypress or oak woodlands and grasslands. Sudden Oak Death does occur on the Garcia and Gualala Forests and will likely infect the HCVF oak woodlands. At this time SOD occurs in isolated areas and does not appear to significantly threaten the oak woodlands. There is no effective and affordable treatment or vaccination against SOD in a forested setting, so treatment will consist of maintaining an ecologically balanced and healthy forest. For all these reasons, protection of the HCVF is well-integrated with the design and implementation of the projects. Additional specific references are provided below.

Oak woodlands and grasslands. TCF Forest Management Policies (Section IV) states, "All true oak (Quercus spp.) woodlands and native grasslands are to be preserved." In addition, the vast majority of the oak woodlands and grasslands on TCF property are included within the Ecological Reserve Network (ERN) on the Garcia River Forest. Management of the ERN is described in the GRF IRMP but all management activities must be designed and implemented to further the ecological goals. In the case of oak woodland and grassland this means that prescribed fire or selective harvest to address conifer encroachment or to control the spread of Sudden Oak Death would be permitted under direction of TNC.

Pygmy cypress forest. TCF Forest Management Policies (Section IV) states, "All pygmy forest is to be preserved." Salmon Creek contains the only known occurrence of this rare natural community type on TCF properties. The area northwest of the Lower Salmon Creek THP Unit A (also mapped as stand #57719) and north of Units D and F (approximately mapped as stand #57718) are to be protected from future harvest and monitored for potential impacts. Pygmy forest occurs along a gradient, according to soil and hydrological variations, and there may be pygmy characteristics within the adjoining managed forest. Unique pygmy features that are encountered within a harvest area would be retained under Forest Management Policies Section X, Retention Requirements.

Old growth coniferous forest. Unfortunately, this does not exist within the TCF ownership. Should any new stands be identified or new property be acquired, all old growth coniferous forest would be preserved. Individual old growth trees are preserved on TCF property whenever they are encountered.

Salmonid spawning streams. Protection for salmonid spawning streams is provided for by the Forest Management Policies Section XIV, WLPZ Protection Measures, and includes measures related to upslope silviculture, road improvements, and increased riparian buffer protection. Additional details are available within the Forest Management Policies and the GRF Site-Specific Management Plan approved by the North Coast Regional Water Quality Control Board.

TCF Monitoring of HCVF

Periodic monitoring of HCVF will be integrated into ongoing monitoring activities on the properties and will occur at different scales and timeframes as necessary. Two categories of monitoring will occur: 1) biophysical—related to the distribution and condition of the HCVF features, and 2) programmatic—related to the effectiveness of the protection measures.

Biophysical monitoring will consist of:

- Ongoing vegetation mapping as part of forest inventory updates and Timber Harvest Plan preparation, with updated forest stratification approximately every ten years.
- Ongoing rare plant surveys in the areas within and adjoining planned Timber Harvest Plans and Road Improvement or Decommissioning Projects.
- Occasional evaluations of Sudden Oak Death distribution and mortality on Garcia River Forest by The Nature Conservancy and or TCF.
- Aquatic habitat typing by The California Department of Fish and Game have been completed on the Garcia River, Big River, Gualala River and Salmon Creek, and are tentatively scheduled to be re-assessed approximately every ten years.
- EMAP aquatic monitoring on Garcia River Forest by The Nature Conservancy and the North Coast Regional Water Quality Control Board—initial assessments completed, re-assessments in approximately ten years.
- Annual summer season stream temperature monitoring at multiple sites on all properties (multiple partners).

Programmatic monitoring will consist of 1) an annual evaluation of whether the HCVF features are being sufficiently protected and if there are any new threats to consider and 2) a long-term evaluation of the water quality and stream habitat condition response to TCF forest management and watershed restoration practices. The former will occur as part of the January Program Review; the latter will be developed over the next decade based on observations in the habitat assessment and EMAP measurements (see the GRF Aquatic Monitoring Plan in the IRMP).

Representative Sample Areas. Ecosystem type definition

Identification and protection of Representative Sample Areas (RSA) are explicitly required as part of the FSC-US Forest Managment Standard (C6.4) in order to ensure the conservation of ecosystem types that are not protected through HCVF or other requirements. [Definition from FSC Standard*: **Representative Sample Areas (RSAs)** are ecologically viable representative samples designated to serve one or more of three purposes: 1) To establish and/or maintain an ecological reference condition; or 2) To create or maintain an under-represented ecological condition (i.e., includes samples of successional phases, forest types, ecosystems, and/or ecological communities); or 3) To serve as a set of protected areas or refugia for species, communities and community types not captured in other Criteria of this Standard (e.g., to prevent common ecosystems or components from becoming rare)*]. In the context of the North Coast there are many ecosystem types and conditions present, from ocean shore to old growth forest. The TCF Forests all occur within the Northern California Coastal Forest Ecoregion (NA0519), as defined by Rickets et al, "*Terrestial Ecoregions of North America: a conservation assessment*" (Island Press 1999). More traditional forest classification systems show similar categorization, e.g. Northern California Coast Section (263A) in "*Description of the ecoregions of the United States*" (Bailey, R.G., US Forest Service, 1995).

Northern California Coastal Forest Ecoregion conservation status

Rickets et al describe the Northern California Coastal Forest Ecoregion as a Class 1 ecoregion, or "Globally outstanding ecoregion requiring immediate protection of remaining habitat and extensive restoration." Urgent action priorities developed by the WWF include greatly increasing "…the number of certified forests where timber is being harvested sustainably," which is "…essential for maintaining the integrity of ecosystems outside protected areas." At 18.7% protected, the Northern California Coastal Forest Ecoregion is one of the most protected forest types in the world (Schmitt, C.B., et al. "*Global analysis of the protection status of the world's forest*," Biological Conservation, 2009). The Convention on Biological Diversity targets 10% protection of each ecoregion as necessary to maintain biological diversity, thus the Ecoregion can be considered well-protected.

The vast majority of the Northern California Coastal Forest Ecoregion is analyzed as part of "*Conservation Prospects*," which recognized two principal recommendations as conservation priorities

- Move quickly to establish "working landscape" conservation management on large, strategically located forest and agricultural properties in resource-rich watersheds in Humboldt, Mendocino and Del Norte counties.
- Focus other fee or easement acquisitions on unique resources that are essential to conserving high-priority coastal resources, such as coastal estuaries, old-growth redwood forest stands, coho salmon refugia, floodplains, and California Coastal Trail segments.

It does not recommend the additional preservation of redwood forest unless it contains some of the high value features (where they occur, those same features are protected within the TCF Forests through the HCVF program).

Identification of Representative Sample Areas

For the purpose of this program we classify the following as Representative Sample Areas—Mendocino Headlands State Park, Jackson State Demonstration Forest, Maillard State Reserve, and the Ecological

Reserve Network of the Garcia River Forest. These are large-scale formally-protected landbases containing a diversity of representative natural habitat conditions.

There are countless habitat conditions and successional stages that could be considered for the purpose of defining Representative Sample Areas. The most significant of these, such as oak woodlands, are protected through the HCVF program described above. Less significant examples could include riparian alder stands and natural (not herbicided and planted) early successional stands. Within the portion of the Northern California Coastal Forest Ecoregion that is actually forested (so setting aside the coastal scrub, pygmy cypress, oak woodlands and other non-forest ecosystem conditions) there is relatively little spatially-explicit variation—almost everything is dominated by redwood, Douglas fir, and tanoak and is less than 100 years old. Other tree species do occur but are almost never a large component of a stand. In addition to vegetation typing, certain ecological processes create significant features to consider, for example forest fires and landslides can and do create successional pathways with some different characteristics.

The process of identifying RSAs within this somewhat indistinctive landscape becomes somewhat irrelevant when looking at the conservation status and management of surrounding lands. In addition to all TCF properties being permanently conserved, there are a number of other large landholdings with similar features which are also permanently conserved. For example, adjoining the Big River property is the Big River unit (7,334 acres) of the Mendocino Headlands State Park and the Jackson Demonstration State Forest (48,652 acres). Due to the shared management history, the State Park is almost identical in conditions to TCF's Big River tract, and is permanently protected with little to no harvesting or road building expected. Comparatively, the State Forest is thirty to fifty years more developed, with significantly older and denser forest conditions prevalent, and will be managed for both continued late-seral forest development as well as some modest level of harvesting (both even-aged and uneven-aged). While the Garcia River Forest does not have the same level of protected land nearby it does adjoin an old growth reserve and contains a 8,264 acre Ecological Reserve, which in addition to being permanently protected from development and conversion can also only be managed for late-seral and other desired ecological conditions. Looking beyond the protected lands, due to the significant land use and forestry restrictions imposed on the surrounding landscape a wholesale change in ecological patterns is unlikely.

As it relates to designating RSAs, it is possible that some existing but niche habitat type is unlikely to persist on the landscape. For example red alder stands less than 30 years old are very uncommon because red alder stands are almost exclusively located in riparian zones and due to the Forest Practice Rules (dating to the 1970s); new clearings in riparian zones are relatively rare (only triggered by flood scouring). They provide a unique and valuable wildlife habitat and enrich stream nutrient conditions, however it would likely be illegal to try to encourage the development of new alder stands and it would certainly be impractical to try to freeze in time the existing stands. The habitat types that are most likely to decrease in abundance are early successional stands, due to the decrease in even-aged management practices. However early successional stand conditions are still being perpetuated to some extent on private lands and were likely an almost non-existent component of the pre-European landscape. The ecological process least represented is probably fire, due to 50+ years of aggressive fire suppression. Reintroducing low-intensity ground fires is a long-term objective for TCF but will require a significant shift in forest structure and community acceptance. And despite the suppression efforts, fires still occur, as shown by the summer of 2008 when over 54,000 acres burned in Mendocino County—so recently burned areas are not lacking and will continue to persist on the landscape. The more pervasive threat to habitat conditions and distribution will likely be climate change, which cannot be prevented through the designation of RSAs, and the extensive network of protected lands already provides the best hope for adaptation and species persistence.

In summary, numerous forest stand types and processes were considered for RSA designation, and the following summarizes the salient conclusions.

1. Old growth forests and Oak woodlands and native grasslands are important and would receive RSA designation if they were not already recognized and protected through the more-stringent HCVF designation.
2. Late-seral conditions are the highest priority feature in the coniferous forest, even when not occupied by Northern spotted owl or marbled murrelet. At the site-scale, protection of existing individual features is recommended by the California Department of Fish and Game and occasionally required during Timber Harvest Plan review, as well as required in TCF's retention policies. At the landscape-scale, over 100,000 acres of similar coniferous forest in Mendocino County is managed for development and retention late-seral habitat conditions, which is in excess of conservation biology guidelines for maintaining biodiversity.
3. Young coniferous forest has not been identified as high wildlife or social importance and will continue to be created on the landscape through ongoing even-aged harvesting activities on private lands; therefore it is unnecessary to include in a RSA.
4. Hardwood riparian stands (of all ages) are gradually being succeeded by coniferous stands. They are a unique and valuable type but impractical to deliberately maintain as a RSA.
5. Fire is the most significant process that is under-represented on the landscape and burned conditions and features are probably under-represented compared to pre-European settlement conditions. TCF is taking steps to be able to re-introduce fire (and by extension, burned conditions) but is decades away from safe implementation.

To summarize, because of the widespread protected nature of the region, the extensive regulatory system restricting land use change and harvest practices, and the existing pattern of habitat conditions and ecological processes present on the landscape, our conclusion is that the designation of additional Representative Sample Areas is not necessary and would not be ecologically beneficial. This conclusion will be re-evaluated at least every ten years, with stakeholder input, as part of a planned update to TCF's Management Policies.

Protection and management of Representative Sample Areas

Ongoing preservation and management of the Representative Sample Areas is the responsibility of the landowner, California State Parks Department, California Department of Forestry and Fire Protection, and The Conservation Fund, respectively. All properties are covered by management plans consistent with the public mission of the organization; in addition management plans and actions are reviewed by outside advisory groups. The adequacy of these protection measures will be re-evaluated at least every ten years, with stakeholder input, as part of a planned update to TCF's Management Policies.

Consultation regarding HCVF and RSAS

The FSC-US Forest Management Standard explicitly expects some level of stakeholder consultation as part of the HCVF and RSA identification and protection process. As described above, the identification of the four HCVF features was based on two well-respected conservation biology planning efforts which were openly developed, are publicly available and have been thoroughly reviewed by natural resource agencies, environmental organizations and the local communities. In addition the HCVF/RSA features descriptions and protection measures have been part of the TCF Policy Digest, which is a publicly available document that has benefited greatly from community and agency review, including by our Advisory Council. The most significant contributors to the policies include: Jen Carah (The Nature Conservancy), Linda Perkins (Sierra Club), and Alan Levine (Coast Action Group). The TCF Forest Management Policies are discussed as part of every THP field review (which includes both an internal staff and an open tour); the public tours draw a broad range of stakeholders, including students, neighbors, and local environmentalists. More recently, we have also benefited from the extensive HCVF and RSA consultation and analysis conducted by the Mendocino Redwood Company which manages an

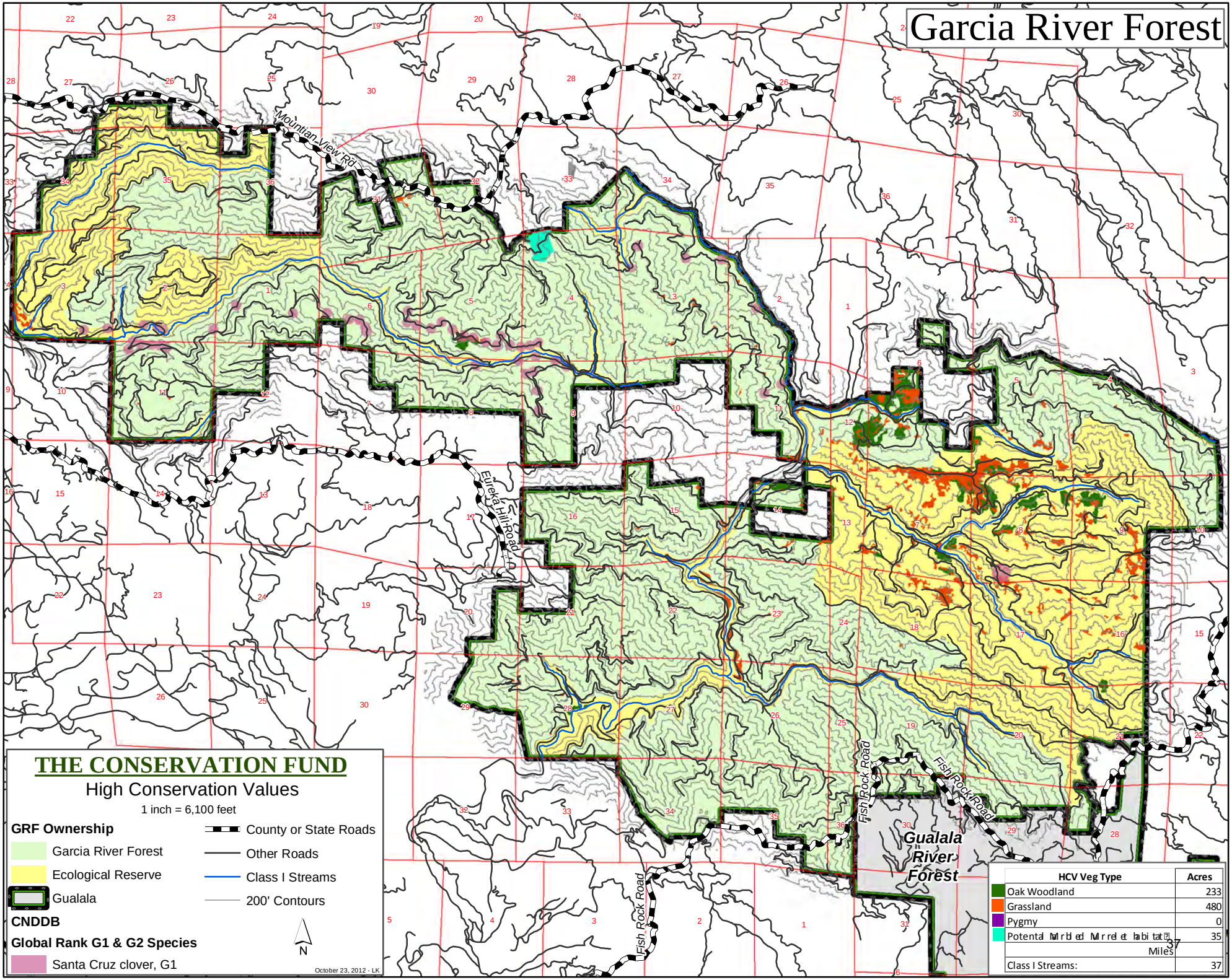
adjoining and much larger landbase and came to very similar conclusions regarding high priority features and protection measures.

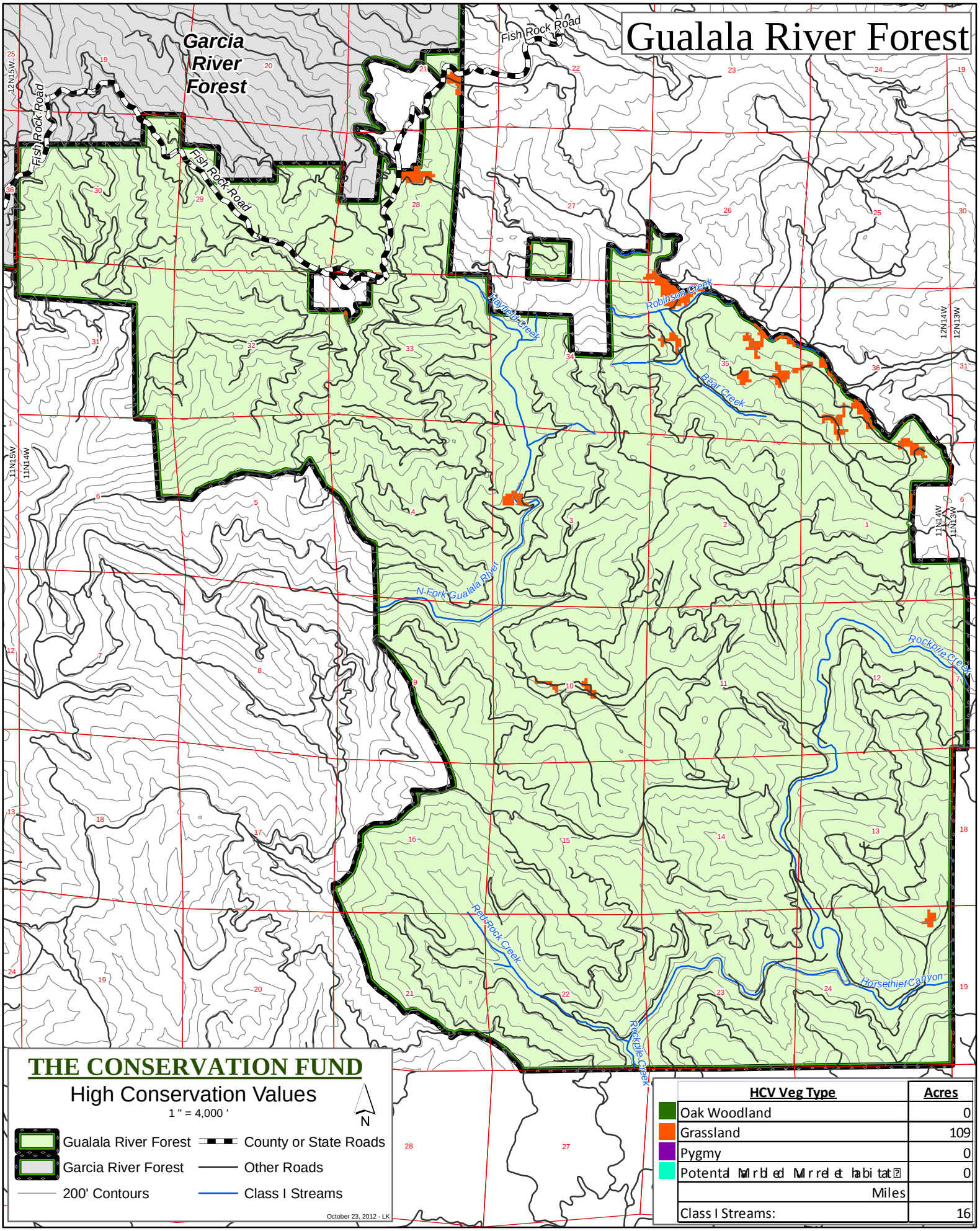
Imperiled Species

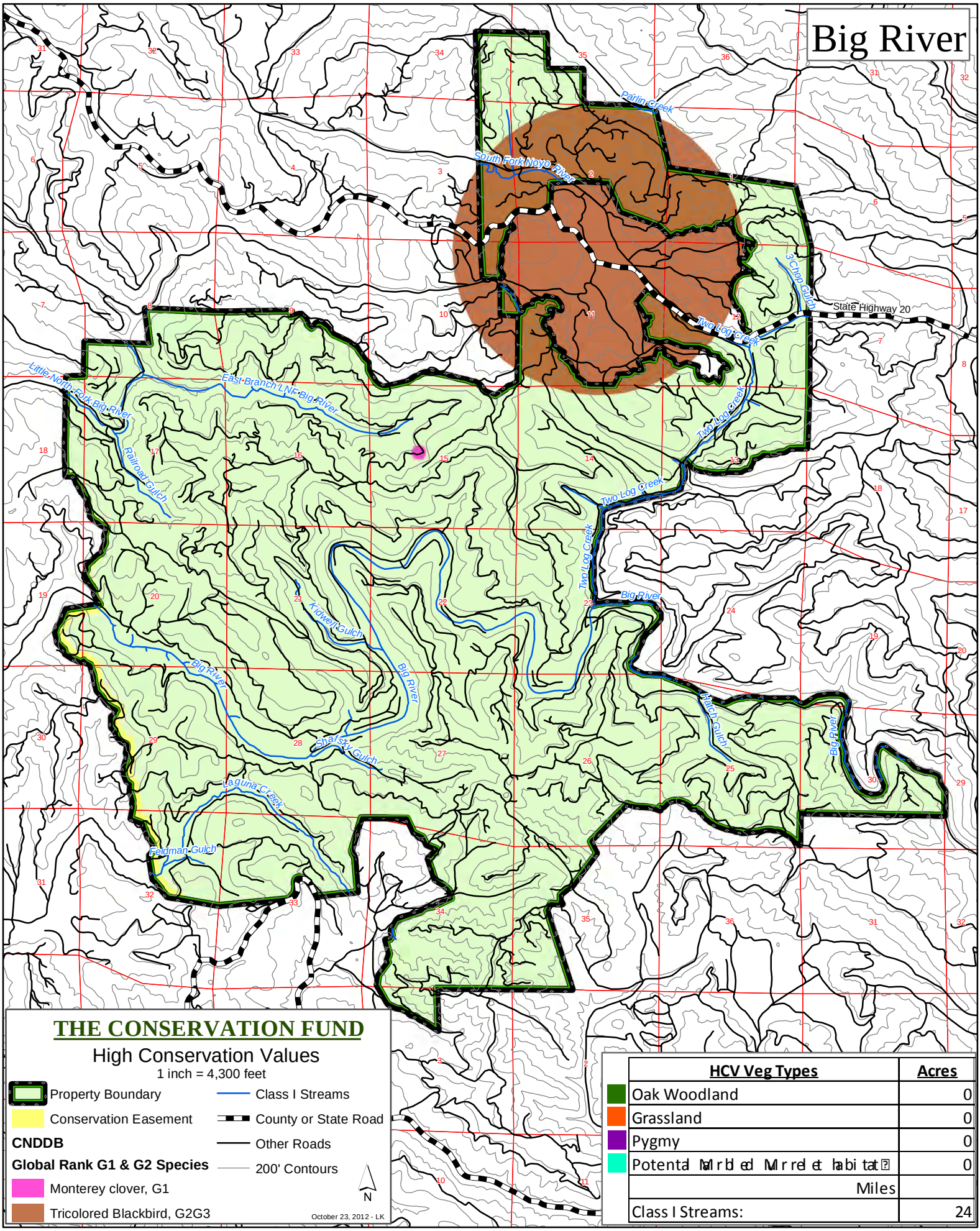
The SFI standard specifically requires identifying and protecting species that have been identified as Globally Critically Imperiled and Globally Imperiled (G1 and G2 status, respectively). The California Natural Diversity DataBase (CNDDB) maintains all recorded sitings of G1/G2 species, as well as other listed species and species of concern. The following G1/G2 species have been identified on TCF properties:

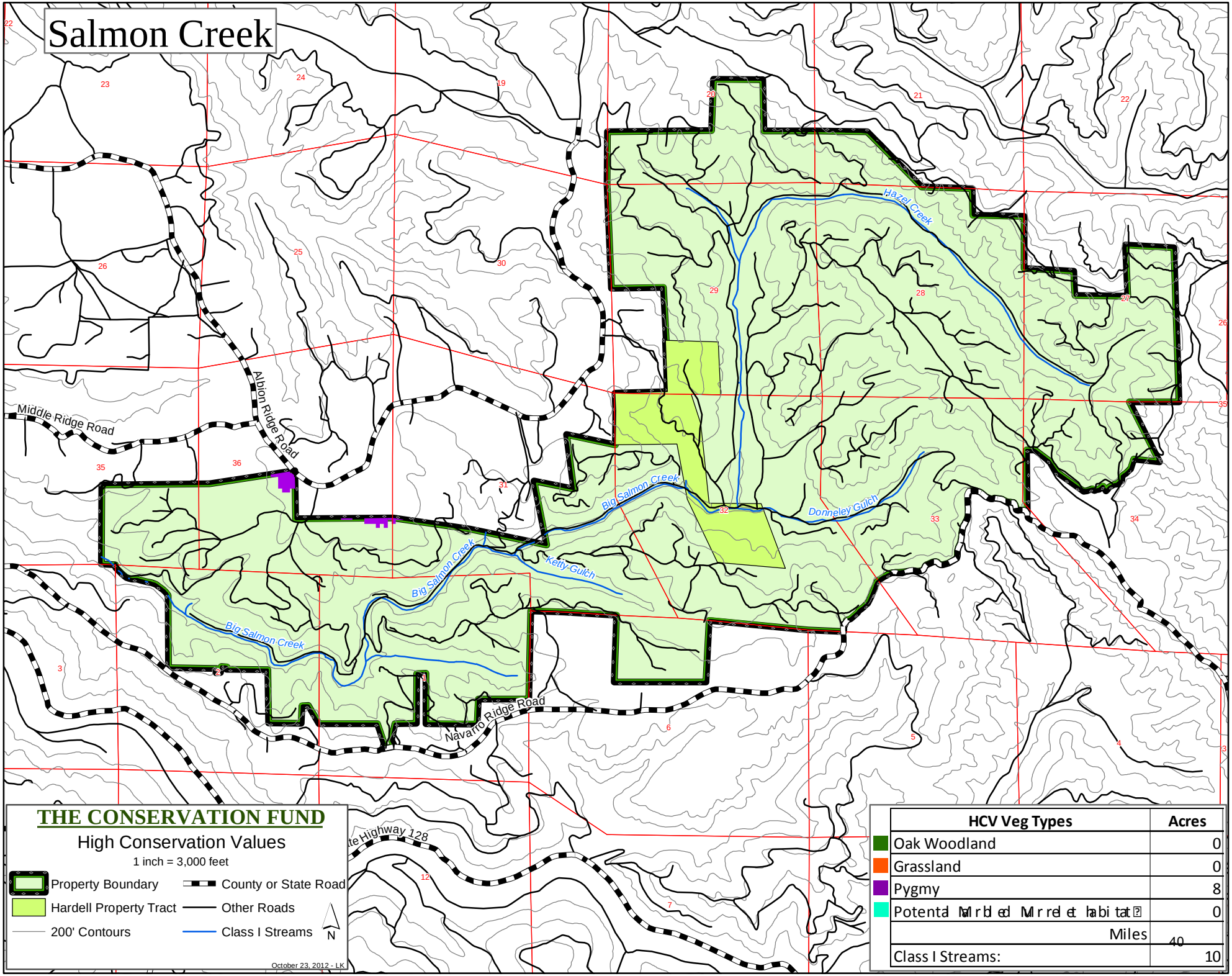
Species name	Common name	Location	Notes and protection measures
Trifolium trichocalyx	Monterey clover	Big River, in a road cut bank near the Elephant Seal and ELF THPs	This G1 and state and federally endangered plant was identified by TCF in 2011 prior to a road upgrade project. Per CDFG permit, the single location was fenced and protected, and will be monitored. It is the only location known outside of a handful of sites in Monterey County.
Agelaius tricolor	Tricolored blackbird	McGuires Pond, private property adjoining Big River	The detection of this G2/G3 species is from a single day in 1992 and it has not been observed since. Given their preference for open riparian and field habitats they are unlikely to be found on TCF property or impacted by TCF management.
Hesperocyparis pygmaea	Pygmy cypress	Salmon Creek, between the Lower Salmon Creek THP and the property border	This G2 plant species is not state or federally listed. Within TCF ownership, it occurs in one stand, and is protected as part of the pygmy forest HCVF area.
Trifolium buckwestiorum	Santa Cruz clover	Garcia and Gualala, along mainline roads	This G1 species was detected by TCF botanists and has been confirmed along multiple sections of road. Per CDFG recommendations, several sites have been fenced for protection and all locations are monitored.

There are a few other rare plants that may yet be found on the property, but given the extensive surveys by TCF botanists prior to any ground disturbing activity, it seems highly unlikely they will go undetected.


Garcia River Forest
Mountain View Rd
Eureka Hill Road
Fish Rock Road
Fish Rock Road
Fish Rock Road
Gualala River Forest
THE CONSERVATION FUND
High Conservation Values
1 inch = 6,100 feet
GRF Ownership
Garcia River Forest
Ecological Reserve
Gualala
CNDDB
Global Rank G1 & G2 Species
Santa Cruz clover, G1
County or State Roads
Other Roads
Class I Streams
200' Contours
N
October 23, 2012 - LK
HCV Veg Type
Acres
Oak Woodland 233
Grassland 480
Pygmy 0
Potential Marbled Murrelet habitat 35
Miles
Class I Streams: 37


Gualala River Forest
Garcia River Forest
Fish Rock Road
Fish Rock Road
Fish Rock Road
Robinson Creek
Bear Creek
N Fork Gualala River
Rockpile Creek
Red Rock Creek
Horsethief Canyon
Rockpile Creek
12N15W
12N14W
12N13W
11N15W
11N14W
11N14W
11N13W
THE CONSERVATION FUND
High Conservation Values
1 " = 4,000 '
N
Gualala River Forest
Garcia River Forest
200' Contours
County or State Roads
Other Roads
Class I Streams
October 23, 2012 - LK
HCV Veg Type
Acres
Oak Woodland 0
Grassland 109
Pygmy 0
Potential Marbled Murrelet habitat 0
Miles
Class I Streams: 16


Big River
Parlin Creek
South Fork Noyo River
3 Chop Gulch
State Highway 20
Two Log Creek
Little North Fork Big River
East Branch LNF Big River
Railroad Gulch
Two Log Creek
Two Log Creek
Two Log Creek
Big River
Kidwell Gulch
Big River
Big River
Shafsky Gulch
Laguna Creek
Feldman Gulch
Hatch Gulch
Big River
THE CONSERVATION FUND
High Conservation Values
1 inch = 4,300 feet
Property Boundary
Conservation Easement
CNDDB
Global Rank G1 & G2 Species
Monterey clover, G1
Tricolored Blackbird, G2G3
Class I Streams
County or State Road
Other Roads
200' Contours
N
October 23, 2012 - LK
HCV Veg Types
Acres
Oak Woodland 0
Grassland 0
Pygmy 0
Potential Marbled Murrelet habitat 0
Miles
Class I Streams: 24


Salmon Creek
Middle Ridge Road
Albion Ridge Road
Navarro Ridge Road
Hazel Creek
Big Salmon Creek
Donneley Gulch
Kelly Gulch
Big Salmon Creek
Big Salmon Creek
te Highway 128
THE CONSERVATION FUND
High Conservation Values
1 inch = 3,000 feet
Property Boundary
Hardell Property Tract
200' Contours
County or State Road
Other Roads
Class I Streams
N
October 23, 2012 - LK
HCV Veg Types
Acres
Oak Woodland
0
Grassland
0
Pygmy
8
Potenta Mrld ed Mrrel et habi tat?
0
Miles
40
Class I Streams:
10

HERBICIDE APPLICATION AND HARDWOOD MANAGEMENT POLICY
For The Conservation Fund's North Coast Forest Conservation Program
Principal authors: Madison Thomson and Scott Kelly
October 2012

Overview

The Conservation Fund acquired the Garcia River Forest in 2004, Big River and Salmon Creek Forests in 2006 and the Gualala River Forest in 2011. Exotic invasive species such as French Broom and Jubata Grass were introduced on the properties as a result of past management activities and continued due to lack of control. Controlling the spread of invasive exotics is a priority for the Fund. All of the Forests have been harvested in the past for forest products and some of the second growth stands have unnaturally high proportion of hardwoods, especially tanoak, as a result of the previous harvests. Control of the tanoak composition within the Forests is a priority for The Conservation Fund and is also required by the California Forest Practice Rules.

Tanoak control can be difficult. The common approaches to tanoak control are: direct herbicide treatment of the tree or sprouted stump; manual felling, also known as "high stumping" or logging. To date herbicides have been our primary method of tanoak control but other methods have been tested and used by the Fund and are described below.

Herbicides are also used for the control of invasive exotics but other methods such as manual removal are also employed. Specifically on Salmon Creek; French Broom and Jubata Grass are removed annually by hand with the volunteer cooperation of the Salmon Creek Project Team. In areas with extreme infestations of exotics such as those found on Big River, we believe that herbicide application is the safest and most cost effective alternative for the control of those species. Reduction in the use of herbicides over time is an important objective for The Conservation Fund and alternatives to herbicide treatments have been, and will continue to be, evaluated. In addition, we will strive to stay informed as new research becomes available related to the efficacy and environmental impacts of various herbicides. The following document has been prepared to outline our herbicide application and use policies to control tanoak and exotic invasive species on the north coast forest properties.

Various precautions are taken with all herbicide applications to ensure that adverse impacts to the environment and human health are minimized. The following is a list of guidelines that are to be followed with all herbicide applications:

1. All applications must be by a licensed pesticide applicator with a good safety track record and in compliance with EPA-approved label recommendations.
2. Work orders will include detailed contract specifications (to minimize risk of over-application or misapplication).
3. Indicator dye will be used to enable better monitoring, and applications areas will be flagged in advance,
4. No herbicides will be applied within 50' of neighborhood property lines.
5. Work will be closely supervised by TCF staff or consulting foresters.

6. Notification signs will be posted in logical locations at least 30 days prior to applying herbicides.
7. Records on all applications will be compiled by TCF staff and available upon request.
8. The effectiveness of treatments will be monitored by TCF staff.

Tanoak Management

Hardwood species, including tanoak, pacific madrone, chinquapin, California bay and alder, are an important ecological component of north coast forests. Hardwood mast is an important source of food for a variety of wildlife species and the trees often possess a variety of structural attributes (basal hollows, cavities, large limbs, etc) which are extremely valuable for wildlife habitat. However, past management practices have resulted in an unnaturally high abundance of hardwoods, specifically tanoak in many areas that historically were dominated by conifers. As such, TCF is committed to pursuing management practices that reduce the tanoak component, increase conifer site occupancy, and transition our forests toward a more historically appropriate species composition while retaining high quality hardwood stands and individual trees for wildlife habitat.

Before discussing specific management practices, it is important to understand the physiological attributes of tanoak and how these attributes contribute to the structure and composition of stands at different points in their development. Tanoak's unique physiological attributes allow it to be a component of north coast forests at a variety of successional stages. Tanoak is extremely shade tolerant meaning that it can persist and grow at relatively low light levels. Because of this characteristic, tanoak regeneration is often ubiquitous in the understory of stands with moderate to high overstory crown cover. Redwood and Douglas-fir are less shade tolerant than tanoak and regenerate poorly under partial canopy. When overstory trees are removed through timber harvest or natural disturbances, the tanoak in the understory "releases" and grows upward to occupy the vacated growing space. As this occurs, redwood and Douglas-fir regeneration and growth is often hindered. Tanoak also sprouts vigorously when cut or damaged, allowing it to rapidly colonize sites after fire, logging, and other disturbances. Because of tanoak's ability to sprout and grow in shade or low light conditions, many stands across TCF ownership that were once conifer dominated now possess an unnaturally high composition of tanoak due to repeated overstory harvests with no tanoak control treatments.

The California Forest Practice Rules require that the site occupancy provided by Group A species (redwood, Douglas-fir, grand fir, western hemlock and sugar pine) shall not be reduced relative to Group B species (tanoak, pacific madrone, chinquapin, California Bay, alder) as a result of timber harvest [see 14 CCR 912.7(d)]. The Conservation Fund's timber harvests primarily involve the harvest of Group A species (since they have commercial value), therefore some treatment of Group B species may be necessary in order to maintain relative site occupancy of Group A species following harvest. Hardwood reduction activities (without any commercial timber harvest) may also be pursued in areas outside Timber Harvest Plans where stands are overstocked with hardwoods.

Many tanoak dominated stands on our tracts were treated with Imazapyr or Triclopyr by previous owners. Those treatments were successful in that they reduced hardwoods and allowed for improved conifer growth but were broad in scope killing all hardwood species at the expense of other forest values. The herbicide application policies described below are intended to reduce tanoak while considering other forest values such as wildlife habitat, aesthetics and fire danger and also reducing our reliance on herbicide use for tanoak control in the future. We have no desire to remove tanoak from the forest or a stand. In fact, tanoak is a necessary forest component in a healthy redwood forest. However due to its physiology it will be necessary to control tanoak in the forest for the foreseeable future. We expect that as the forest matures and the conifer canopy closes that hardwood reduction treatments will no longer be needed, but this is a process that may take multiple entries or 30-40 years.

Depending on the structure and composition of a given stand, there are a variety of approaches that we may take toward tanoak management. The following is a summary of management policies that we use to drive the decision making process on a stand by stand basis. These generalized policies are subject to change as new information becomes available and the results of previous tanoak reduction projects become apparent.

- All true oak (Quercus spp.) woodlands and individual trees are to be preserved.
- Where the post-harvest tanoak basal area would exceed 30 square feet of basal area per acre (averaged across the stand), hardwoods shall be controlled through manual falling or herbicide treatment through direct basal injection (hack-and-squirt) to provide a post-harvest tanoak basal area of 15-30 square feet per acre. (This may take more than one entry to achieve).
- In stands with a moderate tanoak component where conifers are well established in the overstory, selective falling of tanoaks to release existing conifers will be employed. While the tanoak stumps will likely resprout, the conifers should have established dominance and will eventually shade-out most of the sprouts. In this type of incremental treatment (selective falling), clumps of tanoaks and tanoaks, which do not compete with desirable conifers, will be retained.
- In stands with a significant tanoak component which also possess a substantial conifer component in equal and lower crown classes, selective herbicide treatments will be employed. Stands that fall into this category generally have over 75 square feet of tanoak basal area/acre and over 75 square feet of conifer basal area/acre. Tanoak trees that are directly competing with healthy, established conifers will be targeted for treatment. Those tanoaks that are not directly competing with established conifers will be retained. Selective falling of tanoaks can cause excessive damage to residual conifers when numerous hardwood trees are cut. Because of this, herbicide will generally be the primary method of tanoak reduction in stands with both significant tanoak and conifer components.
- In stands with a significant tanoak component and minimal conifer stocking, a more broad scale herbicide treatment coupled with conifer planting will be employed. With this type of treatment, the majority of the tanoak in a given stand

will be treated and conifer seedlings will be planted either shortly before or shortly after tanoak treatment.

- Tanoak logging may be pursued as an alternative to herbicide in certain cases if a market for tanoak logs develops and the tanoak can be harvested without damaging the residual conifers. Tanoak logging tends to generate huge amounts of slash and there is often extensive residual stand damage due to the large crowns of individual tanoak trees. Also, at this time, demand for tanoak logs is low and current prices are insufficient to cover logging and hauling costs. Even where hardwood logging is utilized, there may be a need for post harvest herbicide treatment in order to control tanoak sprouting and prepare the site for conifer regeneration.
- The Big River and Salmon Creek tracts posses a number of young plantations (less than 15 years old) that were established by the previous landowner. In these stands, tanoak reduction will be accomplished in conjunction with precommercial thinnings using brush or chain saws. In addition to tanoak, other brush species such as Blue Blossom, and small trees are cut in order to create growing space for the healthiest, best formed conifer specimens. Mechanical thinning is generally preferred to herbicide application in these stands due to the greater control of spacing and species composition.

The herbicide primarily recommended for use of tanoak control is imazapyr. The primary application method will be via “hack and squirt.” Using this method, a series of cuts are made around the stem of the tree and the herbicide is applied directly to the tree’s vascular tissues. This application method greatly reduces the total quantity of herbicide required and minimizes the risk of drift onto non-target species and other resources. Additional herbicides for tanoak control may be considered in the future as they are developed and tested. Where herbicide will be used for tanoak reduction, the following guidelines will be followed.

- No hardwood species other than tanoak shall be treated
- Retain all hardwoods (>18” DBH) per acre. These larger hardwood trees are of the highest value to wildlife because they tend to be the most prolific mast producers and they possess more desirable structural attributes than smaller trees. Exceptions to the general retentions guidelines may be adopted on a site specific basis if in the opinion of the project forester the general guidelines are not adequate to reduce the hardwood component to a level low enough to allow conifer regeneration and growth.
- There will be no hardwood control with herbicides in Class I, II or IV WLPZs or within 25 feet of a class III watercourse; manual falling or girdling of small hardwoods may be used within these restricted areas as part of a riparian shade enhancement project designed to increase conifer site occupancy and growth.

The results of different tanoak control techniques will be monitored over time and our policies will be revised as new information becomes available. We recognize that because of soils and aspect some sites are naturally dominated by tanoak and we will avoid tanoak reduction activities in these stands. Tanoak reduction projects will be

focused on the more productive sites with evidence of past conifer dominance (i.e. stumps, suppressed conifer regeneration).

Exotic Invasive Species Management

In addition to tanoak management, herbicides will be used to control certain exotic species, primarily pampas grass, French broom, Italian thistle, and bull thistle. Alternatives to herbicide application, such as pulling, scalping and direct shading have been attempted in areas with some success and will continue to be used in the future. Non-herbicide treatments of invasives are preferred to control small localized colonies and will be utilized wherever feasible. Herbicide applications for invasive control will primarily be utilized for large infestations where mechanical or other alternative methods are impractical.

ROAD MANAGEMENT POLICIES
For The Conservation Fund's North Coast Forest Conservation Program
Primary author: Scott Kelly
May 24, 2007, revised September, 2012

Introduction

The Conservation Fund owns approximately 54,000 acres in Mendocino County California. The tracts consist of the 24,000 acre Garcia River Forest, the 12,000 acre Big River Forest the 4,000 acre Salmon Creek Forest and the 13,900 acre Gualala River Forest. The Garcia River Forest was acquired by The Conservation Fund in 2004; the previous landowner conducted some minor road maintenance activities and remediation projects however the forest land and roads have been essentially inactive since 1998. The Conservation Fund acquired the Big River and Salmon Creek forests in 2006 from Hawthorne Timber Company in Fort Bragg who were actively managing the forest for timber production. The Conservation Fund acquired the Gualala River Forest in 2011 the previous landowner conducted some minor road maintenance activities and remediation projects however the forest land and roads have been essentially inactive since 1998. The Conservation Fund intends to actively manage the timber resources on all four properties to improve stocking and growth across the ownership and to actively manage the road system and riparian conditions to improve watershed health and use by anadromous fish. Therefore, it has become a priority to improve and maintain access to the timberlands from the existing road system.

It has been documented that forest roads can contribute significant sediment to streams. Increased stream sediment can result in cemented gravels reducing salmonids ability to spawn and/or inhibiting salmonid fry emergence. High sediment levels can also cause pool filling and associated reduction in pool habitat. Extreme sediment loads can cause stream temperatures to be elevated due to the reduction in stream depth. Near stream roads can also reduce stream shading where the road is very wide or very close to the stream. Reduced stream shading has been linked to increased water temperature which stresses juvenile salmonids.

The Garcia River, Gualala River and Big River have been identified by the EPA and are on the 303(d) list of impaired waterbodies. The listed stressors include sediment and temperature. The Gualala is also listed for Aluminum on the mainstem downstream of The Fund's property. Placement of a waterbody on the 303(d) list acts as the trigger for developing a sediment control plan, called a TMDL, for each water body and associated pollutant/stressor on the list. At this time the Garcia River is the only river that has an action plan for the TMDL and many of the sediment reduction activities in this document have been adopted to conform to the Garcia TMDL and are implemented throughout the ownership.

Recent management practices by TCF and previous landowners have reduced road related stream sedimentation and improved long-term road stability. Specifically many bridges and multi-plate culverts have been installed to replace standard culverts on class I streams. Class II watercourse crossings have been rock armored and new culverts buried to grade. Watercourse and Lake Protection Zone (WLPZ) roads have been rocked or otherwise improved to reduce stream sedimentation caused by near stream roads. Many other forest roads have been rocked and drained by outsloping or use of rolling dips. The use of ditch reliefe culverts is being minimized to reduce the potential for culvert failure and road maintenance costs.

Objectives

The Conservation Fund is committed to continue this trend of road improvement over time and has developed and will continue to refine this Road Maintenance and Improvement Plan to:

1) Reduce sediment inputs resulting from the existing road network as well as reduce inputs from new roads.
2) Develop proactive measures to help reduce stream sedimentation as a result of road runoff and cooperate with regulatory agencies involved with timber harvest planning.
3) Develop a timeline for road maintenance activities.
4) Act as a guide to foresters who are actively developing timber harvest plans or other projects on the properties.

Planned road maintenance will be in conformance with The Conservation Funds overall forest management goals. The Conservation Funds immediate goal for new properties such as the Gualala tract is to maintain access through grading and maintaining existing mainline roads. These roads form the core of the road system and provide access for fire suppression, log hauling, wildlife surveys, future road improvement and abandonment projects and other management activities. It is expected that maintenance and improvements of secondary roads will be carried out in conjunction with Timber Harvest Plans or as part of larger Watershed Improvement projects.

Timeline

It is The Conservation Fund's goal is to develop a road system which provides access to the property for timber harvest, fire protection and wildlife resource monitoring while reducing annual maintenance activities and expense and potential watershed impacts. It is expected that the property will generally be managed with unevenage silvicultural systems and a 10-20 year re-entry period. Most road improvement projects will generally be done in conjunction with THP's and therefore the timeline to rotate through the property with road upgrades will be similar as the overall harvest schedule (within the first 20 years). Projects which require a 1603 stream alteration permit and do not otherwise qualify as an emergency repair will necessarily be conducted in conjunction with timber harvests or another CEQA project.

The Conservation Fund will conduct property wide assessments of all the roads on each tract using the road inventory and assessment system developed by Pacific Watershed Associates and others. The assessments will be used as a planning tool to prioritize sites for repair and to assist in the evaluation procedure for road decommissioning.

Road Maintenance and Improvement Guidelines

The purpose of this section is to aid resource professionals to identify forest road attributes that will assist in determining whether a road should be maintained in its current configuration, reconfigured with upgraded drainage structures or decommissioned. Some of the primary objectives and constraints identified during land management planning were: 1) Improve fisheries and wildlife habitat. 2) Maintain or improve the current level of access. 3) The landowner is willing to bear higher management costs in the future that arise from reconfiguring the roads if it results in other operational and environmental benefits.

To reduce sediment delivery from the road surfaces emphasis will be placed on increasing the number of drainage points along roads and reducing the potential for diversion at culverted watercourse crossings. On low gradient roads (0-4% grade) roads will be primarily drained by outsloping with occasional dips or ditch relief as necessary. On higher gradient roads (5-10+% grade) roads will be drained primarily with rolling dips in combination with outsloping and inboard ditch relief culverts as necessary. It is expected that most roads will be improved so as

to be drained by a combination of out sloping with rolling dips. However ditch relief culverts cannot be completely abandoned and will be used where necessary. To reduce sediment from watercourse crossings up to 3 criteria will be met: 1) New culverts and culverts proposed for replacement will be sized to meet the 100 year storm event. 2) New or replaced culverts will be installed such that the culvert is at stream grade and deep enough that a critical dip can be constructed to provide protection against stream diversions. 3) A trash rack or stake shall be installed upstream of the culvert to catch or turn debris prior to reaching (and blocking) the pipe.

New roads will be designed with gentle grades wherever possible and long rolling dips will be constructed into the road or the road shall be outsloped to relieve surface runoff. Where possible watercourse crossings will be designed such that road grades dip into the crossing and then climb out of the crossing, eliminating the need for abrupt critical dips. Crossings will be rock fords or temporary crossings on secondary roads which see only periodic activity to reduce maintenance requirements. Minor crossings on permanent roads can be converted to rock fords over time.

The Handbook of Forest and Ranch Roads prepared by Weaver and Hagans 1994 will be used as a guideline for all proposed road construction and improvement projects. Specific projects and locations will be mapped and site specific prescriptions for each project will be included in the appropriate THP, TMDL, SSMP or other guiding document.

Road Abandonment Plan

There are three criteria to consider in determining which roads can be abandoned. The first is focused on environmental considerations. Roads located near (within the WLPZ) of a class I or class II stream or constructed on unstable slopes such as active landslides or headwall swales are likely candidates for abandonment due to their potential contribution to in-stream sediment. Road construction across headwall swales and unstable slopes can result in mass wasting events, delivering large amounts of sediment to the watershed. They pose an ongoing maintenance problem caused by constant bank sloughing which block roads and plug ditches and culverts.

The second criterion is that roads to be abandoned must not cut off or substantially reduce access to areas where future management is anticipated. In the case where a road has been determined to be undesirable due to its location but access is still required the landowner is obliged to maintain the existing road or find another route. Reconfiguring the road network is a difficult, time consuming and costly task and will have long term effects on management activities. The likely result is that any new road system will be designed for yarder logging and to minimize the total road mileage.

The third criteria is that road abandonment does not result in the construction of a replacement road that is environmentally unsound. Removing a road from a stream zone with the intent of moving upslope can require that the landowner make a value judgment between, for example, a near stream road and a road constructed on steep slopes with multiple watercourse crossings. Improving existing roads with rock surfacing, rolling dips and oversized culverts or bridge installation is generally the least costly alternative compared to relocating a road system and should be considered when no clear beneficial alternative is available.

In areas with excess roads it may be desirable to abandon or decommission roads or reduce their status to “temporary” to reduce potential sediment delivery. Temporary roads and decommissioned roads are similar in that permanent and temporary watercourse crossings are removed for an indefinite period of time. Road decommissioning differs from abandonment in that a decommissioned road may be rebuilt at a later date if in the opinion of the land owner it is the least damaging alternative.

The economics of road abandonment also contributes to the decision making process. Unfortunately it is not practical to use a “one size fits all” prescription for road abandonment. Some roads, which appear to be poorly located, may have to remain in place because they service a larger area with good arterial roads. While it may be physically possible to relocate a road it may not be in the best interests of the landowner to do so due to the excessive cost involved . The types of roads which will be a priority to evaluate as potential candidates for abandonment are listed below.

1. Roads that parallel watercourses and dead end in landings are good candidates for abandonment or repair because of their proximity to streams and their lack of arterial roads. These are the highest priority because they can be abandoned or decommissioned without impact to future management.
2. Roads that cross unstable areas or headwall swales can be abandoned if alternate routes exist to both ends of the subject road. Roads crossing unstable areas are deemed to be the second priority for abandonment because there are fewer roads on unstable slopes than WLPZ roads and the management implications and fieldwork necessary to make an informed decision will delay the decision making process.
3. Long term plans should include abandonment and replacing or upgrading roads that are poorly located but are necessary in the short term for forest management.

It is felt that proper implementation of this plan will reduce the potential for excess runoff and diversions common to forest roads. Over the long term the reduction in stream sedimentation will improve salmonid habitat conditions and reduce yearly maintenance costs.

CERTIFIED PRODUCT CHAIN-OF-CUSTODY PROGRAM
For The Conservation Fund's North Coast Forest Conservation Program
March 1, 2010, revised September 2012

Note to Licensed Timber Operators, Log Haulers, and Log Buyers

This document is being provided to you because it is required by The Conservation Fund's certification under the Forest Stewardship Council standard for forest management and chain-of-custody for logs. The purpose of this policy is to ensure that wood products which originate on our properties are appropriately accounted for and do not become inappropriately labeled. All logs generated on our Mendocino properties are certified under the Forest Stewardship Council US Forest Management Standard (v.1.0) and Sustainable Forestry Initiative Standard (section 2). Use of the Forest Stewardship Council logo or other origin claims is restricted to those facilities that have undergone an independent certification of their compliance with the Forest Stewardship Council Chain-of-Custody standard. The Conservation Fund's participation in this program should not impose any additional burdens on our contractors and customers other than standard log security and accounting. If you have any questions about this policy, please contact Scott Kelly at (707) 272-4497.

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Forest Certification Status

The Conservation Fund's North Coast timberland (Garcia River, Big River, and Salmon Creek, Mendocino County, California) were certified as sustainably managed by the Forest Stewardship Council and the Sustainable Forestry Initiative on October 12, 2007. The Gualala River Forest will be certified in 2012. Audits are conducted annually to ensure continued eligibility and are available at http://www.conservationfund.org/our-conservation-strategy/focus-areas/forestry/north-coast-conservation-initiative/north-coast-forest-reference-documents/

Section 1, Control System Documentation

1.1 The Conservation Fund has implemented a documented control system in order to responsibly track log sales under Generally Accepted Accounting Principles (GAAP) and to address the Principles of Chain-of-Custody control as set forth by the FSC.

1.2 The Conservation Fund's designated Chain of Custody Control Administrator is Scott Kelly, the senior forester responsible for, among other things, log sales and harvest administration. Scott Kelly is responsible for education of employees and contractors, as well as for implementation of the documented control system for Chain of Custody of FSC-certified wood products sold by The Conservation Fund from its properties in Mendocino County, California.

1.3 Scott Kelly is assisted in this documentation by Margery Hoppner, consulting accountant, who manages the log sale accounting process and reconciles trip tickets, scale records, mill receipts, and contractor payments.

1.4 A sample Trip Ticket and Log Sales Record are attached at the end of this document. Instructions for the trip ticket are provided to the log hauler. Instructions for the Log Sales records are contained in The Conservation Fund's accounting procedures manual.

Section 2, Confirmation of Inputs

2.1 The Conservation Fund is engaged in the business of selling logs and does not purchase logs or any other FSC-certified wood products. Therefore, confirmation of inputs is not applicable, except that The Conservation Fund will be responsible for ensuring that log decks in the forest contain only logs originating on that property and that log trucks exiting the property only contain logs that originated on the property.

2.2 It may be required for The Conservation Fund or its partners to purchase small quantities of conifer logs for installation in streams as restoration projects. Those logs are intended for permanent installation and will not be considered an input for the purpose of Chain of Custody accounting.

Section 3, Separation/Demarcation of Inputs

3.1 The Conservation Fund has a system for ensuring that FSC-certified products are clearly identified. The Conservation Fund timber harvest and log sale activity is only conducted for The Conservation Fund's properties, all of which are certified. Thus, there are no non-FSC products involved.

3.2 Physical separation/segregation of certified and non-certified products is achieved by not involving any non-certified logs in The Conservation Fund's activities. There are no inputs (either certified or not), thus no non-certified logs will ever be brought on the property and mixed with certified logs.

3.3 Logs are identified as certified through paperwork supplied by The Conservation Fund to the purchasing mill.

Section 4, Secure Product Labeling

The Conservation Fund does not use on-product labels during the sale of logs. The Conservation Fund accepts the responsibility to ensure that the FSC Logo Pack and labels are not used by unauthorized users or for any unauthorized use.

Section 5, Identification of Certified Outputs

Certified products are identifiable by field marking and trip ticket paperwork that clearly identifies the purchaser and seller of the logs. The certified status of the logs is communicated in writing (through the log sales agreement and by sharing this document) by The Conservation Fund to the purchaser.

The Conservation Fund operates an accounting system that records log species, volume, and grade information for all log deliveries. This includes reconciliation between the trip tickets provided by the LTO and log hauler, scale records provided by the scaling bureau, and payment receipts provided by the purchasing mill.

Payment is issued by the purchasing mill upon receipt (and scaling) according to the terms of the log sales agreement. Because no invoices are issued it is incumbent on The Conservation Fund to communicate the certified status of the logs to the purchaser (which is done through this document and the log sales agreement). A copy of The Conservation Fund's Chain of Custody certificate will be provided to the purchasers upon request.

Section 6, Record Keeping

6.1 The Conservation Fund maintains appropriate records of all log sales (which is the same as outputs of certified products) in accordance with Generally Accepted Accounting Practices (GAAP).

6.2 The Conservation Fund's records are sufficient to satisfy a financial auditor or an independent assessor seeking to trace back any given certified product output pool or load back to the specific certified forest of origin.

6.3 The Conservation Fund's records are sufficient to allow an independent assessor to determine the rate of production of certified logs from the certified forest, as well as to determine the certified product delivered to each manufacturing facility.

6.4 All records related to certified products sold by The Conservation Fund will be kept for a minimum of five years.

THE CONSERVATION FUND
TEMPLATE -- TRIP TICKET:

THE CONSERVATION FUND

America's Partner in Conservation

TRIP TICKET

150

14951 "A" Caspar Road, Box 50, Caspar, CA 95420 (707) 962-0712

DATE _____/_____/_____ TRUCK NO./ DRIVER _____

TRACT NAME _____ THP NAME _____

FSC/SCC COC-00102N
FSC 100%

LOGGER _____ SOURCE CODE _____

BUYER _____ DESTINATION _____

OF LOGS RW___ DF___ WF___ ww___ HW___ OTHER_____

RECEIVED BY_____ DECK NO._____

White - Logger Canary - Trucker Pink - Mill Goldenrod - Owner

COMMITMENT TO SAFETY AND HEALTH OPERATING POLICY,
The Conservation Fund's North Coast Forest Conservation Program
Primary authors: Evan Smith and Scott Kelly.
November 28, 2011, revised September, 2012

Commitment to Safety and Health

A. Safety and Health Policy

The Conservation Fund (TCF) is firmly committed to maintaining a safe and healthful working environment across all its offices and programs. This document guides TCF activities on its Mendocino County, California, timberlands to ensure safe operations. To achieve this goal TCF has implemented a comprehensive Injury and Illness Prevention Program. This program is designed to prevent work place incidents. The designated Safety Coordinator is responsible for monitoring the performance of each team member to ensure compliance in conducting an affective Injury and Illness Prevention Program.

Special statement on forestry-related risk-- The field of forest management inevitably involves travel, heavy equipment, challenging terrain, and variable weather conditions—all serious contributors to risk. All employees and contractors should be cognizant of those risks and develop the judgment to evaluate conditions and act in a safe manner. Driving to and from the forest is probably the most dangerous activity we engage in—it is very important that we slow down and pay attention. The most important piece of safety equipment is what sits under the hardhat, behind the safety glasses, and between the ear plugs—use your brain! Every team member is responsible for thinking about the safety of themselves and everyone else present. TCF's North Coast program is a loosely-organized team of employees, contractors, consultants, partners, and volunteers—we rely on these individuals to exercise good safety skills. It is critical that we be cognizant of the conditions around us and the safety preparedness of those around us and those that might visit the site later. We owe it to ourselves and the families of those we work with to conduct all our activities safely.

Each individual is responsible for their own safety at the work place. The safety coordinator can assure that programs and policies are in place to provide for a safe working environment however it is the responsibility of the individual to implement the safety policies and make their own working environment as safe as possible.

Specific policies—

1. *No alcohol or drug use on the property.*
2. *Maintain a daily log of where people are working and an emergency contact system in the event of an emergency or someone not returning in a timely fashion. Each employee has been issued a SPOT GPS device, which tracks an employee's location and allows an emergency signal to be sent. This device has essentially replaced the daily log.*
3. *Remind visitors and tour participants of potential risks and necessary precautions.*

4. *Annual safety training will be developed for everyone that works in the woods if it is not already part of their professional licensing requirements (eg Licensed Timber Operator).*
5. *First Aid Kits are available in the TCF office and vehicles.*
6. *Indications of illegal marijuana cultivation will not be investigated by field staff but reported to the property's security patrol who will report it to law enforcement personnel.*

B. Vehicle Operation

Driving to and from the forest is probably the most dangerous activity we engage in it is very important that we slow down and pay attention while operating company vehicles on the street or on company lands. Driving in the forest exposes the driver to narrow winding gravel roads which can be very slick when wet and require extra caution when operating a motorized vehicle.

- All persons operating a vehicle on company property are required to possess a valid driver's license.
- All persons operating an ATV or other off road vehicle shall have received proper training from a certified ASI Rider Course Instructor or equivalent. To enroll in an ATV Rider Course, call the national, toll-free enrollment number, 1-800-887-2887.
- Use common sense, do not drive in dangerous conditions or terrain beyond your ability to safely operate the vehicle, when in doubt, slow down or walk.

C. Chainsaw Operation

Staff is required to read the owner's manual carefully before operating a chain saw. Wearing proper safety equipment and protective clothing is required. When using a chainsaw be sure to keep the cutting area clear of spectators, note any overhead hazards, including hanging tree limbs and utility lines, keep the chain clean, sharp and lubricated, keep both hands on the saw handles, and let the saw come to a complete stop before reaching for the chain or blade. For further safety regulations regarding chainsaw usage please consult http://www.osha.gov/OshDoc/data_Hurricane_Facts/chainsaws.pdf

D. Herbicide Application

Only Certified Pesticide Applicators may apply herbicides. Staff will read and follow all chemical label directions. Apply herbicides at minimal levels in accordance with the label and targeted to specific weed problems. Wearing proper safety equipment and protective clothing is required. A notice of intent must be submitted to Mendocino County 24 hours prior to application; a pesticide use report must be filed by the 10th of the month; herbicides should be contained and not be allowed to drift unto a neighboring property; and immediately notify Mendocino County Agriculture Commissioner of any changes to our permit. To promote transparency and communication, TCF will post signs in the forest at the locations where herbicides are proposed for use 30 days prior to their

application. For more information please consult
http://www.epa.gov/oppfead1/safety/resource.htm

E. Personnel Safety

Many minor injuries such as cuts, scratches, bee stings, and ankle sprains can be prevented by wearing proper safety equipment or protective clothing. When working in the woods around heavy equipment all personnel shall wear hardhats and boots. Long pants are also required while working in the forest. Other recommended personal safety items include:

- Eye Goggles
- Ear Plugs
- Long sleeve shirt
- Gloves
- Tecnu or other poison oak prevention treatments.

F. Contractor Safety & Training Policy

The Conservation Fund shall only employ contractors that have good safety records and up-to-date training. Specifically, only Licensed Timber Operators in good standing may conduct timber harvesting operations and only Certified Pesticide Applicators may apply herbicides. Prior to the start of each work project (e.g. logging job, road opening, weed control treatment, etc) the Safety Officer will conduct a discussion of the safety concerns and ensure contractors are aware of TCF's safety expectations. For professions that do not have formal licensing requirements that address safety, such as consulting biologists and botanists, The Conservation Fund will emphasize the importance of accident avoidance and communication and seek to resolve any safety concerns they may have.

G. Company Housekeeping Policy

Good housekeeping is a critical part of the safety program. Keeping work areas neat and clean reduces the risk of on the job injuries. Well organized work areas increase the ability of employees to perform their jobs efficiently and safely. In addition a clean workplace is a source of good morale, improved quality and partner satisfaction. Each employee is responsible for keeping his or her work area neat and orderly. Housekeeping inspections may be conducted as part of regularly scheduled or impromptu safety inspections.

II. PERSON(S) WITH AUTHORITY AND RESPONSIBILITY FOR IMPLEMENTING THE PROVISIONS OF THIS INJURY AND ILLNESS PREVENTION PROGRAM (IIPP)

The North Coast Timberlands Manager shall serve as the Safety Coordinator, with authority and responsibility for implementing the provisions of this program.

Responsibilities assigned to the Safety Coordinator, Site Supervisors, and Employees are described in general on the following pages.

All employees and contractors of TCF are responsible for working safely and maintaining a safe and healthful work environment. It is a condition of employment.

The North Coast Timberlands Manager will assume the overall responsibility for this program as the Safety Coordintor. These duties include:

- Ensuring that adequate financial, personnel and material resources are available, including identifying safety leaders for projects and training needs.
- Ensuring employees receive specific training for each task they are expected to perform, and whenever new processes or chemicals are introduced into the workplace.
- Leading by example.
- Recognizing safe work practices as part of performance reviews.
- Encouraging employee involvement.
- Investigating and correcting any unsafe action or condition reported to them.
- Holding employees accountable for poor safety performance by utilizing re-training and company disciplinary procedures.

All TEAM MEMBERS (employees, contractors and lead partners) will be responsible for the implementation of this program at his/her work area. These duties include:

- TAKING PERSONAL RESPONSIBILITY FOR THEIR OWN SAFETY AND THE SAFETY OF OTHERS.
- Understanding that working safely is a condition of employment.
- Participating in developing safety rules, procedures, and improvements.
- Obeying safety rules, procedures and work practices.
- Wearing all required Personal Protective Equipment (PPE).
- Reporting all injuries, no matter how minor, to their supervisor immediately.
- Reporting all “near-misses” and hazardous conditions to their supervisors.

- Participating in the safety effort by demonstrating an understating of training received and the ability to perform tasks safely.

- Participating in tailgate and general safety meeting.

- Learning to manage "self-safety" by developing proactive (prevention) skills in decision-making.

- Communicating safety suggestions to supervisors or contract representatives.

III. **SYSTEM FOR ENSURING THAT ALL WORKERS COMPLY WITH SAFE AND HEALTHY WORK PRACTICES:**

A. Informing employees of the provisions of our Injury and Illness Prevention Program (IIPP):

B. Recognizing employees who perform safe and healthful work practices.

C. Training employees whose safety performance is deficient; and

D. Disciplining employees for failure to comply with safe and healthful work practices.

IV. **SYSTEM FOR COMMUNICATING WITH EMPLOYEES:**

A. Safety Meetings

TCF requires frequent tailgate meetings with individual work-groups to discuss safety issues and resolve problems. At a minimum, employees will be exposed to ½ hour per month of safety training/discussion. Also, tailgating will be held whenever work conditions change – e.g. foresters moving from burning to marking trees, contractors working at a mill site in an area which affects employees, special construction or maintenance projects are taking place, etc. to alert and/or remind employees to potential hazards.

B. Training

All employees will receive an overview of the IIPP during their initial orientation and can review a copy provided by their supervisor. Additional training, such as First Aid and Interagency Wildland Fire Certification, will be made available on an as needed basis. Employees and contractors that desire additional training should notify their supervisor or the Safety Officer.

C. Written Communications

TCF produces informational memos and handouts covering various safety topics. These sources of communication are posted for review by all employees. They include safety inspection reports and safety committee meeting minutes.

TCF's written IIPP is also assessable to all employees.

D. Anonymous Notification Procedures

TCF has a system of anonymous notifications whereby an employee who wishes to inform TCF of work place hazards may do so anonymously by notifying Safety Coordinator in writing or over the phone. The Safety Coordinator shall investigate, or cause to be investigated, all such reports in a timely manner.

V. HAZARD IDENTIFICATION

TCF will identify and evaluate work place hazards when the program is first established; whenever new substances, processes, procedures, or equipment are introduced to the work place that represents a new occupational safety and health hazard and whenever TCF is made aware of a new or previously unrecognized hazard.

A. General Elements To Identify and Evaluate Work Place Hazards

1. Review of applicable General Industry Safety Orders and other safety orders that apply to the operation.
2. Review of industry and general information (including Material Safety Data Sheets for chemicals used) about potential occupational safety and health hazards.
3. Investigation of all incidents and unusual events that have occurred at these facilities.
4. Periodic and/or scheduled inspections of general work areas and specific work stations.
5. Evaluation of information provided by employees.

B. New Safety and Health Concerns

It is a requirement of all employees and contractors to notify the Safety Coordinator and provide appropriate documentation (location, MSDS, potential hazards, etc.) regarding any new substance, process, or equipment prior to its introduction to the workplace.

C. Employee Reporting of Hazards

Employees are required to immediately report any unsafe condition, unsafe action or other hazard that they discover in the work place to their supervisor or any safety committee member. No employee will be disciplined or discharged for reporting potential work place hazards or unsafe conditions.

Employees who wish to remain anonymous may report unsafe conditions as described above.

VI. PROCEDURE TO INVESTIGATE OCCUPATIONAL INJURY OR ILLNESS

A. Employee Responsibility

Employees shall immediately report all injuries occurring at work, no matter how slight, to their supervisor.

B. Supervisor's Responsibility

It is the Supervisor's responsibility to complete an Incident Investigation Report and, IF THE INJURED NEEDS TO GO TO A MEDICAL PROVIDER OFF-SITE, TO ACCOMPANY THE INJURED. The Supervisor will immediately alert the Safety Officer of any injuries requiring treatment other than first aid.

C. Incident Investigation Procedure

Incident where a hazard or condition persists after the occurrence of an incident, incidents where there is a potential for recurrence, and incidents where the Safety Officer judges that procedural or training deficiencies may have contributed to the incident will be investigated.

They may be investigated by the supervisor and employee only, an appointed investigator, or an incident review team depending on the nature and/or severity of the incident.

Employees have the right to an independent investigation by someone other than their supervisor if they feel additional investigation is necessary. All incidents will be investigated at the time of occurrence, or as soon thereafter as possible, but in no case later then twenty-four hours.

When appropriate, these investigations may include complete statements from the employee(s) involved, any witnesses to the injury and the injured employee's supervisor. A copy of all Incident Investigation Reports will be forwarded to the Safety Officer for review. Employees who do not cooperate with incident investigations will be subject to TCF's disciplinary policy.

VII. PROCEDURE TO CORRECT UNSAFE OR UNHEALTHYCONDITIONS, WORK PRACTICES, AND WORK PROCEDURES IN A TIMELY MANNOR BASED ON THE SEVERITY OF THE HAZARD.

A. Workplace Hazards

The causes of all incidents will be documented and reviewed immediately. Corrective actions including condition repair/modifications, retraining or disciplining for unsafe actions will be initiated immediately. Safety procedures will be reviewed, if necessary, by the combined efforts of the affected employees, supervisors and safety manager and or safety committee. Training programs and safe job operating procedures will also be modified, if appropriate, to prevent reoccurrence.

B. Imminent Hazards

When an imminent hazard exists which cannot be immediately abated without endangering employees and or property, all exposed employees will be removed from the area except those necessary to correct the existing condition. Employees needed to correct the hazardous condition shall be provided with the necessary training and Personal Protective Equipment. All such actions taken and dates they are completed shall be documented.

VIII. PROVISIONS FOR TRAINING AND INSTRUCTION

A. Policy

Awareness of potential health and safety hazards as well as knowledge of how to control such hazards is critical to maintaining a safe and healthful work environment. TCF is committed to instructing all employees in safe and healthful work practices. To achieve this goal, TCF shall provide training to each employee with regard to general safety and emergency procedures. Training shall also be provided by the effected employees' supervisor for any hazard or safety procedure specific to the employees work assignments as mandated by regulations or company safety programs. Records of all training shall be maintained in employee files.

B. When Training Will Occur.

1. When the program is first established.
2. To all new employees.
3. To all employees given a new job assignment for which training has not previously been received.
4. Whenever new substances, processes, procedures or equipment which represent a new hazard are introduced into the workplace.
5. Whenever TCF is made aware of a new or previously unrecognized hazard.
6. Whenever an employee, through observation or investigation is found deficient, they will be retained.

Supervisors must familiarize themselves with the safety and health hazards to which employees under their immediate direction and control may be exposed. Supervisors

shall be responsible to provide their employees with safety training to minimize or eliminate such exposure.

C. Areas of Training

All areas or items identified in the IIPP.

All areas or items identified as specific to the performance of any task.

IX. RECORDS OF THE STEPS TAKEN TO IMPLEMENT AND MAINTAIN THE PROGRAM

Records of scheduled and periodic inspections to identify unsafe conditions and work practices, including person(s) conducting the inspection, the unsafe conditions and practices that have been identified and the action taken to correct the identified unsafe conditions and work practice. These records shall be maintained for at least one year. Documentation of safety and health training for each employee, including employee name or other identifier, training dates, types of training, and training providers. This documentation shall be maintained at least one year.

Social Benefit/Impact Assessment Memo
The Conservation Fund's North Coast Forest Conservation Program
Primary authors: Jenny Griffin and Evan Smith
Original: August 25, 2008; Updated September 2012

social: L socialis, fr. socius companion, ally, associate; akin to L sequi to follow. Of or relating to human society, the interaction of the individual and the group, or the welfare of human beings as members of society (Websters Seventh New Collegiate Dictionary, 1972).

The Conservation Fund's North Coast Forest Conservation Program endeavors to have a very positive impact in our local community. This is due in part to our charitable mission as a non-profit organization, which is broader than just environmental protection, and references economic development and education. It is also explicitly addressed as part of the Garcia River Forest Integrated Resource Management Plan:

"The Plan identifies and describes in detail the following general management goals:

- *Improve ecological conditions by increasing the viability of selected "conservation targets" identified during the planning process.*
- *Generate sufficient revenue to cover the costs of property taxes, on-site maintenance, management and restoration projects and, potentially, generate net revenues for other conservation initiatives.*
- *Practice continual improvement through adaptive management based on monitoring of ecological, financial and social values.*
- *Support the local business community by utilizing local contractors and suppliers.*
- *Engage the local community by providing compatible public access, educational and recreational opportunities."*

We pride ourselves on being very cognizant of and sensitive to the potential social impacts (positive and negative) of our forest management activities and the role we play in the community.

We have identified five primary social elements as integral to our program and organize our evaluation of potential social impacts/benefits around these elements. We have not had a formal prioritization of these elements—all are important for our evaluation and monitoring. The five elements, and examples of how they are addressed, are:

- Creative arts (eg. College of the Redwoods and Mendocino Art Center photography and painting workshops, elementary school writing and art projects, etc.)
- Economic/financial (e.g. employment, log sales, carbon sales, etc.)
- Recreational (e.g. interpretive walks, passive recreational access, Boy Scouts and Sierra Club hikes, Audubon trips, etc.)
- Science/education (e.g. EMAP project, UC Davis research, Humboldt State and other surveys, SONAR projects, PWA workshops, stakeholder tours, etc.)
- Spiritual (e.g. open space values, Children and Nature programs, Leopold and Thoreau philosophy-based programs, and access/utilization by Native tribes)

We consider social benefits as an integral part of our management planning. The social elements are assessed and described in various sections of our forest management plans, which include policies on such issues as recreational access, scientific monitoring priorities, and preference for

local goods and services. In addition to management planning, our operational decision-making also includes evaluation of potential social impacts—ranging from maintaining a viable logging industry to resolving the concerns of a neighbor. Our forest management policies have very clear requirements for community engagement and local procurement—we require that every timber harvest plan and major watershed restoration project have publicly available summaries and provide opportunities for field tours before and after operation. We continually ask for feedback from the local community through tours and informal meetings and routinely adjust programs or projects to address concerns. As described above, having a positive impact in the community is a program objective; we evaluate our success at meeting this objective as part of our annual operations review. The discussion and results of the annual operations review then inform the next year's workplan and as appropriate will be included in updates to the management plans.

As part of our annual monitoring, we publicly report (via the Annual Review) our data on key activity metrics. Most relevant to this topic is reporting on local economic contribution, participants in our public access program, and number of public tours we host. In addition to these three metrics that seem to best track the community interest, we usually also include short features on specific harvests, restoration projects, or safety issues. We also keep a log of any criticisms the program receives and how those are resolved. These metrics and concerns are also reviewed annually by the local Advisory Council.

APPENDIX F

The Conservation Fund
North Coast Forest Conservation Program
2013 Fire Plan

This Fire Suppression Resource Inventory is being submitted to comply with 14CCR 918.1. Specific rule requirements cited in the plan are to be followed by contractors working in the woods at all times. This plan should not be construed to mean that untrained contractors or their personnel are required to actively fight wildland fires that occur on The Conservation Fund property.

The plan is to be kept with each employee or their assigned vehicle at all times. Copies to be provided to all Conservation Fund (TCF) employees and logging/road maintenance contractors operating on company managed lands. Copies provided to California Department of Forestry and Fire Protection (CAL FIRE) Northern region headquarters in Santa Rosa and on a CD to Mendocino ranger unit office in Willits (Howard Forest).

INTRODUCTION

The Conservation Fund owns and manages approximately 53,000 acres of timberland in four tracts on the Big River, Salmon Creek, Garcia River and Gualala River watersheds. Due to the risk that uncontrolled fire poses to its assets, The Conservation Fund manages its properties with careful and thorough consideration toward fire prevention, planning, and control. This Fire Plan is provided to acquaint all personnel with the policies and procedures for the current fire season. The policies and details listed in the following Plan apply across the entire TCF ownership and are not specific to any tract or area. Tract and area specific issues are conveyed through the maps attached at the end of the document. These maps display specific fire prevention and mitigation infrastructure, such as access points, roads, drafting sites, and helicopter landing sites.

POLICY STATEMENT

The Conservation Fund will respond within its capacity to all fires occurring within its ownership, as well as any uncontrolled fires which may threaten its ownership. TCF response will commence upon notification of a fire on or near TCF property, and with utmost concern for the safety of everyone involved.

TCF employees will take the immediate action necessary to contact appropriate fire control agencies once a fire is identified.

TCF employees will not place themselves or contractors at unreasonable risk during any response to a fire or during the course of fighting a fire. Safety is our first priority.

Appropriately-trained TCF employees and contractors may work at their discretion to contain and extinguish fires until the fire is taken over by the California Department of Forestry and Fire Protection (CAL FIRE) or some other responsible party.

TCF will cooperate with, and follow the direction of CAL FIRE or local fire protection departments responsible for fire protection on private lands.

To the extent information is available; relative humidity, temperature, wind direction and speed, overall fire season trends, and availability of resources shall be considered when determining appropriate action should an ignition occur.

TCF shall strictly enforce all laws, rules, and regulations governing logging operations during Fire Season.

TCF shall attend an Annual Fire Meeting at the beginning of the Fire Season, with representatives from CAL FIRE, logging contractors, and major adjacent forest landowners.

EMERGENCY TELEPHONE NUMBERS

TO REPORT A FIRE:

1. Call CAL FIRE Dispatch Howard Forest (707) 459-5336 or 459-7404 or Dial 911

    a) Give CAL FIRE the legal description (Township, Range & Section no. to the nearest ¼ section) and the approximate size of fire.

    b) Name of person reporting fire.

    c) Best access route(s) to the fire.

2. Call TCF emergency contact personnel in the order delineated below until a TCF representative is contacted in person:

    a) The TCF Office (707) 962-0712

    b) Scott Kelly, Timberland Manager (707) 272-4497

    c) Madison Thomson, Forester (707) 357-3919

    d) Don Miller, Security Patrol (707) 489-0315

    e) Mark Taylor, Security Patrol (707) 367-8366

    f) Brian Pickett Forestry technician (707) 357-5305

    g) Evan Smith, VP Conservation Ventures (503) 407-0301

FIRE PREVENTION PROCEDURES

General Responsibilities for Logging Contractors, Road Crews and Consultants, herein after referred to as “Contractor”.

All persons working on or traveling through TCF property must strictly adhere to the following Fire Prevention Procedures:

918.3 Roads to be Kept Passable.
Contractors shall keep all logging truck roads in a passable condition at all times for fire truck and emergency vehicle traffic.

918.4 Smoking and Matches
Subject to any law or ordinance prohibiting or otherwise regulating smoking, smoking by persons engaged in timber operations shall be limited to cleared log landing areas. Burning material shall be extinguished in such areas of bare soil before discarding. Contractors shall specify procedures to guide actions of his employees or other persons in his employment consistent with this subsection.

918.5 Lunch and Warming Fires
Subject to any law or ordinance regulating or prohibiting fires, warming fires or other fires used for the comfort or convenience of employees or other persons engaged in timber operations shall be limited to the following condition:
1. There shall be a clearance of 10 feet (3.05 m) or more from the perimeter of such fires and flammable vegetation or other substances conducive to the spread of fire.
2. Warming fire shall be built in a depression in the soil to hold the ash created by such fires.
3. The Contractor shall establish procedures to guide actions of his employees or other persons in their employment regarding the setting, maintenance, or use of such fires that are consistent with (a) and (b) of this subsection.
Under no conditions will warming fires be permitted on TCF property during the declared fire season. The Fire season is determined by CAL FIRE and it generally extends until sufficient rain has fallen to reduce the chance of accidental ignition.

918.6 Posting Procedures
Contractors shall post notices which set forth lists of procedures that they have established consistent with this Fire Plan. Such notices shall be posted in sufficient quantity and location throughout their logging areas so that all employees, or other persons employed by them to work, shall be informed of such procedures. Contractors shall provide for diligent supervision of such procedures throughout their operations.

918.7 Blasting and Welding
Contractors shall provide for a diligent fire watch service at the scene of any blasting or welding operations conducted on their logging areas to prevent and extinguish fires resulting from such operations.

918.8 Inspection for Fire
The Contractor or his/her agent shall conduct a diligent aerial or ground inspection within the first two hours after cessation of felling, yarding, or loading operations each day during the dry period when fire is likely to spread. The person conducting the inspection shall have adequate communication available for prompt reporting of any fire that may be detected.

918.10 Cable Blocks
During the period when burning permits are required, all tail and side blocks on a cable setting shall be located in the center of an area that is either cleared to mineral soil or covered with a fireproof blanket that is at least 15 ft. in diameter. A shovel and an operational full five-gallon back pump or a fire extinguisher bearing a label showing at least a 4A rating must be located within 25 feet of each such block before yarding commences..

Fire Boxes
A sealed fire box shall be present on every active landing during the course of logging operations. It shall contain at least 2 shovels, 2 axes or Pulaski's, a chainsaw serviced with gas and oil and 1 five gallon back pack pump full of water. Fire equipment shall only be used in case of fire.

Heavy Equipment
All tracked or rubber tired equipment over 5,000 lbs GVW shall be equipped with one serviceable shovel and one serviceable chemical fire extinguisher of at least a 2A:10B:C rating (5 lb. capacity) or water stored pressure fire extinguisher with at least a 2A rating (2½ lb. capacity). Equipment shall have and maintain the factory exhaust system or equivalent.

Vehicles
Shall keep a serviceable shovel at least 46 inch total length, an ax or Pulaskie, and a fully charged fire extinguisher with at least a 1A:10B:C rating (2½ lb. capacity) in their vehicle and must be equipped with the factory exhaust system or equivalent.

Chainsaws
Chainsaws shall be equipped with the original factory exhaust system or equivalent. A serviceable fire extinguisher must be located within 25 feet of the point of operation.

Firearms
The discharging of firearms is not permitted on TCF property

TCF Responsibilities

~~a)~~ Monitor fire weather daily during periods of extreme fire danger
b) All active operations may be required to be shut down when the relative humidity reaches 20% or lower, or when excessively high air temperatures are present.
c) All logging and road maintenance contractors shall be inspected for fire protection preparedness during the declared fire season. **Failure to comply will cause the job to be shut down until all fire protection measures are in place.**
d) Maintain and have ready fire equipment for immediate mobilization.
e) Use fire equipment only for fire related activities such as fire suppression and planned burning activities.
f) Each passenger vehicle shall be equipped with a fire extinguisher rated 1A:10B:C (2½ lb. capacity), shovel (46 inches in total length) and an ax.
g) TCF shall be a paid subscriber to the Mendocino County Cooperative Aerial Fire Patrol. Aerial flights are scheduled by CAL FIRE.
h) In the event that CAL FIRE announces "very high" fire danger or a "red flag warning" (extreme fire weather conditions), TCF shall determine whether any specific fire prevention measures need to be implemented and if so, shall transmit such measures to contractors for implementation.

INITIAL ACTION INSTRUCTIONS

Any action taken will be done in the safest manner possible. Your personal safety and the safety of other individuals working in the area is the highest priority.

a) Contractor will report the fire to CAL FIRE and TCF personnel as described above.
b) Provide a precise location (general area, ¼ Section, Township and Range) and size of the fire if possible.
c) Describe best access route(s) to the fire. Where possible, open gate(s) or have a TCF employee wait for CAL FIRE/local volunteer fire department at the specified gate, to lead them to the fire.
d) Determine escape routes from the fire and be prepared to evacuate nearby personnel. If no escape route exists evacuate personnel from the area to a safe location, generally a large open area.
e) An appropriately-trained TCF employee responding to a fire on TCF lands, or a fire that is posing an immediate threat to TCF lands may at his or her own discretion assist in coordinating initial fire suppression actions. Take the lead to designate duties and remain in communication with all resources. As soon as CAL FIRE arrives, TCF personnel shall brief them and turn control of the fire over to CAL FIRE personnel.
f) Place available equipment on standby or route to the fire area.
g) Request additional appropriate equipment needs.
h) Direct all water tenders to fill up with water.
i) Place fire locator signs to mark route to the fire.
j) Leave gates on access roads to fire open until the fire is out.
k) Stop all operations that are on or will use the access road to the fire. In extreme fire weather all active logging on the property shall be shut down.

RECOGNIZING FIRE DANGER BUILD-UP

There are many environmental factors affecting the probability of fire ignition and the rate of fire spread, including low relative humidity, high wind speeds, high atmospheric instability, and others. The Burning Index, which indicates severe fuel and atmospheric conditions for logging operations, takes these different factors into account in order to assess the potential for hazardous fire behavior. It is derived from a calculation involving the drying rate of fuels, the humidity, temperature, wind, and the state of curing of the growing plants. It cannot pinpoint the exact conditions in any one particular place. This leaves the Contractor with the responsibility of policing his own area and using good judgment in operating procedures. The Burning Index for coastal Mendocino County is available each day during Fire Season at (707)-459-7404.

OPERATIONAL FIRE SUPPRESSION RULES

Any action taken will be done in the safest manner possible. Your personal safety and the safety of other individuals working in the area is the highest priority. There is no requirement

for untrained or unwilling personnel to fight fire on TCF property. The following rules apply to persons who find themselves actively fighting fires.

FIRE SAFETY

a) Personal Safety: The safety of yourself and crew is your highest priority if you find yourself or your crew in an unsafe situation all persons should leave the scene immediately. If you or your crew are directed by anyone including CAL FIRE to do something which you feel is unsafe you may decline to do so. Report any such incidence to the CAL FIRE incident commander and TCF.
b) Working alone on a fire shall not be permitted.
c) Only experienced and capable operators shall be placed on or operate power equipment such as bulldozers, water trucks and chain saws.
d) Hand tools will be carried and used in a safe manner. Protect yourself and the person working next to you by maintaining safe working separation. Watch your footing at all times.
e) Be alert as to what is going on around you (e.g. burning snags, rolling rocks, and logs). Rolling debris comes from above, but don't forget, burning snags do sometimes fall up the hill.
f) Snag fallers must be exceptionally thorough and accurate in their "Timber" call and must allow ample time for an answer before starting their saw for the final cut. Close correlation between hand trail crews and snag fallers is most important.
g) The Fire Boss is responsible for his/her personnel. Missing personnel is cause for alarm and an immediate investigation.
h) Tractors must be provided with lights when working at night.

OPERATION OF TRACTORS

a) Avoid carrying fire outside the lines.
b) Push hot material away from the line and into the fire.
c) Don't bury fire. Buried fire may burn undetected for weeks and break out later when thought to be under control.
d) Work the tractors in pairs on steep terrain so that one can get the other out of "jackpots".

OPERATION OF WATER TRUCKS AND PORTABLE PUMPS

a) Operate pumps at the recommended speed. Exceed this only temporarily when the emergency justifies.
b) When pumping downhill, use only the pressure needed; often times gravity is enough. Excessive pressure will burst a hose and cause dangerous and costly delays.
c) When filling water trucks or pumping directly from streams, utilize a hose with a screened inlet. Keep the intake hose in clean water. Sand and gravel will easily go through the volume pump and will foul the pressure pump.

d) Always keep a grease gun, screwdriver, pliers, and a crescent wrench with the water truck or water pump to facilitate minor pump adjustments. Good service is important with the portable pumps, which in most cases, must be carried to their place of operation.

USE OF HAND TOOLS

a) Keep hand tools sharp and ready for use at all times.
b) All hand tools must be securely handled. Axes and Pulaskis tend to dry out during the summer months. They should be checked regularly and tightened with wedges if necessary.
c) Tools rendered ineffective due to damage or use shall be removed from active use and repaired or replaced as soon as possible.

ENVIRONMENTAL PROTECTION

a) When drafting water, screens will be used to prevent the entrapment of aquatic vertebrates. Drafting sites will be located to minimize damage to the watercourse.
b) When possible, firebreaks shall be placed outside of watercourse and lake protection zones (WLPZs) and other riparian areas.
c) When possible, firebreaks shall avoid unstable areas.
d) Water bars shall be installed on tractor constructed firebreaks as a part of the final "mop-up" operation. Mulching with slash or straw shall be conducted in WLPZ's where necessary to prevent erosion.

TCF CONTACTS

Contact Order	Name	Home Phone #	Cell Phone #
1.	Scott Kelly		(707) 272-4497
2.	Madison Thomson		(707) 357-3919
3.	*Holly Newberger		(707) 357-3391

*Office and administrative support only/Fire dispatcher

TCF FIRE SUPPRESSION ORGANIZATION AND DUTIES

In the event that The Conservation Fund has to maintain fire suppression activities without the aid of CAL FIRE. The following is a list of individual fire suppression roles with their associated duties. In this hierarchical system, with fire fighter as the lowest rank and dispatcher as the highest, individuals report directly to the rank above them. Roles will be distributed between staff and contractors on the basis of experience and physical capacity.

Dispatcher/Fire Operations Manager (Holly Newberger)
Duties and Responsibilities: Maintains radio contact with TCF Fire Boss(es). Arranges for and dispatches equipment, personnel and supplies ordered by the Fire Boss. Maintains the following log/records:

• Daily log of contract equipment and personnel dispatched to each fire including numbers of personnel, supervisor, numbers and type of equipment, hours worked by shift.

• Daily log of all conversations, phone calls with CAL FIRE and others including the time, person talked to, fire command job title/function or other, and substance of the discussion. (Use the Incident Report Form).

Fire Boss (Scott Kelly or designee)
Duties and Responsibilities: Overall organization and supervision of suppression operations on each fire until relieved by CAL FIRE. Develops suppression strategy. Determines and manages manpower, equipment and supplies needs. Maintains personnel roster. Directly supervises crew bosses or fire fighters on small fires. Maintains radio/cellular contact with main office. Maintains contact with Crew Bosses as conditions dictate (intervals not to exceed two hours). Interacts with CAL FIRE hierarchy when present. Completes or directs other TCF personnel to complete the Wildfire Information Report Form. Ensures that the access route to the fire location is adequately signed.

Crew Boss (Scott Kelly or designee)
Duties and Responsibilities: Responsible for direct supervision of fire fighters engaged in suppression operations (e.g. tool complement, fire line location, width and construction; hose lays, mop-up operations). Follows directions and implements strategy developed by the Fire Boss. Monitors fire suppression progress and fire behavior and reports said information to Fire Boss at intervals not to exceed two hours. Coordinates with water truck pump operators. Directs location and construction of tractor firelines. Ensures replacement of worn-out or unusable tools/equipment. Knows the location of, and ensures the safety of each fire fighter on the crew at all times.

Fire Fighters
Duties and Responsibilities: Follows directions of Crew Boss and Fire Boss. Responsible for wearing protective clothing and gear (i.e. long-sleeve shirt, pants, boots, safety glasses, gloves, handkerchief, and hard hat). Wears ear protection and chaps when operating chainsaws; only operates power saws if trained and capable. Uses the proper tool for the specific task at hand. Reports unsafe conditions to Crew Boss. Reports broken or unusable tools to Crew Boss. Paces their work to forestall fatigue. Maintains a supply of personal drinking water. Keeps alert at all times and in contact with other crew members.

TCF EQUIPMENT RESOURCES

McClouds	3
Pulaski's	2
Shovels	4
Backpack pumps	2
Nomex shirts	2
BK radios	2
Fire shelters	2
Pick-ups	2

CONTRACTOR CONTACT LIST

This is a partial list of potential contractors. TCF office will know which contractors are on site and who to contact, additional manpower and equipment may be ordered by the TCF office as deemed necessary by the Fire Boss.

Contractor	LTO#	Contact Persons	Home/mobile
Anderson Logging, Inc. P.O. Box 1266 Fort Bragg, CA 95437 (707)964-2770	A-7124	Mike Anderson Myles Anderson Don Sallinen Mark LeRoy Woods Office	964-0303/489-0837 964-2690/489-5805 961-0305/489-1625 964-0592/272-3706 964-4037
Barnett Logging 31651 Pudding Creek Road Fort Bragg, CA 95437	A-10343	Eddy Barnett	964-2542/357-1285
Bob Baker Trucking P.O. Box 655 Gualala, CA 95445		Bob Baker	884-3318
Christopher Blencowe 633 N. Harrison St. Fort Bragg, CA 95437		Chris Blencowe	964-1409/972-6768
Hautala & Mills Logging 27937 Highway #20 Fort Bragg, CA 95437	A-9276	Richard Hautala Parker Mills	964-2340/489-9556 877-3250/489-4587
Darcie Mahoney 30995 Greenwood Rd. Elk, CA 95432		Darcie Mahoney	877-3435/489-4865
Philbrick, Inc. P.O. Box 1288 Fort Bragg, CA 95437 (707) 964-2277	A-5697	Jerry Philbrick John Starkey	937-5919/489-0923 964-8809/489-2514
William T. Piper Logging P.O. Box 295 Manchester, CA 95459 (707) 882-2561		Bill Piper Robert Piper	489-5150 489-7923
Redwood Resources P.O. Box 1477 Fort Bragg, CA 95437 (707) 961-0347		Jesse Feidler	357-2677

Shuster's Logging Inc. 550 East Valley Street Willits, CA 95490 (707) 459-4131	A-8080	Steve Shuster Randy Yanez	456-9475/272-7120 964-7369/489-0237
Stornetta Excavating P.O. Box 225 Point Arena, CA 95468		Stan Stornetta	884-9628/357-1654
Summit Forestry 16575 Franklin Road Fort Bragg, CA 95437		Lee Susan	964-4566/357-0906
Gary Swanson 31651 Cedar Street (707) 964-3519	C-762	Gary Swanson	964-3519/489-0152
T&S Logging Inc. P.O. Box 31 Philo, CA 95466 (707) 895-3751		Ed Slotte	489-1948
Wylatti Resource Mngmnt. PO Box 575 Covelo, CA 95428	A-851	Brian Hurt	(707) 983-6633 (707) 983-8184 (707) 489-1463

MAPS OF TCF OWNERSHIPS
Helicopter suitable landings
Water drafting sites
Environmentally sensitive areas

APPENDIX G

APPENDIX G: SPECIES-SPECIFIC OLD-GROWTH CHARACTERISTICS

Redwood Old Growth Characteristics

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

Douglas-fir Old Growth Characteristics

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

Hardwood Old Growth Characteristics (tanoak, live oak, black oak, madrone, laurel, chinquapin)

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

Source: http://www.mrc.com/key-policies/old-growth/