THE
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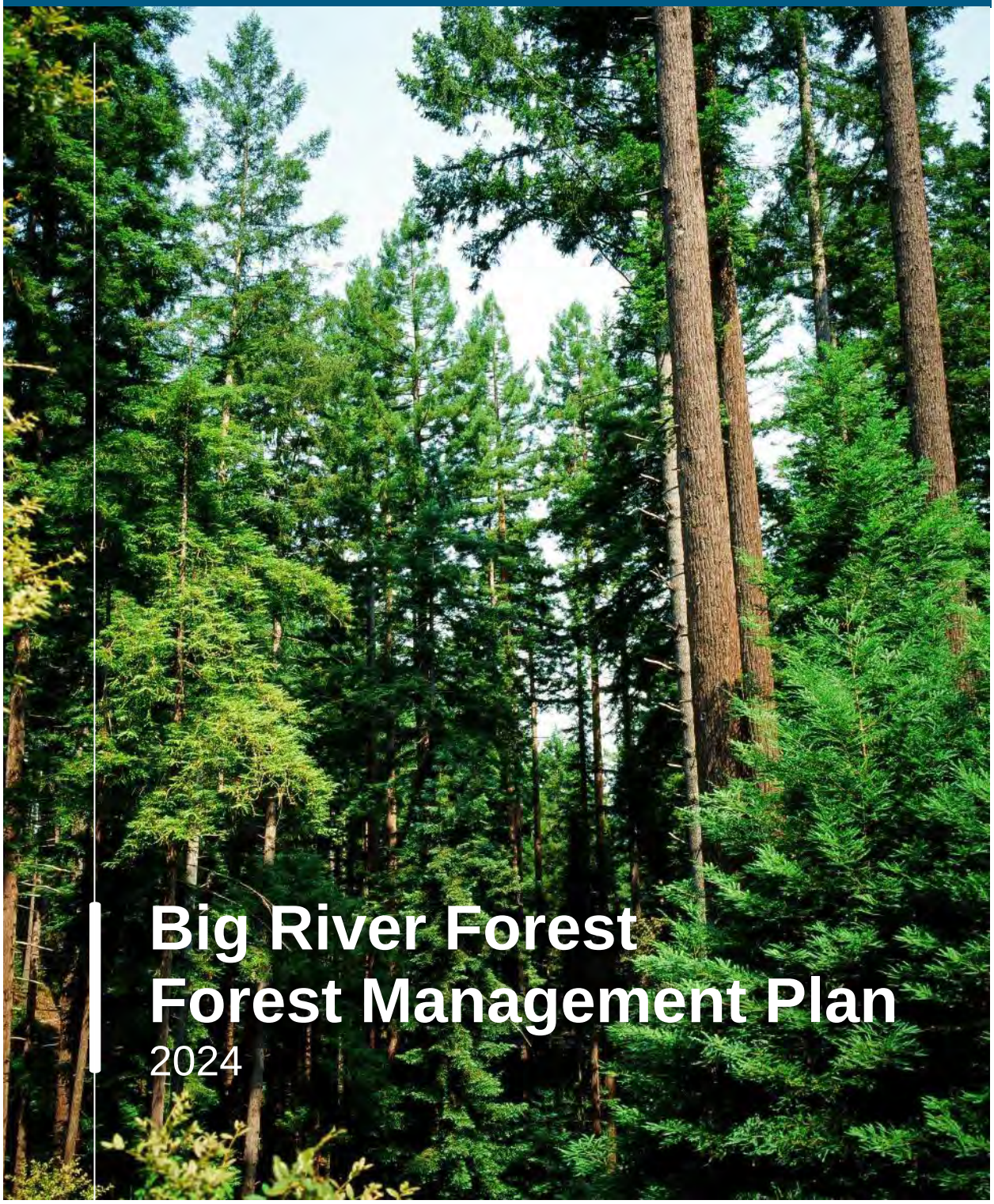

Big River Forest
Forest Management Plan
2024

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1. Summary

1.1 Project Background

The Big River Forest (Big River Forest or BRF) and Salmon Creek Forest were acquired in November 2006 by The Conservation Fund (the Fund) with funding from the California State Water Resources Control Board, the California State Coastal Conservancy, the Wildlife Conservation Board, and the David and Lucile Packard Foundation.

As set forth in a Memorandum of Understanding (MOU) among the California State Water Resources Control Board (SWRCB), the California State Coastal Conservancy (SCC) and the Wildlife Conservation Board (WCB). The "purposes for the acquisition and subsequent management of the [forests] are (a) to ensure the permanent protection of the [forests] from subdivision, residential and commercial development, mining … water diversion, and conversion to non-forest uses, and (b) protect, restore and enhance water quality and salmonid habitat, improve forest structure and increase natural diversity, provide a sustainable harvest of forest products, and, where appropriate, provide public access." The MOU further provides that the Fund will prepare a forest management plan. In 2009, the Fund submitted an Integrated Resource Management Plan (IRMP) which described the integrated management activities intended to satisfy the purposes of the acquisition set forth in the MOU. The original IRMP for Big River and Salmon Creek was approved by SWRCB, SCC and WCB (collectively, the "Agencies" in 2009. The IRMP was updated and approved by the Agencies in 2019.

The MOU provided for the eventual substitution of conservation easements on each of the Big River Forest and Salmon Creek Forest in exchange for the reconveyance of certain recorded instruments securing the conditions of the SCC and WCB funding agreements. To facilitate the conveyance of conservation easements on the Big River and Salmon Creek forests and to provide for the possibility that the forests each may have different owners in the future, the Fund and the Agencies agreed to create separate IRMPs for each forest. On May 10, 2024, the Fund conveyed a conservation easement over the Big River Forest to the Mendocino Land Trust, a copy of which is attached hereto as Appendix B (the "Conservation Easement"). This Big River Forest Management Plan has been approved by the Mendocino Land Trust, SWRCB, SCC, and WCB and fulfills and replaces in their entirety the requirements of the MOU with respect to the Big River Forest and shall hereafter serve as the forest management plan (FMP) under the Conservation Easement. Any amendments to this FMP shall be governed by the terms and conditions of the Conservation Easement.

A separate conservation easement and forest management plan that fulfills the requirements of the MOU with respect to the Salmon Creek Forest was separately conveyed and approved on May 10, 2024.

1.2 Project Financing

Sustainable forest management allows the Fund to rebuild commercial timber inventories that support the local economy and, at the same time, help repay loans taken to acquire the forests, upgrade roads and restore stream conditions for rare and threatened species. The emergence of a market for greenhouse gas emission offsets associated with improved forest management has significantly improved the means and rate of attainment of our principal management objectives.

1.3 Overview of Forest Characteristics and Conditions

The Big River Forest (approximately 11,707 acres) is in the middle portion of the Big River watershed and contains tributaries, including Little North Fork, Two Log Creek and Laguna Creek, as well as a central portion of the main stem of Big River. It adjoins the Big River State Park and Jackson

Demonstration State Forest; together these three properties make up the largest contiguous block of non-federal, protected land entirely within Mendocino County. Please see the BRF Property Map (Figure 1) and Adjacent Landowner Map (Figure 2).

Big River is a high priority watershed for anadromous salmonids and was identified in the 2004 "Recovery Strategy for California Coho Salmon." The forest includes 26 miles of Class I watercourses, 32 miles of Class II watercourses, associated riparian habitats, three major sub-basins the North Fork BR, Little North Fork BR and Two Log Creek watersheds all support coho salmon, and an array of additional sensitive species. The size and location of the forest provides significant contributions to the integrity and ecological viability of the Big River watershed and the larger ecoregion. (Refer to Appendix E, Aquatic Management Plan for Big River, for information on aquatic resources and proposed strategies for their protection and restoration.)

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 such imperiled species as coho salmon, steelhead trout and northern spotted owls. Timber has been harvested at least twice in the majority of local forests since the arrival of European settlers around the turn of the 20th century. Initially logs were transported primarily by railroad, but as logging moved inland, splash dam logging was used to move the logs from the forest down to the wider river channels. Remnants of the railroads and splash dam logging are still visible today. Splash dam logging was responsible for some stream channel degradation in the Big River watershed. After World War II, tractor logging was used extensively. Currently, the forests are relatively well-stocked, consisting of second- and third-growth timber, ranging from 30 to 100 years old.

1.4 Streams and Roads

Extensive logging and road building practices have contributed to erosion and subsequent stream sedimentation, producing a legacy of increased sediment loads that severely impact aquatic habitat in Big River and its tributaries. 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 overstory shade canopy from primary anadromous fish spawning grounds. 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 (Gualala River Watershed Council, (GRWC), 2013).

Like most large timberland tracts in the region, the BRF had been managed for industrial timber production for several decades. According to the *Nonpoint Source Program Strategy and Implementation Plan, 2014-2020* (NPS Implementation Plan), "silviculture contributes pollution to 17 percent of the polluted rivers … in California. 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 the use of fertilizers and pesticides." The *Recovery Strategy for California Coho Salmon* (Coho Strategy), prepared by the California Department of Fish and Wildlife, says: "[H]istorical 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 [large woody debris]; decreased [dissolved oxygen] concentrations; increased instream organic matter; and decreased stream-bank stability."

The State Water Resources Control Board (SWRCB) lists the Big River watershed as having impaired

water quality due to sediments and/or temperature in accordance with Section 303(d) of the federal Clean Water Act. In addition, Big River watershed is designated as “Critical Coastal Areas,” or specially designated land areas of the California coast where government agencies and other stakeholders have agreed to improve or protect exceptional coastal water quality from the impact or threat of nonpoint source pollution through the implementation of specific management measures.

While past forest management has been a significant contributing cause of impairment of North Coast water bodies (primarily because of poorly designed and maintained legacy roads), there is broad agreement that preventing fragmentation of large tracts of coastal forests and implementing management measures relating to sediment reduction through improved road maintenance and sustainable forest practices is the most feasible means of enhancing water quality in the region.

1.5 Forest Management

The specific management objectives identified and described in this plan are set forth in Section 4(b) of the Conservation Easement and are restated below for convenience:

i. Maintain and enhance habitat conditions for the northern spotted owl, Marbled Murrelet, coho salmon, and steelhead trout by increasing structural diversity, high canopy closure, late seral characteristics, and the maturity of the riparian forests that promote and restore cold water fisheries.

ii. Maintain and enhance productive and economically sustainable forest management and attendant contributions to the long-term economic vitality of the region and the State of California, including carbon sequestration.

iii. Increase the inventory of commercial conifer volume by harvesting less than growth as measured over any ten-year rolling average until a minimum residual volume of 30,000 board feet per acre of conifer is achieved on the unconstrained forested acres as identified in the Forest Management Plan, after which harvests shall not exceed growth.

iv. Maintain the vegetative diversity of the Property by retaining native trees, shrubs, and grasslands where they occur throughout the property and as further described in the Forest Management Plan.

v. Maintain the highest possible, commercially feasible standards for road layout, construction, and maintenance, so as to minimize the impacts on water quality and riparian habitat.

vi. Practice adaptive management as described in the Forest Management Plan.

1.6 Community Use and Involvement: Public Access

The Fund will provide opportunities for community use and involvement, while also protecting natural resources, engaging with long-term restoration and enhancement projects, and implementing active forest management practices. These opportunities for the public range from research, education and demonstration to participation in restoration projects, as well as unsupervised pedestrian access.

To foster community relationships, the Fund provides guided tours of road improvement and restoration

projects, native plants and areas that are intended for timber harvest. In turn, these programs familiarize the public with sustainable management methods and objectives, while building transparent community partnerships.

Photo by Jenny Griffin

Figure 1: Big River Forest Property

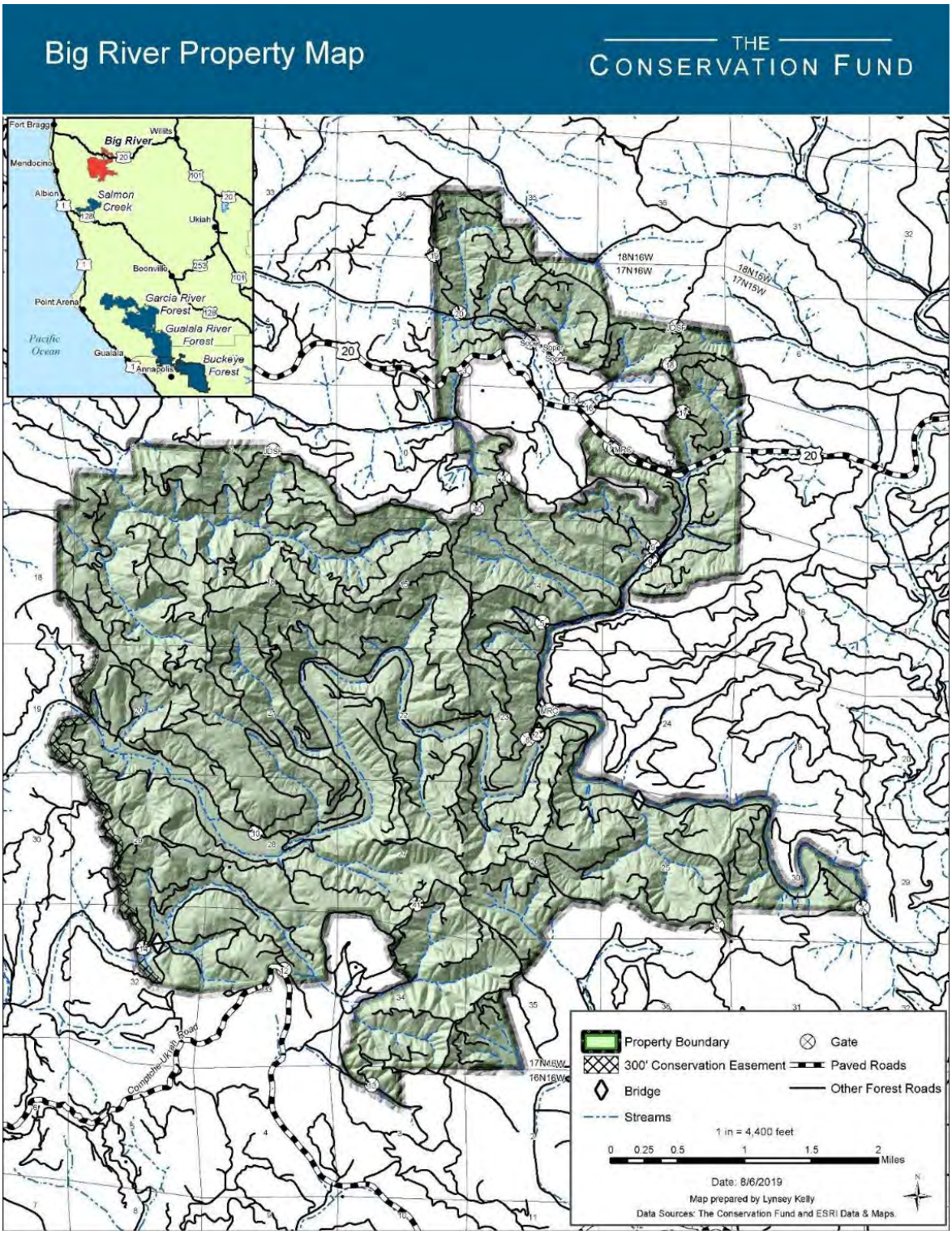
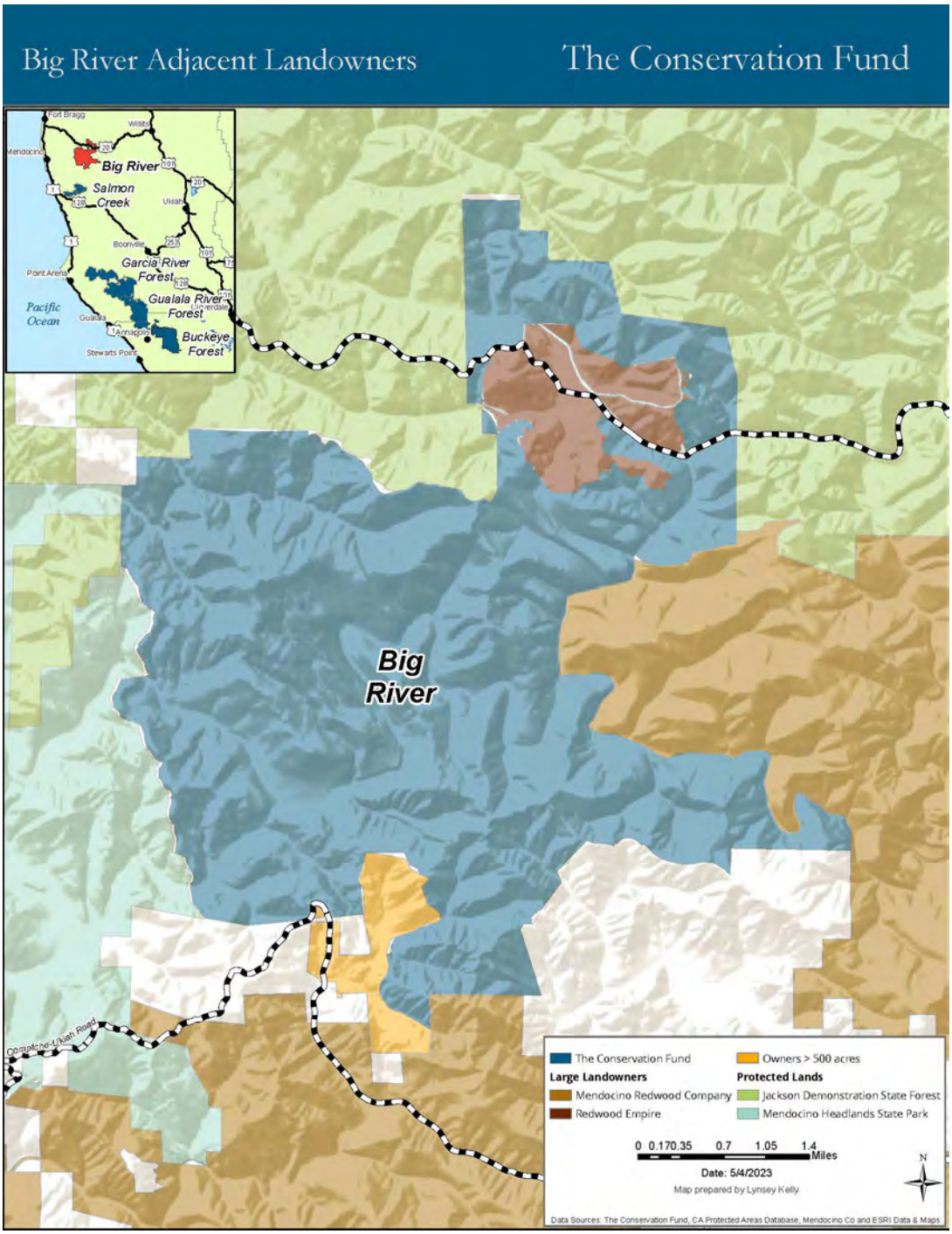


Figure 2: Big River Adjacent Landowner Map



2 Purpose of Plan

2.1 Plan Requirements

At the Fund's election as described in Section 4.1.9 below, this FMP follows requirements established in the Forest Stewardship Council ® (FSC®-C001535) U.S. Forest Management Standard (version 1.0). The intent of this FMP is to ensure that a written management plan contains actions and objectives detailed in this FMP are specific, achievable, measurable and adaptive. The following principles are discussed in the plan:

a) Management objectives;
b) Description of the forest resources to be managed, environmental limitations, land use and ownership status, socioeconomic 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.

This FMP meets the requirements of Section 4(b) of the Conservation Easement and shall be updated every 10 years in accordance with Section 4(c) of the Conservation Easement or such longer period based on the mutual agreement of the landowner and the Mendocino Land Trust. The Fund shall provide all updates to the Mendocino Land Trust for its review and approval and to SCC and WCB for their review.

2.2 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 future plans. This FMP is a compilation of the Fund's goals and policies with complementary Best Management Practices (BMPs) selected to attain those goals. BMPs are acceptable practices that could be implemented to protect water quality and promote soil

conservation during forestry activities. It is expected that as we increase our knowledge base or BMPs change, our management practices will also change.

Photo by Matthew Gerhart

3 Property Setting and Current Conditions

3.1 Property Orientation

3.1.1 Property Location

The Big River Forest is in the coastal mountain range of southwestern Mendocino County, roughly centered between the Highway 1 and Highway 101 corridors. The Big River Forest (approximately 11,707 acres) adjoins Big River State Park and Jackson State Demonstration Forest and is located within the middle portion of the Big River watershed; its tributaries include Little North Fork, Two Log Creek and Laguna Creek, as well as a portion of the main stem of Big River. The property is accessed by Highway 20 on the north and Comptche-Ukiah Road on the south.

3.1.2 Neighbors and Adjacent Lands

The Big River Forest is adjacent to Big River State Park (which contains the 8.3-mile estuary), Mendocino Woodlands State Park, and Jackson State Demonstration Forest. Together, Mendocino Redwood Co., Jackson State Demonstration Forest, Big River State Park, Mendocino Woodlands State Park, Coastal Ridges, the Fund, and Weger Holdings own 82 percent of the watershed. Thirty-one property owners—with plots ranging from 160 acres to 2,052 acres—own 9 percent of the land, and the rest is in scattered private residences (NCRWQCB, 2005). Other than the town of Mendocino at the mouth of Big River, there are few people living in the watershed. Scattered ranches and residences can be found primarily in the upper or east end of the basin, which are dominated by annual grasslands and therefore more suitable for ranching.

3.1.3 Description of Watershed

The Big River watershed is 116,000 acres (181 square miles) located in the northern California Coast Range in western Mendocino County, entering the Pacific Ocean at the town of Mendocino, about 10 miles south of Fort Bragg. The Big River Basin extends 24 miles to the east, to within three miles of Willits and Highway 101. It drains primarily from east to west, sharing ridges with the Noyo River and Caspar Creek basins to the north, the Eel River watershed to the east, and the Little, Albion and Navarro rivers' watersheds to the south.

Elevations within the Big River Basin range from sea level at the mouth to 2,836 feet at Irene Peak, five miles south of Willits. The basin's topography is diverse along its length, varying from flat estuarine environments and uplifted marine terraces to rugged mountains with high relief in the eastern portion.

3.1.4 Climate

Big River is a forested watershed with a coastal-influenced climate in the lower half of the drainage. Located within the Oregonian Biotic Province, the watersheds have a Mediterranean climate, characterized by a pattern of low- intensity rainfall in the winter and cool, dry summers with coastal fog. Mean annual precipitation is 40 inches at Fort Bragg near the western margin of the watershed and 51 inches at Willits to the east. Most of the precipitation (roughly 90 percent) occurs between October and April, with the highest average rainfall during the month of January (NCRM, 2011).

3.1.5 Geology

The regional geologic landscape of the Big River Forest was shaped by the tectonic collision of the Farallon and North American plates during the Mesozoic and early to middle Tertiary periods (Steinbuck, 2008). Tectonic forces mixed these continental plates with other less common rock types as subduction continued; subsequent metamorphism and accretion to the western margin of North America resulted in what geologists collectively refer to as the Franciscan Complex (Blake and Jones, 1981). Geologic mapping conducted in the region indicates that the Big River and Salmon Creek forests are solely underlain by the coastal belt Franciscan Complex (Kilbourne, 1983a). 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, both natural and related to past management, occur within the BRF and are widespread within the Franciscan Complex across the Coast Range Mountains. Large deep-seated landslides (e.g. translational-rotational landslides) have occurred on BRF 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 mainstem of Big River and its larger tributaries. Recent unconsolidated channel deposits composed primarily of sand, silt and gravel are exposed along the active channels on BRF.

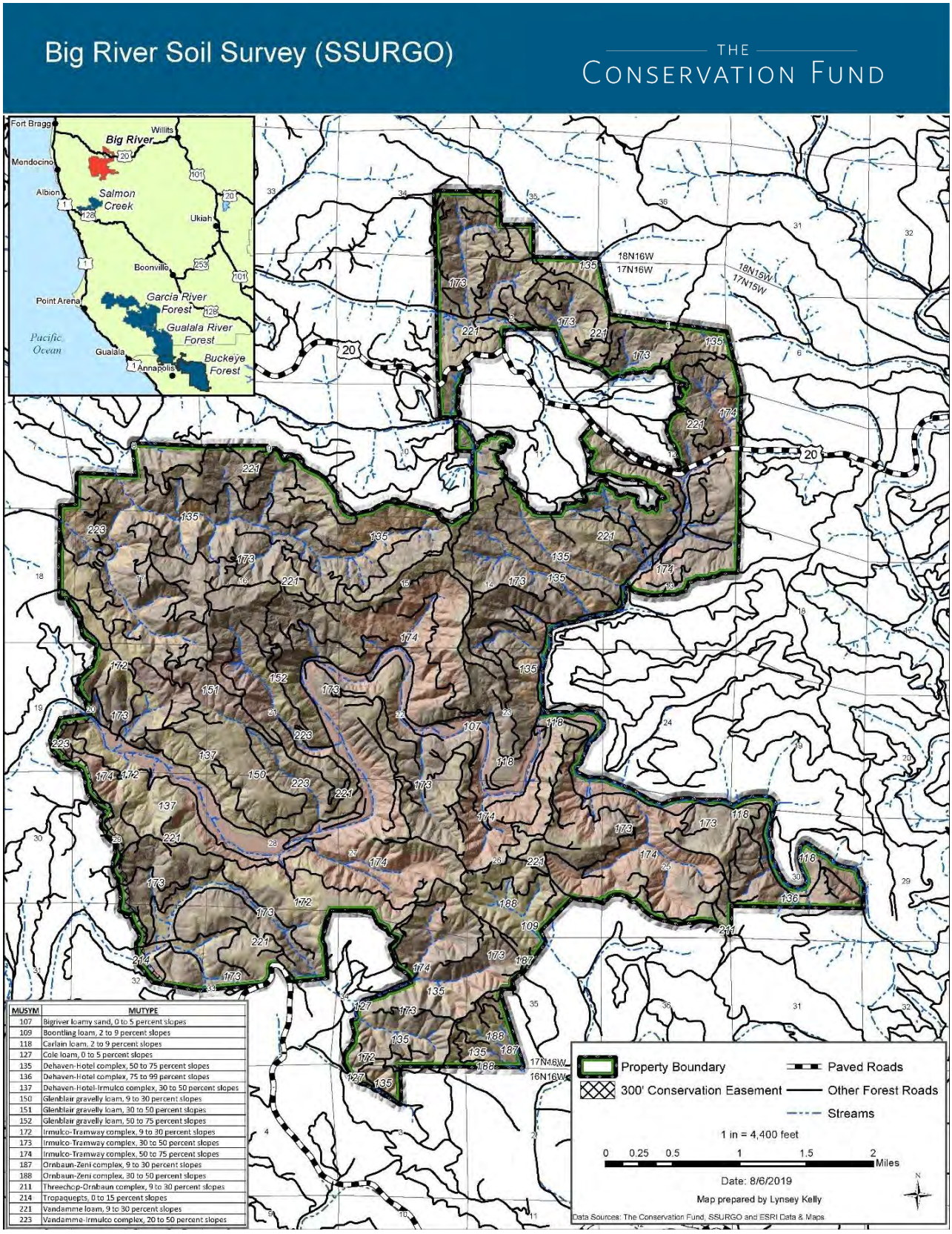
3.1.6 Soils

The soils formed from the Franciscan Complex are generally well-drained loams and sandy clay loams. Due to the high annual precipitation, soil fertility is high and well suited to growing timber. Formed from the weathering of sedimentary rock, colluvial soils blanket a majority of the hillslopes across the Coast Range Mountains.

Thickness of the overlying colluvial soil can be highly variable. Generally, colluvium is thin along ridges and upper side slopes (typically one to two feet), and thick (as much as five to 10 feet) within deep swales and local depressions.

See Figure 3: Big River Sol Survey SSURGO Map for information on soil types relating to slopes.

Figure 3: Big River Soil Survey SURGGO Map



3.1.7 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 1 below summarizes the state and federal environmental laws and regulations that pertain to forest management on the North Coast.

Table 1: State and Federal Laws Commonly Applicable to Forest Management

Regulation	State or Federal State	Responsible Agency
1600 Lake or Streambed Alteration Agreement	State	California Department of Fish and Wildlife
California Endangered Species Act	State	California Department of Fish and Wildlife
California Coastal Act	State	California Coastal Commission
California Environmental Quality Act (CEQA)	State	Any state or local public agency undertaking a CEQA "project"
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

3.2 Forest and Terrestrial Conditions

3.2.1 Forest Overview

The BRF is typical of California's North Coast redwood forest—dominated by redwood, Douglas-fir and white fir, steep slopes, and heavy rainfall that typify the region. The forests are richly productive and support significant wildlife, including many imperiled species, such as coho salmon, steelhead trout and northern spotted owls. Some of the timber stands are 80 years old, but most are much younger—the result of significant harvesting in the 1950s through 2006 when the Fund

purchased the land. The timber inventory is depleted compared with 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.

The forest is well situated for continued sustainable harvesting—there is a good road infrastructure and high site productivity for forests in the redwood region, and a mixture of mature forest and rapidly growing young stands or plantations. Since the Fund took ownership in 2006, we have selectively harvested most of the mature stands, or about 50 percent of the property, and are now initiating re-entry into some of our earlier harvests. Additionally, some of the older clear-cuts executed by Georgia Pacific Corp. are now available for harvest. The Fund has harvested less than growth, and the overall board foot volume and carbon stocks are increasing under our current management regimen.

3.2.2 Operational Constraints

It is important to understand several key facets of forest management on the BRF (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 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, specifically clearcutting, has resulted in young, well- stocked stands, which will take a few more decades to reach merchantable size. Almost all stands are well stocked with conifers that are healthy and growing well. Many of the recent clearcuts have been pre-commercially thinned since the Fund's ownership began.
- 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 unmerchantable trees. In almost all cases this competition is from native species, such as tanoak, which is an early successional species and may occupy heavily disturbed sites for many years following timber harvesting. Reduction in hardwood competition through manual treatments (sawing) or chemical applications (herbicides) is effective but expensive. 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 productive also means harvesting and road improvement operations are limited during the rainy season to avoid damage to the road infrastructure and 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. The timber market is volatile and dependent on housing starts and state and national economies. The number of sawmills in the region has declined steadily since 1970 but has currently stabilized at seven sawmills in our region. 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, 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 four months and $50,000 to $80,00 to prepare and administer a timber harvest plan (THP), which is five to 10 times the cost of a similar operation in Oregon or Washington. Improvements to the regulatory process could free up significant time and money to benefit other projects.
- Conservation Easement – July 30, 2002. A 300-foot wide conservation easement applies to the property on a section of its western boundary, per Figure 1. The easement was conveyed by the former owner, the Hawthorne Timber Company, to the Trust for Wildlife Communities and assigned to the Coastal Land Trust on June 5, 2008. The easement was subsequently reassigned by the Coastal Land Trust to the Mendocino Land Trust on September 30, 2014. Subdivision, development, timber harvesting, and quarrying are among the activities prohibited in the conservation easement. Refer to Appendix A for specific language in the easement.
- Conservation Easement – . 2023. See Appendix B.

3.2.3 Forest Inventory System

The BRF currently maintains two timber inventories, one for the sustained yield plan and one for carbon sequestration. This was done because the initial sustained yield plan inventory does not adequately capture all the elements needed to calculate sequestered carbon. The Fund maintains linked forest inventory and geographic information system (GIS) databases to assess, document and monitor forest conditions. Since acquiring the forests, the Fund has acquired high definition digital imagery LiDAR data, used to provide high resolution timber stand classification, as well as provide the Fund with improved mapping capabilities. The Fund is in the early stages of developing an inventory that will service our needs for the sustained yield plan and for forest carbon calculations.

As part of the Continuous Forest Inventory (CFI), the Fund re-measures approximately 10% of the forest plots each year. The actual percentage varies based on disturbance levels from harvesting, available personnel and CFI needs on our other properties. Data is collected from a system of permanent plots to track forest conditions on an annual basis. This provides a continually updated picture of the standing forest biomass. The Forest and Stand Evaluation Environment (FORSEE) program is used to compile and grow the forest inventory in a manner that models the Fund's specific silvicultural prescriptions. The volumes shown in Table 2 reflect the most current inventory as updated in early 2023. Based on the inventory, we have an increase of 4.7 million board feet (MBF) in the last 10 years or 420 board feet (BF)/acre after harvest, which is consistent with our sustained yield plan.

Table 2: Inventory Summary

	BRF 2012 MBF/Acre (Source: Campbell Timberland cruise data)	BRF 2023 MBF/Acre (Source: The Fund carbon/timber inventory)
Douglas fir	6.8	9.1
Redwoods	13.2	16.2
White Woods	1.2	1.8
Hardwood	1.6	2.1
Total MBF/Acre	22.9	29.1

The following tables were developed from the 2023 Big River Inventory:

Table 3: Current Board Feet/Acre for constrained and unconstrained acres

Big River Forest - Constrained Acres BF/Acre[1]						
DBH Class	Douglas-fir	Redwood	White woods	Tanoak	Other	Total
2 - 4	0	0	0	0	0	0
4 - 6	0	0	0	0	0	0
6 - 8	0	0	0	0	0	0
8 - 10	584.86	503	152	154.28	24.18	1418.31
10 - 12	480.43	684.71	47.43	271.42	27.33	1511.32
12 - 14	519.71	1243.86	159.14	161.01	61.84	2145.56
14 - 16	326.71	1236	196.86	153.01	42.49	1955.07
16 - 18	733.29	1294.29	156	180.7	226.37	2590.64
18 - 20	536.71	1975	36.71	218		2766.43
20 - 22	632.43	1748.29	95.14	62.69		2538.55
22 - 24	498.71	2116	224.43		19.1	2858.24
24 - 26	790	2567.86		43.13		3400.98
26 - 28	1285	2242.14	300.14			3827.29
28 - 30	1267.43	1770.57	469			3507
30 - 32	1243.29	1525.43	170.43			2939.14
32 - 34	355.71	1382.86	215			1953.57
34 - 36	1047.29	2133.43				3180.71
36 - 38		1561.71				1561.71
38 - 40		841.29				841.29
40 - 42	406.43	1080.29				1486.71
42 - 44		1555.86				1555.86

Big River Forest - Unconstrained Forest Acres BF/Acre						
DBH Class	Douglas-fir	Redwood	White woods	Tanoak	Other	Total
2 - 4	0	0	0	0	0	0
4 - 6	0	0	0	0	0	0
6 - 8	0	0	0	0	0	0
8 - 10	676.81	487.02	176.28	207.92	28.47	1576.49
10 - 12	784.33	673.01	121.74	203.4	31.09	1813.56
12 - 14	810.21	754.61	175.43	233.98	25.38	1999.61
14 - 16	731.81	924.4	128.09	297.76	71.14	2153.19
16 - 18	728.48	901.1	106.74	313.03	68.53	2117.87
18 - 20	603.23	910.99	167.87	184.16	39.86	1906.11
20 - 22	502.84	1080.6	144.75	76.8	59.28	1864.27
22 - 24	558.48	1100.85	157.77	134.31	22.38	1973.79
24 - 26	345.71	1211.38	172.73	32.81	11.6	1774.23
26 - 28	377.16	980.82	146.88	53.24	27.36	1585.46
28 - 30	403.72	700.67	61.63	71.75	14.16	1251.93
30 - 32	240.71	944.65	63.62			1248.97
32 - 34	546.21	519.65				1065.85
34 - 36	234.04	435.28	55.5			724.82
36 - 38	416.56	333.37				749.93
38 - 40	134.86	62.98				197.84
40 - 42	89.68	393.44				483.12
42 - 44	195.21					195.21

[1] Constrained acres are areas designated for no harvest by regulation or areas designated for high retention primarily within the Watercourse and Lake Protection Zones. Unconstrained acres include the remaining forest where harvesting is subject to the terms of the conservation easement and this FMP as amended.

44 - 46	712.71					712.71
46 - 48		385				385
48 - 50	727.43	432.29				1159.71
50 - 52						
52 - 54						
54 - 56						
56 - 58						
58 - 60						
60+		805.71				805.71
Totals						***45,102***

44 - 46						
46 - 48		100.53				100.53
48 - 50		92.73				92.73
50 - 52		143.9				143.9
52 - 54						
54 - 56						
56 - 58		332.23				332.23
58 - 60						
60+						
						25,352

Table 4: Current Basal Area /Acre for constrained and unconstrained acres

Big River Forest - Constrained Acres BA/Acre						
DBH Class	Douglas-fir	Redwood	White woods	Tanoak	Other	Total
2 - 4	1.05	0.66	0.38	3.84	0.99	6.93
4 - 6	3.45	2.29	0.86	5.63	1.88	14.11
6 - 8	3.5	4.82	1.25	3.64	1.12	14.35
8 - 10	3.74	6.43	1	3.83	0.51	15.51
10 - 12	3.34	7.97	0.46	5.18	0.37	17.33
12 - 14	3.06	12.05	0.93	2.27	0.51	18.82
14 - 16	2.03	11.8	1.36	2.08	0.36	17.63
16 - 18	3.37	10.96	1.11	2.66	1.39	19.49
18 - 20	2.78	14.05	0.26	2.2		19.28
20 - 22	2.76	10.25	0.64	0.65		14.3
22 - 24	2.14	12.99	1.27		0.85	17.24
24 - 26	2.92	14.51		0.96		18.38
26 - 28	4.52	11.37	1.68			17.57
28 - 30	3.95	8.45	1.91			14.31
30 - 32	3.74	8.31	0.71			12.76

Big River Forest - Unconstrained Forest Acres BA/Acre						
DBH Class	Douglas-fir	Redwood	White woods	Tanoak	Other	Total
2 - 4	1.34	0.6	0.46	3.27	0.52	6.18
4 - 6	3.29	3.16	1.36	5.27	0.65	13.73
6 - 8	4.66	5.09	1.12	5.34	0.58	16.79
8 - 10	4.84	7.16	1.19	5.6	0.5	19.29
10 - 12	5.4	8.63	0.81	4.34	0.39	19.57
12 - 14	5.08	8.69	1.16	4.13	0.47	19.54
14 - 16	4.42	9.68	0.93	3.83	0.8	19.66
16 - 18	4.19	8.77	0.69	4.12	0.67	18.43
18 - 20	3.11	7.84	1.04	2.36	0.56	14.9
20 - 22	2.55	8	0.85	0.99	0.67	13.06
22 - 24	2.72	7.91	0.74	1.21	0.19	12.78
24 - 26	1.6	8.3	0.73	0.23	0.23	11.1
26 - 28	1.53	5.23	0.59	0.26	0.27	7.89
28 - 30	1.46	3.94	0.15	0.31	0.33	6.2
30 - 32	0.91	5.87	0.36			7.14

32 - 34	0.88	6.02	0.81			7.71
34 - 36	2.9	9.6				12.5
36 - 38		6.37				6.37
38 - 40		4.79				4.79
40 - 42	1.28	5.34				6.62
42 - 44		5.72				5.72
44 - 46	1.63					1.63
46 - 48		1.73				1.73
48 - 50	1.83	1.82				3.64
50 - 52						
52 - 54						
54 - 56						
56 - 58						
58 - 60						
60+		3.04				3.04
Totals						***291.76***

32 - 34	1.68	2.99				4.66
34 - 36	0.94	2.13	0.24			3.3
36 - 38	1.07	1.56				2.63
38 - 40	0.58	0.31				0.88
40 - 42	0.31	1.58				1.9
42 - 44	0.37					0.37
44 - 46						
46 - 48		0.42				0.42
48 - 50		0.47				0.47
50 - 52		0.52				0.52
52 - 54						
54 - 56						
56 - 58		1.23				1.23
58 - 60						
60+						
Totals						***222.64***

Table 5: Current Trees/Acre for constrained and unconstrained acres

Big River Forest - Constrained Acres TPA/Acre						
DBH Class	Douglas-fir	Redwood	White woods	Tanoak	Other	Total
2 - 4	20	12.86	5.71	67.14	17.14	122.86
4 - 6	25.71	16.29	6.86	43.71	15.14	107.71
6 - 8	13.43	18	4.71	14.29	4.29	54.71
8 - 10	8.57	15.14	2.43	9.14	1.29	36.57
10 - 12	5.14	12.14	0.71	8.29	0.57	26.86
12 - 14	3.43	13.29	1	2.57	0.57	20.86
14 - 16	1.71	9.71	1.14	1.71	0.29	14.57
16 - 18	2.14	7	0.71	1.71	0.86	12.43
18 - 20	1.43	7.14	0.14	1.14		9.86

Big River Forest - Unconstrained Forest Acres TPA/Acre						
DBH Class	Douglas-fir	Redwood	White woods	Tanoak	Other	Total
2 - 4	21.28	10.64	8.16	57.8	9.22	107.09
4 - 6	25.21	23.3	10.67	41.7	5.07	105.96
6 - 8	17.66	19.29	4.22	20.5	2.2	63.87
8 - 10	11.21	16.38	2.73	12.84	1.13	44.29
10 - 12	8.3	13.05	1.28	6.67	0.6	29.89
12 - 14	5.64	9.5	1.28	4.54	0.5	21.45
14 - 16	3.62	7.94	0.74	3.19	0.64	16.13
16 - 18	2.7	5.6	0.43	2.62	0.43	11.77
18 - 20	1.6	4.01	0.53	1.21	0.28	7.62

20 - 22	1.14	4.29	0.29	0.29		6
22 - 24	0.71	4.57	0.43		0.29	6
24 - 26	0.86	4.29		0.29		5.43
26 - 28	1.14	2.86	0.43			4.43
28 - 30	0.86	1.86	0.43			3.14
30 - 32	0.71	1.57	0.14			2.43
32 - 34	0.14	1	0.14			1.29
34 - 36	0.43	1.43				1.86
36 - 38		0.86				0.86
38 - 40		0.57				0.57
40 - 42	0.14	0.57				0.71
42 - 44		0.57				0.57
44 - 46	0.14					0.14
46 - 48		0.14				0.14
48 - 50	0.14	0.14				0.29
50 - 52						
52 - 54						
54 - 56						
56 - 58						
58 - 60						
60+		0.14				0.14
Totals						***440.43***

20 - 22	1.06	3.37	0.35	0.43	0.28	5.5
22 - 24	0.96	2.77	0.25	0.43	0.07	4.47
24 - 26	0.46	2.41	0.21	0.07	0.07	3.23
26 - 28	0.39	1.31	0.14	0.07	0.07	1.99
28 - 30	0.32	0.85	0.04	0.07	0.07	1.35
30 - 32	0.18	1.13	0.07			1.38
32 - 34	0.28	0.5				0.78
34 - 36	0.14	0.32	0.04			0.5
36 - 38	0.14	0.21				0.35
38 - 40	0.07	0.04				0.11
40 - 42	0.04	0.18				0.21
42 - 44	0.04					0.04
44 - 46						
46 - 48		0.04				0.04
48 - 50		0.04				0.04
50 - 52		0.04				0.04
52 - 54						
54 - 56						
56 - 58		0.07				0.07
58 - 60						
60+						
Totals						***428.17***

3.2.4 Productivity and Site Index

The BRF is generally site class II/III for redwood and Douglas fir. The average measured site index in feet at base age 50 from the 2015 inventory is Douglas fir = 119 and redwood = 99. Site index is calculated using Krumland and Eng's site index system (Krumland and Eng, 2005).

Photo by Matthew Gerhart

3.3 Terrestrial Habitat and Species

3.3.1 Habitat Overview

Terrestrial habitat communities present on BRF include redwood (*Sequoia sempervirens*), Douglas fir (*Pseudotsuga menziesii* var. *menziesii*), coastal oak woodland, riparian forest with minor components of montane hardwood, 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 many wildlife species including a variety of sensitive species (Marcot, 1979). Oak woodlands provide food (mast) or cover as well, including resident populations of quail, wild turkey, squirrel and deer. The dominant hardwood species on the BRF is tanoak (*Notholithocarpus densiflorus*), with madrone (*Arbutus menziesii*),California laurel (*Umbellularia californica*), and other California hardwoods interspersed throughout the forest.

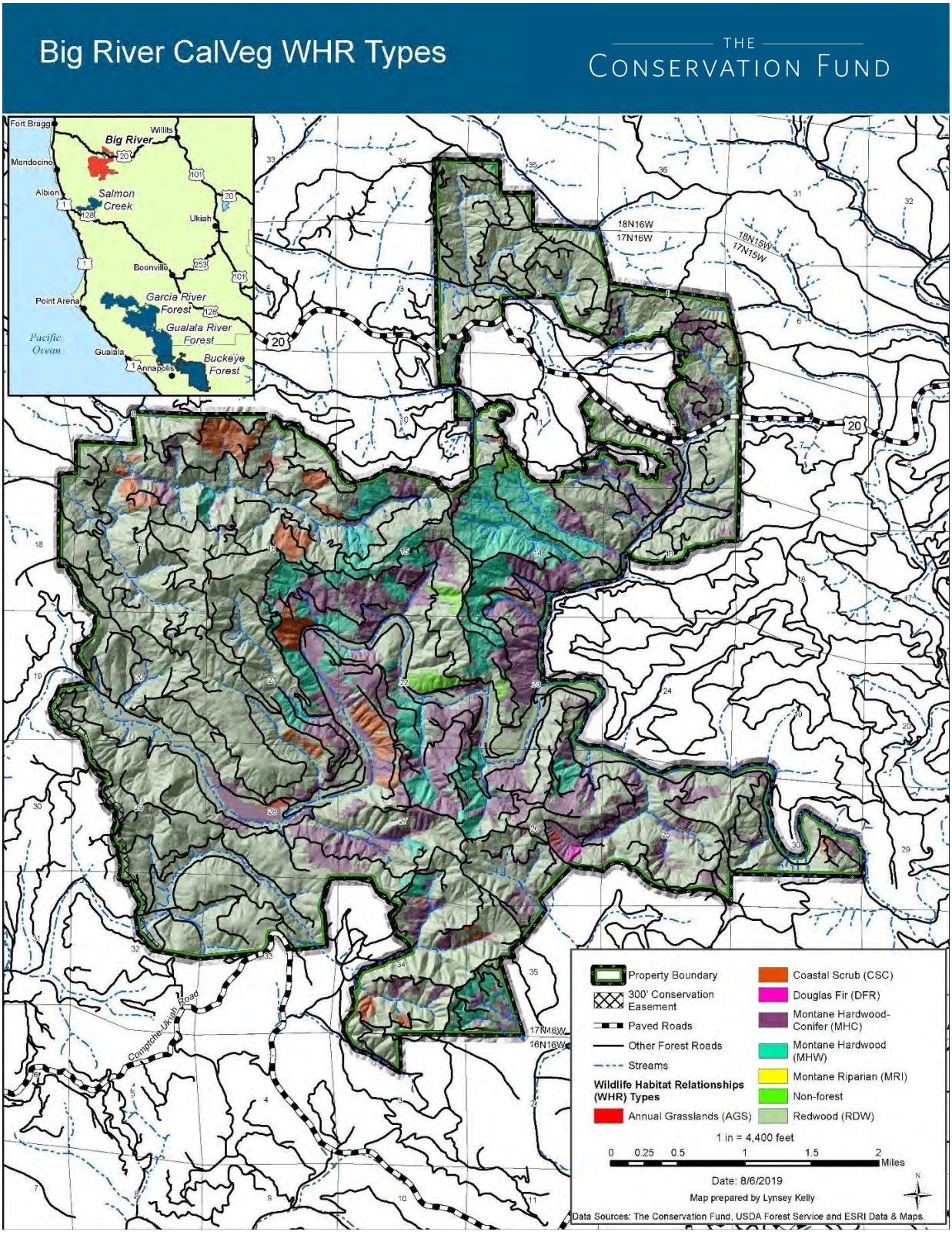
Table 6 below details habitat types and approximate associated percentage of the BRF according to the California Vegetation (CalVeg) system.

Table 6: California Vegetation Types and Approximate Acreage on Big River Forest

Big River	
Wildlife Habitat Relationships Type	**Acres**
Annual Grasslands (AGS)	30
Coastal Scrub (CSC)	353
Douglas Fir (DFR)	15
Montane Hardwood-Conifer (MHC)	1,811
Montane Hardwood (MHW)	1,153
Montane Riparian (MRI)	4
Redwood (RDW)	8,261
Non-Forest	80
Total	**11,707**

Source: FRID 2017, North Coast West, Calveg Zone 1

Figure 4: Big River CalVeg WHR Types Map



3.3.2 Special Status Species

Species listed as federally "threatened" that are confirmed in the forest include coho salmon, steelhead trout and northern spotted owl. The northern spotted owl is believed to be the most imperiled species and is intended to benefit from our management actions; it is described in more detail below in section 3.3.3. Aquatic species are described in section 3.4.3.

Table 7: Terrestrial species listed as Rare, Threatened, Endangered, Sensitive and Species of Concern Which May Potentially Occur on the BRF per the CNDDB and the Fund's observations.

Species	Listing Status
Foothill yellow-legged frog *(Rana boylii)*	CDF&W:SSC
Marbled Murrelet	FT, CDF&W: FP
Northern spotted owl (*Strix occidentalis caurina*)	FT, SE
Pacific tailed frog *(Ascaphus truei)*	CDF&W:SSC
Red legged Frog (Rana draytonni)	CDF&W :FT
Sonoma tree vole *(Arborimus pomo)*	CDF&W:SSC
Southern torrent salamander *(Rhyacotriton variegatus)*	CDF&W:SSC
White-tailed kite *(Elanus leucurus)*	CDF&W:FP
Coho salmon *(Oncorhynchus kisutch)*	FE, SE
Steelhead *(Oncorhynchus mykiss)*	FT
Plants	
Leafy-stemmed mitrewort *(Mitellastra caulescens)*	Plants of limited distribution; fairly threatened in California
Methuselah's beard lichen *(Usnea longissima)*	Plants of limited distribution; fairly threatened in California
Oregon goldthread *(Coptis laciniata)*	Plants of limited distribution; fairly threatened in California
Monterey clover *(Trifolium trichocalyx)*	Plants rare, threatened or endangered in California and elsewhere; seriously threatened in California
Swamp harebell *(Campanula californica)*	Plants rare, threatened or endangered in California and elsewhere; fairly threatened in California
White-flowered rein orchid *(Piperia candida)*	Plants rare, threatened or endangered in California and elsewhere; fairly threatened in California
Seacoast ragwort *(Packera bolanderi var. bolanderi)*	Plants rare, threatened or endangered in California, but more common elsewhere; fairly threatened in California
California sedge *(Carex californica)*	Plants rare, threatened or endangered in California, but more common elsewhere; not very threatened in California

Listing Status Codes:

CDF&W: SSC = California Species of Special Concern

CDF&W: FP = Fully Protected

FE= Federally Endangered
FT= Federally Threatened

Source: California Department of Fish and Wildlife CNDDB 2019

The initial Botanical Resource Assessment was completed in 2008. THP specific botanical surveys have been conducted throughout BRF for each THP submitted providing a more accurate picture of species diversity. It is noted that THP surveys are conducted per CEQA guidelines and expire after 5 years therefore surveys are continually renewed as we harvest new areas. See Appendix D Botanical Resources Report for more information.

Table 8: BRF Floristic Summary

	2008	2018
Big River (BR)		
total vascular species	317	538
families	68	89
exotics	88	156
rare	7	9

Photo by Whitney Flanagan

3.3.3 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 the coastal and Cascade mountain ranges of Oregon and Washington to southern British Columbia. The Redwood Region accounts for only about 9 percent of the northern spotted owl's range.

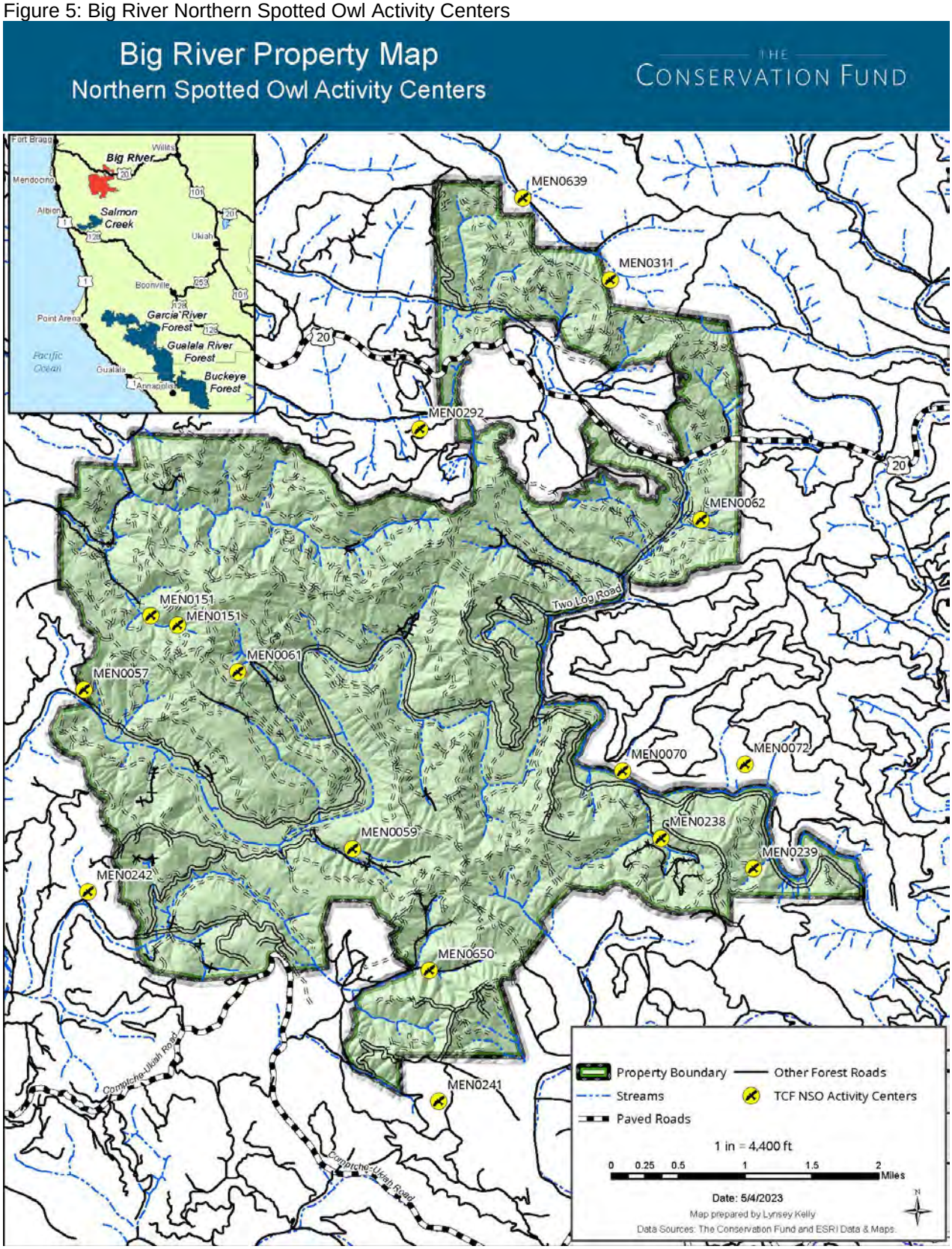
The Fund surveys annually in areas subject to timber harvesting, harvest planning or areas subject to CEQA review (such as LWD restoration projects). Prime NSO nesting habitat consists of moderate-to-dense stands of medium-to-large trees and multilayered stands of redwood and Douglas fir, with at least 60 percent closed canopy, multilayered stands required for breeding.

Primary prey species 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, multilayered canopy for seclusion and appear to prefer north-facing slopes in summer due to intolerance to high temperatures. NSOs require a large home range of 100 acres to 600 acres of 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 Fund contracts with an NSO biologist who is 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 forests' 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. See Figure 5: Big River Northern Spotted Owl Activity Centers.

Figure 5: Big River Northern Spotted Owl Activity Centers



3.3.4 Marbled Murrelet

The Marbled Murrelet is a small sea bird ranging from Alaska to approximately Santa Cruz, CA. It nests in coastal old growth forest prefering large limbs on Douglas-fir with surrounding cover for nest sites. The Fund's contract biologist has evaluated the Big River riparian corridor for habitat suitability several times in the past 15 years in response to THP review questions. The biologist has concluded that although individual trees may have sufficint structure, the necessary surrounding cover is absent, leaving any potential nest site unsuitable. This condition will likely change over time as the riparian corridor continues to mature.

3.4 Watershed Conditions

3.4.1 Water Quality Overview

Prior to the Fund's acquisition, the BRF had been managed for industrial timber production for many decades. The Recovery Strategy for California Coho Salmon (Coho Strategy) prepared by the Department of Fish and Game 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. The NPS Implementation Plan says, "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 4.

3.4.2 Stream Conditions

Big River

Big River drains an approximately 180-square-mile watershed in the northern California Coastal Range in western Mendocino County. The Big River Forest contains approximately 11 miles of mainstem Big River and 13 miles of tributaries with habitat attributes conducive to salmonid production. Vegetation 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* sp.), all of which are nearly continuous throughout the stream network. Streambed gradient is generally low (2

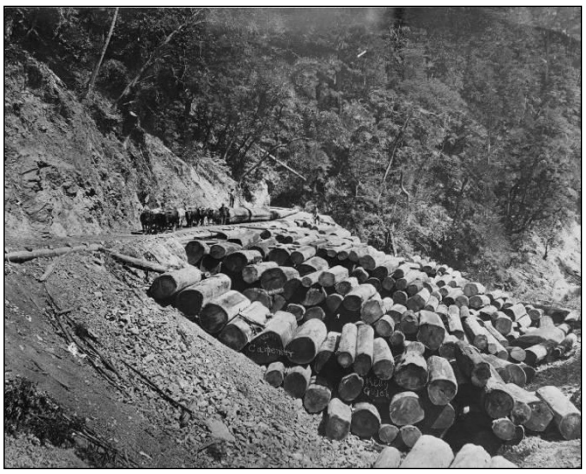
percent or less) throughout the mainstem reaches. The regional climate is characterized as Mediterranean with wet, mild winters and dry summers. Rainfall averages 55 to 65 inches annually.

The entire Big River watershed support runs of coho salmon and steelhead trout. Chinook have been reported occasionally, but presently there are no significant runs (Downie et al, 2006). Historical anecdotes indicate that Big River supported significant populations of coho salmon and steelhead with an associated recreational and local commercial fishery. By the 1950s agency reports indicated that the populations were depleted and in serious decline. The Big River Basin has been listed as a sediment-impaired waterbody, and as such, considerable literature has been generated regarding stream conditions and their historical context. The summer water temperatures in the mainstem are unsuitable for rearing salmonids, whereas most of the perennial tributaries are within suitable limits for rearing salmonids (Campbell Timberland Management, 2008).

Logs Stored In Stream Channels Awaiting Winter Flows, Circa 1880 (The Robert J. Lee Photographic Collection of The Mendocino County Historical Society)

Log Drive in Big River, Circa 1924 (The Robert J. Lee Photographic Collection of the Mendocino County Historical Society)

Historic Logging Operations, Circa 1955 (GP Photo)



Big River Splash Dam, Circa 1925 (The Robert J. Lee Photographic Collection of The Mendocino County Historical Society)

3.4.3 Aquatic Species Affecting Management

As mentioned previously, the aquatic species focus of this plan is on the salmonid species known to or currently inhabiting the BRF 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).

Table 9: BRF Coho Salmon Population Estimates (derived from redd counts) provided by California Department of Fish and Wildlife. Population Target: 5,500

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Number of coho salmon on BR	134	160	269	894	507	1310	744	221	1054	NS	1198	866

Large Woody Debris

The placement of large woody debris (LWD) in streams is a high priority for salmon habitat restoration. The addition of LWD enhances spawning and rearing habitats by providing cover and refuge from peak winter flows, increasing pool complexity, depth and frequency, and sorting and collecting spawning gravels, all of which will increase the quality and quantity of rearing habitat within the project reach. To date the Fund has added 299 pieces of LWD to three Class I streams (Little North Fork, East Branch Little North Fork, Two Log Creek) on BR, totaling 5.4 miles. Since these projects were implemented, NOAA's "Final Recovery Plan for Central California Coast coho salmon Evolutionarily Significant Unit (2012)" has provided further guidance on the size and scale requirements of LWD projects. We will be re-treating Little North Fork to meet these standards, and other Class I streams will be evaluated under the new criteria. In addition, Trout Unlimited has received grant funding to design and Engineered Log Jam project to be installed on the mainstem Big River. In 2022, the Fund participated in defining priority restoration actions in the Big River watershed developed through CDF&W's collaborative Salmonid Habitat Restoration Priorities (SHaRP) process to identify future projects.

3.4.4 Existing Road Conditions

The BRF has an extensive network of maintained roads. Most roads have locked gates to control access. The BRF property maps show the forest's primary roads. In addition to frontage on county-maintained roads (Highway 20, Comptche Ukiah Road), there is an extensive system of gravel and dirt roads on the forest, which were developed for timber harvesting. The majority of the road network within BRF and much of the coastal Redwood Region was developed after World War II when logging with tractors became cost effective for timberland and sawmill owners. During the

war, many improvements were made to the machines, which made tractor logging economical and efficient. Tractors allowed timberland owners to access much more ground more quickly than railroads, and truck roads were constructed from the mainline roads to points previously inaccessible by rail.

More recently progress has been made to improve BRF roads. Many bridges have been installed on the larger watercourses, road surfaces have been rocked, rolling dips installed and in some cases road widths have been reduced. The roads on the forests at the time of the Fund's purchase could generally be characterized as average forest roads. The rock surface applied by previous owners protected the permanent roads and prevented major failures from occurring due to gullying and culvert diversions. As part of the THP process roads are evaluated and upgraded to conform to modern design criteria, including the installation of rolling dips, critical dips, and out-sloping the running surface.

Common problems associated with 1950's era forest roads include: perched or raveling fills on the outside edge; gullying of fills at watercourse crossings; shot-gunned culverts or short culverts; inadequate or missing downspouts; and plugged inside ditches. Some secondary roads are impassable due to brush encroachment. Due to the past harvesting history there is an extensive, and mostly unmapped, network of skid trails (used for tractor logging). Many of these roads are on steep slopes where new construction would not be appropriate. Roads are being maintained, upgraded or decommissioned by the Fund to meet current standards, concurrently with timber harvesting.

Roads are upgraded in relationship to their intended use: permanent roads are maintained with a rock surface and permanent drainage structures; seasonal roads generally have a native soil surface and sediment control is achieved with a combination of permanent drainage and temporary or seasonal drainage structures. Roads to be decommissioned are generally near stream roads. Since acquiring the forests in 2006 the Fund has made significant improvements to the roads and infrastructure, improving 96 miles of road and preventing 38,446 cubic yards of sediment from entering the watershed (PWA, 2010) (Steinbuck and Blencowe, 2011).

Schedule 3, paragraph 3 of the Conservation Easement allows for the construction of new roads associated with forest management activities with conditions described in the Easement. New roads and culverts not identified in this FMP or approved in a THP or other similar permit require the prior written approval of Mendocino Land Trust.

In addition, Schedule 4, paragraph 17, identifies conditions under which rock can be quarried solely for use on the property.

3.5 Archaeology and Cultural History

The Big River watershed lies within the Pomo ethnographic province, which indicates that the prehistoric resources most likely to be encountered on the forests are lithic scatters with ground stone tool fragments reflecting generalized use of the area. Native American sites are commonly situated along trending ridgelines or spurs, broad mid-slope terraces, and areas adjacent to seasonal and perennial watercourses, including springs (Van Buren, 2005). Vegetation ecotones such as a meadow/forest interface along these geographic features are generally preferred.

The most likely types of historic sites to be encountered are those related to early timber harvests. These types of sites range from simple logging camps and historic trails to mill sites and

infrastructure related to timber transport. Most of the substantial historic sites in the region are railroad grades, historic era dams and camps and are relatively common throughout the watersheds.

A California Historic Resources Information System (CHRIS) property-wide records search was received by the Fund from the Northwest Information Center (NWIC) at Sonoma State University. 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 in 2022. NWIC cultural resources include archaeological resources and historical buildings and/or structures.

For the Big River Forest, the NWIC has record of 66 previous surveys covering roughly 45 percent of the BRF (NWIC, 2010). 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 to detect and protect any previously unknown sites or artifacts.

In accordance with the American Indian Religious Freedom Act and the Antiquities Act, the California cultural records database (maintained at Sonoma State University) is consulted prior to any land-disturbing activities. Continued assessments will be made to locate cultural resources before any significant activity in the forests, and personnel trained in archaeological inventory methods will inventory all sites before timber harvesting. Both acts require that site locations and descriptions be kept confidential to protect the resources; therefore, no listing is included in this plan.

3.5.1 Big River Cultural Resources

Cultural resources within the Big River Forest include remnants of historic occupation by Indigenous peoples and non-Indigenous settlers. The Indigenous village of Búldam was located not far from the Big River Forest, just east of the town of Mendocino. The Pomo were the earliest known inhabitants of the Big River watershed. They hunted, gathered and fished, often using fire as a vegetation management tool to favor the maintenance of habitat that supported plants and game animals. Colonization by Mexicans, Europeans, and later, North Americans, began to substantially alter the watershed, especially when commercial timber harvest began. Following the discovery of gold in California in 1849, the demand for lumber spiked (Van Buren, 2005).

Evidence of early settlers can still be seen in what remains of the Piccolotti homestead, remnants of logging camps on some of Big River's bends, and a partially collapsed cabin near Two Log Crossing. In 1852, mill owners constructed the first sawmill at the mouth of the Big River. In 1860, mill owners constructed the first splash dams to facilitate log transport. Use of splash dams along Big River and its tributaries continued through the early 1900s when a railroad was built in the watershed. As detailed previously, the watershed continues to experience legacy effects from over a century of timber harvest and log transport practices. The Big River channel was scoured from the force of the logs released from dams and the channel lacks habitat diversity to this day.

4 Forest Management Goals and Measures

4.1 Forest Management Overview

The following forest management objectives set forth in Section 4(b) of the Conservation Easement are intended to secure the Easement Purposes as defined in Section 1 of the Conservation Easement.

i. Maintain and enhance habitat conditions for the northern spotted owl, Marbled Murrelet, coho salmon, and steelhead trout by increasing structural diversity, high canopy closure, late seral characteristics, and the maturity of the riparian forests that promote and restore cold water fisheries.

ii. Maintain and enhance productive and economically sustainable forest management and attendant contributions to the long-term economic vitality of the region and the State of California, including carbon sequestration.

iii. Increase the inventory of commercial conifer volume by harvesting less than growth as measured over any ten-year rolling average until a minimum residual volume of 30,000 board feet /acre is achieved on the unconstrained forested acres as identified in this FMP, after which harvests shall not exceed growth.

iv. Maintain the vegetative diversity of the Property by retaining native trees, shrubs, and grasslands where they occur throughout the property and as further described in this FMP.

v. Maintain the highest possible, commercially feasible standards for road layout, construction, and maintenance, so as to minimize the impacts on water quality and riparian habitat.

vi. Practice adaptive management as described in this FMP.

4.1.1 Forest Management Strategies

Forestry is an inherently site-specific endeavor, and forest management strategies must retain the flexibility to adapt to individual stand conditions, market characteristics or logging contractor capabilities within the context of the objectives defined in the Conservation Easement and this FMP.

- 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. However other silvicultural treatments may be necessary to achieve an uneven-aged forest state, including intermediate treatments such as variable retention, transition, rehabilitation and commercial thinning. Please refer to Table 14: Acres Harvested by Silviculture in the Option A for the current plan for silvicultural treatments.

- Our harvest levels will be significantly less than growth rates over the next few years until an average of minimum residual volume of 30,000 MBF of conifer per acre is attained in the unconstrained acres.

- Watercourse protection measures will follow the standards identified in Table 10 which use the 2024 Forest Practice Rules as a foundation. We are providing a 50-foot no harvest buffer on

Class I streams, a 30- foot no-harvest buffer on Class II-Large streams, and additional overstory canopy retention measures on Class III watercourses to improve riparian habitat conditions and provide late-seral connectivity across the landscape.

- The 100-acre core NSO habitat retention polygons will not be cut. [2]
- 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 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.
- Include ample internal and external review of proposed and completed THPs through staff annual management review meetings and public tours. The Fund will continue to report carbon sequestration through the California Air Resources Board as required by the Regulation.
- In order to ensure consistency with the provisions of the Conservation Easement, the BRF will be monitored at least annually by the Mendocino Land Trust; Timber Harvest Plans and amendments to this FMP will be reviewed and approved by the Mendocino Land Trust; and the Fund and the the Mendocino Land Trust will meet annually to review the results of monitoring and discuss forest management activities for the coming year.

4.1.2 Forest Pests

There are relatively few diseases that impact trees throughout the forests and most impact individual or small groups of trees. At this point, landscape-scale disease outbreaks resulting in significant and widespread mortality have not been observed. The following is a list of diseases known to occur on the ownership which may result in declining tree vigor and mortality:

- Red Ring Rot (*Phellinus pini)* causes heartwood and sapwood decay in a wide range of conifer species and is the most common form of wood decay seen in coastal California forests. Infections in Douglas fir are common on the property. Visual indicators of infestation include brownish, bracketlike conks on the bole of the tree and swollen branch nodes. Damage is most prevalent in older stands (generally over 80 years).
- Black stain root disease (*Leptographium wageneri* var *pseudotsugae)* is a vascular root disease common to Douglas fir throughout the ownership. It does not cause a decay but rather disrupts the trees vascular system and leads to declining vigor and often death. The disease causes a black staining in the sapwood of the roots and lower bole. Outward signs of infection include chlorotic foliage and reduced leader growth. Patches of trees infested with

[2] Harvesting in core habitat retention areas is currently not allowed under federal and state regulations. However, harvesting within unoccupied NSO Activity Centers may be allowed in the future. In addition, the Fund or a future landowner may obtain a US Fish and Wildlife Safe Harbor Agreement for NSOs, which allows for some harvesting on a site-specific basis.

this disease are most commonly noted by small groups of trees that break off anywhere from four feet to 20 feet up the bole.

- Velvet top fungus (*Phaeolus schweinitzii)* causes a root and butt rot in Douglas fir. This disease is most common in older trees and often leads to loss of structural support and windthrow. There are few outward signs of infection other than clumps of brownish, irregularly lobed caps that emerge from roots around the base of infected trees.
- Brown cubical rot (*Poria sequoiae)* and white ring rot (*Poria albipellucida)* cause heart rot in redwood but almost never lead to tree mortality.
- Sudden Oak Death is caused by the exotic oomycete *Phytophthora ramorum.* The disease has a very wide host range, and mortality has been seen in tanoak, Shreve's oak, interior live oak, California black oak and canyon live oak. Tanoak is the most highly susceptible species to this disease, and tanoak mortality caused by sudden oak death has been observed on the ownership. Mortality in true oaks on the ownership due to sudden oak death has not been observed. Outward signs of infection include reddish, oozing stem cankers and foliage dieback. Tanoak mortality associated with this disease is almost always in close proximity to California bay trees. California bay trees are not killed by the disease but are suitable hosts and important sources of inoculum.
- *Armillaria mellea* infects a wide range of species across the ownership including Douglas fir, sugar pine, tanoak and true oaks. *Armillaria* colonizes the roots of infected trees causing a white rot. *Armillaria* root disease-caused tree mortality has been observed across the ownership, but it is relatively uncommon and not considered to be problematic. Fading crowns and chlorotic foliage are common symptoms in infected trees. Armillaria mellia is often indicated by small (up to ½ acre) death groups.

4.1.3 Harvest Levels

Section 4(b)(ii) of the Conservation Easement provides that the Landowner shall "Increase the inventory of commercial conifer volume by harvesting less than growth as measured over any ten-year rolling average until a minimum of 30 MBF/acre is achieved within the unconstrained forested area, after which harvest shall not exceed growth." The BRF is currently subject to an Option A, "A Plan to Demonstrate Long Term Sustained Yield, (LTSY)" that was developed for the Garcia, Gualala, Big River and Salmon Creek forests as a requirement of the Forest Practice Rules (FPR) (The Fund, 2014) ("Option A"). Section 10 of the Conservation Easement requires that the "Landowner shall comply with all statutes, laws, ordinances, rules, regulations, orders, guidelines, or other restrictions, or requirements applicable to the Property…". Accordingly, forest management on BRF must comply with the harvest levels identified in the Option A until such time as the Option A is either amended or the requirement to have an Option A changes either through a change in the Fund's ownership or outright sale of the Big River Forest. Thereafter permissible harvest levels shall be determined in accordance with the requirements of Section 4(b)(ii) of the Conservation Easement.

The calculated LTSY for Big River over the 100-year planning horizon is 7,840 MBF/ year. LTSY was calculated for each forest for a 100-year planning horizon. The calculation of LTSY considered unconstrained timber stands and limited harvesting in riparian zones. Areas designated as "no harvest" due to wildlife or water quality constraints were omitted from the LTSY calculation. The Option A will be updated approximately every 10 years.

Please refer to the growth and yield Tables 12 and 13 on pages 36 and 37 in the Option A—Sustained Yield Plan - Appendix G.

Photo by Sheila Semans

4.1.4 Silvicultural Objectives

The principal silvicultural objectives are to grow large high-quality conifer trees, increase structural complexity and natural diversity, restore wildlife habitat, and establish a high level of sustainable timber production through selective harvests. These measures should maximize value growth and development and maintain important late-seral habitat characteristics for wildlife and nontimber forest vegetation going forward. Future “crop tree” target diameters are 30 inches to 36 inches for redwood and 22 inches 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, retain and restore wildlife habitat, and a high degree of structural diversity.

Timber marking (designating individual trees for harvest) is the art of shaping future forest stand conditions by extracting merchantable trees from the forest. The intention is for the remaining trees to be vigorous and free to grow, while protecting and enhancing wildlife habitat and maintaining the Forest’s capacity for productive and sustainable forest management and attendant contributions to the long-term economic vitality of the region and the State of California. The result is a well-stocked forest—rapidly growing and healthy with abundant and diverse wildlife habitat features together with a high level of sustainable timber production.

4.1.5 Harvest Retention Requirements and Guidelines

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. Retention trees will be painted with a "W" or tagged by the field foresters as they are marking the timber for harvest; this will communicate the value of these features not just to the loggers but also the public and future foresters. A harvest can include many retention trees and thus, not all are mapped or recorded unless they are suspected to be an NSO nest tree.

Please refer to Table 23 on page 49 in the Option A – Appendix G - which shows the change in diameter distribution over time in the unconstrained areas in particular the increase in large conifers.

Downed Wood

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 two for recruitment).
- Old-growth trees if present (generally in the upper 20 percent diameter class for the species on-site, deep bark patterns, flattened or irregular crowns, large limbs, crown debris accumulation).
- Raptor nest trees.
- True oaks, madrone and tanoak over 20 inches and chincapin shall be maintained across the landscape. Exceptions may be made in site specific cases where large tanoak or madrone need to be removed to facilitate conifer growth.
- Den trees (cavity greater than 3-inch diameter and greater than 10 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.

General Harvest Retention Guidelines

- Large conifer trees (>48" DBH) retained for wildlife 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 10 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. Marking shall occur in connection with timber harvest marking and shall not include retained hardwoods**.**

- 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. Loggers have been directed 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 all timber harvest. When marking variable retention harvests, extra screen trees may be appropriate.

Due to 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 the forests 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 20 years; the development of late- seral habitat elements is a long-term process and will be shaped over several harvest entries. These targets will be reevaluated with future FMP updates, approximately every ten years.

When encountered, rare plants, animals and their associated habitat will be protected per the guidelines established by CAL FIRECAL FIRE, USFWS or CDFW. 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 CAL FIRECAL FIRE, CDFW and/or USFWS will be implemented. Habitat protection measures for coho salmon and steelhead trout are embedded in the FPRs and included in the "Specific Watercourse and Lake Protection Zones (WLPZ)". Other rare species are generally protected on a case-by-case basis during the timber harvest planning and review process. See Table 10: Summary of No Harvest Areas and Additional Watercourse Protection Measures for more information regarding harvest retention.

Table 10: Summary of No Harvest Areas and Additional Watercourse Protection Measures

Forest Management Consideration	Description	Acres
July 30, 2002 Conservation Easement	The Big River Conservation Easement extends from the northwest corner to the southwest corner of the property and extends from the western property line east for approximately 300 feet parallel to the property line and adjacent to the Mendocino Headlands State Park.	113
Northern Spotted Owl Territories (7)	Northern spotted owl habitat retention and maintenance is required wherever a valid NSO activity center is known to occur. Protection measures consist of maintaining a 100-acre core habitat area as well as 200 acres of nesting and roosting habitat within .7 miles of the activity center. Core habitat acres only shown here.	870
Class I Watercourse Buffer[3]	Fish-bearing watercourse or a watercourse used for a domestic water supply. The Forest Practice Rules require a 30-foot no-harvest buffer within a 100-foot Water and Lake Protection Zone (WLPZ). The Rules also require retention of 80% overstory canopy cover and the 13 largest trees per acre in the next 70 feet within the WLPZ. However, the Fund has elected to use a 50-foot no-harvest zone within the WLPZ.	295
Large Class II Watercourse Buffer	Watercourses that support non-fish aquatic life with a watershed area that is equal to 100 acres. The Forest Practice Rules require a 30-foot no-harvest buffer within the Class II- Large WLPZ as well as the retention of 80% overstory canopy and the 13 largest trees per acre in the next 70' within the WLPZ.	60
Standard Class II Watercourse Buffer	Small Class II watercourses that support aquatic life that are not fish-bearing and have a watershed area of less than 100 acres in size. The width of the Class II - Standard WLPZ varies by slope. The Fund has determined that the average no-harvest buffer width implemented in the Big River Forest is a 15-foot no-harvest buffer. In addition, the Fund has elected to retain 50% of the overstory canopy in the WLPZ.	81
Class III Watercourses	There is no WLPZ along Class III watercourses, and there are no canopy retention buffers associated with these watercourses. There are operational buffers, generally a 25-50 foot Equipment Exclusion Zone (ELZ) required by the Forest Practice Rules. The Fund has elected to retain 50 percent of the overstory canopy within the ELZ.	NA
Total		**1,419**

[3] Exceptions to the no-harvest buffers include sites where cable yarder corridors are needed and forest management activities that promote stream restoration and that maintain and enhance wildlife habitat.

4.1.6 Hardwood Management

In addition to the ecological imbalance, the high concentration of tanoak in some stands significantly reduces conifer growth and stocking, retards the development of a well-stocked large tree forest and the future financial value. Since tanoaks have effectively no commercial value the long-term goal is to reduce or maintain tanoak to 30 percent or less of the stand basal area. 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% of the basal area (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 reduce tanoak to an appropriate level. This may take more than one entry to achieve. These targets may be adjusted on a site-specific basis.

- Most hardwood reduction can be achieved within a selection or thinning harvest by selective falling of tanoaks to release existing conifers. 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 hardwoods and individual hardwoods which do not compete with desirable conifers will be left alone. Where tanoaks make up more than half of the stand, herbicides have been used to control the tanoak. Currently there is a temporary moratorium on the use of herbicides in Mendocino County, but we will maintain it as an option in the event the moratorium is lifted.

- Smaller areas of intact hardwoods would be intentionally retained (for biodiversity reasons). Preference for hardwood retention in the managed stands will be given to large trees (greater than 20 inches), true oaks, chinquapins and madrones, and groups of hardwoods.

- 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.

- Any planned use of herbicide needed to comply with the forest practice rules 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 cutting of tanoaks for hardwood control was conducted on the Jarvis Camp THP on the Big River Forest. Compared to stem injection of herbicide, cutting and logging of the hardwoods resulted in significantly greater disturbance and resprouting.

- 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. Hardwood control measures will be reviewed periodically and revised as appropriate based on knowledge and experience gained in the field. Herbicides may be used to control tanoak sprouts after harvest in VR and selection harvest units, as deemed appropriate by forestry staff. Herbicides will 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.

Pre Commercial Thinning

Pre commercial thinning (PCT) 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 percent 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.

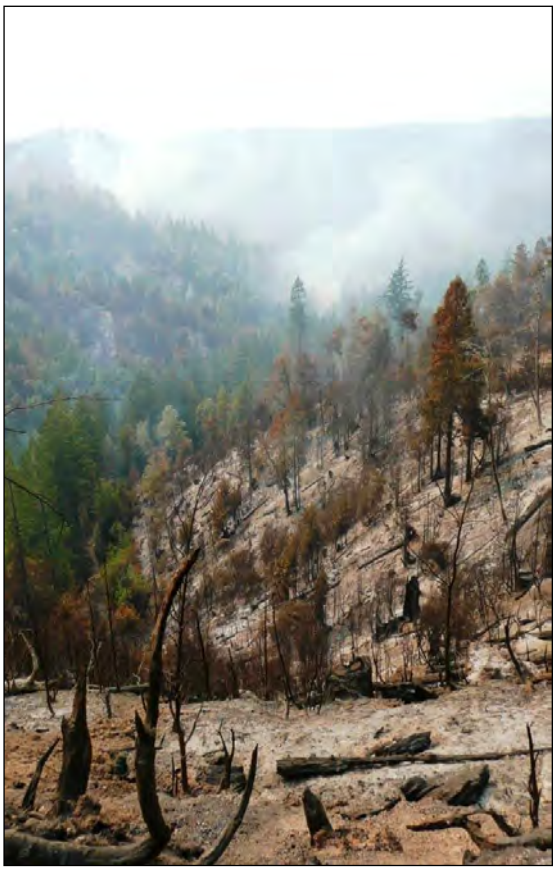
PCT is implemented in young stands with chainsaws and no heavy equipment is used therefore, impacts to non-timber resources including wildlife habitat, rare plants and water quality are assumed to be negligible. Conifer and Hardwood trees identified for retention with an orange stripe by the previous owner(s) are retained for wildlife habitat. The Fund 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.

4.1.7 Fire Management

Fire is both a natural and human-caused presence on the North Coast landscape, which requires careful consideration and preparation. The included Fire Plan Map illustrates relevant fire management features, including drafting sites, water sources and helicopter landing sites. The Fund has developed a Fire Management Plan to specify the fire prevention and response measures to be used on the forests. 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 Fund's timberland manager. In the event of a catastrophic fire, a landscape scale fire rehabilitation plan will be created and implemented.

The 2008 Navarro Fire on the Salmon Creek Forest was lightning-caused and resulted in a mostly benign low- intensity burn. The fire spread to include a total of 2,700 acres, including approximately 700 acres within the Salmon Creek watershed, with approximately 75 percent mortality. The area was replanted with conifer seedlings in 2010. (See Appendix F Fire Management Plan)
More recently there has been a focus on creating forests that are fire resilient through forest thinning, vegetation management and the creation of shaded fuel breaks along county roads and trending ridges. The Fund is currently using YUM Yarding (Yarding Unmerchantable Material) within harvest units, where appropriate, to reduce post- harvest fuel loads. Roadside mulching is also used to reduce fuel loads near forest and county roads.



Salmon Creek Navarro Fire. Photo by Jenny Griffin

4.1.8 Timber Harvest Planning

Ongoing timber harvest planning of both activity implementation and program effectiveness is a critical part of adaptive management and successful initiatives. Three broad categories of timber harvest planning will be utilized: short-term, long-term, and certification. These are described in detail below.

4.1.8.1 Short-Term

Due to the sensitivity and significance of our management activities such as timber harvest, sediment reduction and in stream habitat improvement, they 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 s management policies, including safety, regeneration, residual stand quality and aesthetic issues. This monitoring process begins before the harvest operation, with each THP review by the Fund's resource management team to identify any sensitive issues that deserve additional attention. In addition, the Fund offers a public THP tour prior to operations, to solicit suggestions and answer questions from interested community members. Post-operations reporting to North Coast Regional Water Quality Control Board for Waste Discharge Requirement compliance occurs yearly. Harvest reporting for sustained yield compliance occurs yearly.
Effectiveness monitoring for compliance with our management guidelines occurs concurrently with operations is visual in nature and generally undocumented. Opportunities for improvement are noted by the project supervisor and communicated to the staff or contractors verbally. Some observations have resulted in changes to our management strategies.

4.1.8.2 Long-Term

The Fund has developed an Option A plan to demonstrate long-term sustained yield in compliance with the Forest Practice Rules (FPR). The plan utilizes the FORSEE growth and yield model which simulates forest growth and harvest in compliance with the FPR and The Fund's internal management policies. The tables below are the FORSEE model output, which clearly demonstrate that by following the provisions in the Option A the forest will, over time, increase in standing inventory. To ensure compliance with the Option A until such time as it may be amended or terminated in accordance with the FPR, the Fund is required to report annually to CAL FIRE the previous year's harvest, which also shall be shared with the Mendocino Land Trust when the report applies to Big River. The calculation of LTSY considered for unconstrained timber stands and limited harvesting in riparian zones. Areas designated as "no harvest" due to wildlife or water quality constraints were omitted from the LTSY calculation. Please refer to Table 13: Growth and Yield/acre over 100 Year Planning Horizon in the Option A.

4.1.9 Certification

Though not required by the Conservation Easement, the Fund has elected to certify the BRF in conformance with the Forest Stewardship Council and Sustainable Forestry Initiative® standards for sustainable forest management by an accredited third-party auditor. These broad-ranging standards are intended to ensure 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. The standards are publicly available at: www.fscus.org and www.forests.org.

This rigorous system of third-party audits is intended to help land managers evaluate and improve their practices and communicate their success. Future landowners have the option to continue certification but are not required to maintain certification.

The BRF is also an approved and verified Improved Forest Management Project (IFM) through the California Air Resources Board (CARB). The Fund is subject to annual reporting and periodic audits, during which independent auditors review the forest inventory system, the growth and yield modeling, and greenhouse gas reporting system to ensure that the forest stocks contain

greenhouse gas emission reduction credits claimed. General information on the CARB Forest Project Protocol can be found at https://www.arb.ca.gove/cc/capandtrade/offsets/offsets.htm. Specific project details are available at https://www.climateactionreserve.org.

4.2 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 density and structure; and c) improve stream habitat complexity. To meet these goals, we will implement uneven-age silviculture where possible, improve the road network to reduce sediment inputs, maintain required riparian buffers and actively place large wood into stream channels to improve habitat complexity.

4.2.1 Road Management

The Big River sediment source assessment was completed in 2011. The road assessment utilizes the CDF&W- 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 goal of the road assessment is to develop an erosion control and 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 road drainage structures to accommodate a 24-hour, 100-year storm discharge; 3) decommission unnecessary or poorly located roads, such as roads crossing headwall swales or near stream roads, where practical; 4) reduce long-term road maintenance requirements and related costs through proper road shaping and installation or permanent drainage structures. Upgraded roads will be out-sloped with rolling dips to control surface runoff wherever possible.

4.2.2 Road Management Implementation Plan Timeframe

Road improvement (upgrading and decommissioning) and repairs will be conducted annually as part of Timber harvesting and the Fund's ongoing maintenance.

Sediment Reduction Plan

To reduce sediment delivery from the road system, emphasis will be placed on increasing the number of drainage points along roads such as rolling dips, waterbars or ditch relief culverts and by reducing the potential for diversion at culverted watercourse crossings by constructing critical dips. 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.

- 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 or seasonal 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 or reconstructed 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.

- The "Handbook for Forest, Ranch & Rural Roads" prepared by Weaver and Hagans (2014) will be used as a guideline for all proposed road construction and improvement projects.

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 and to a limited extent during wet weather, shall be designed, constructed, re-constructed 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.

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, such 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 the at-risk roads, such roads will be scheduled for decommissioning. Alternatively, if no alternate access can be identified, then the at-risk road may be upgraded or temporarily decommissioned.

4.2.3 Road Improvement Monitoring

Effectiveness monitoring to evaluate road upgrades and sediment inputs associated with THPs enrolled into the GWDR program are conducted annually in keeping with the NCRWQCB's GWDR enrollment program. A Controllable Sediment Discharge Source inventory and implementation

schedule, also known as an erosion control plan (ECP) is prepared for each THP and submitted for review and approval to CAL FIRE and the THP review team which includes NCRWQCB. Once approved the THP is enrolled in the Waste Discharge Requirement Order No. R1-2004-0030 (GWDR) through the SWQCB. As a condition of enrollment all seasonal and permanent roads associated with the THP are inspected a minimum of three times each year; fall, mid-winter and spring. Annual monitoring reports are sent to the NCRWQCB every June describing the condition of each site identified in the ECP, any new sites created or discovered, and whether implemented mitigation is working as intended.

To the extent possible all other permanent and seasonal roads on the property will be checked for erosion problems after large storm events, at least once a year for erosion problems. Corrective action will be taken as necessary to keep roads open and maintain watercourse crossings in a condition that will not deliver sediments.

Property wide sediment source assessments have been completed (PWA, 2010) (Steinbuck and Blencowe, 2011), during which every watercourse crossing on the property was GPS located, described and mitigation measures recommended as necessary. Sites have been methodically repaired through THP ECP's and limited grant funding. . Any changes or repairs made to a watercourse crossing and the year they were made are noted in the GIS database. A complete inventory of all road watercourse crossings exists in the GIS database. The data is used to detail annual or cumulative sediment reduction activities on the forests as well as provide information for future THP/ECP's. Since acquiring the property in 2007, the Fund has upgraded 374 of a total of 610 identified sites or 60% of actionable sites (an additional 110 sites were identified where no mitigation was recommended). Concurrently 96 miles of road have been upgraded of the 176 total miles of mapped road. (See Appendix C Road Projects Inventory)

4.3 Riparian Habitat Protection and Restoration Measures

4.3.1 Riparian Habitat Protection

The California FPR and other requirements of the NCRWQCB and CDF&W provide extensive and complex protections for watercourses. By most estimations, in combination 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 past five 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 BRF.

Improvement of spawning and migration habitat for salmonid species is a key management goal for the Fund and one of the principal motivations for acquiring the forests. Prohibiting development and agricultural uses on the property will preclude large-scale impacts on water quality. Comprehensive forest-wide road assessments have been completed to identify and prioritize sites with sediment delivery potential. In addition, the following practices (discussed previously in Section 4.1.4) also will be implemented to improve water quality:

1. Upslope silviculture. Implementing the silvicultural and forest management measures described above are expected to reduce the potential hydrologic impacts often associated with 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/).
2. Commitment to improving the road infrastructure through the timber harvest planning process including upgrading stream crossings, stabilizing the road running surface, and hydrologically disconnecting the roads from the streams.

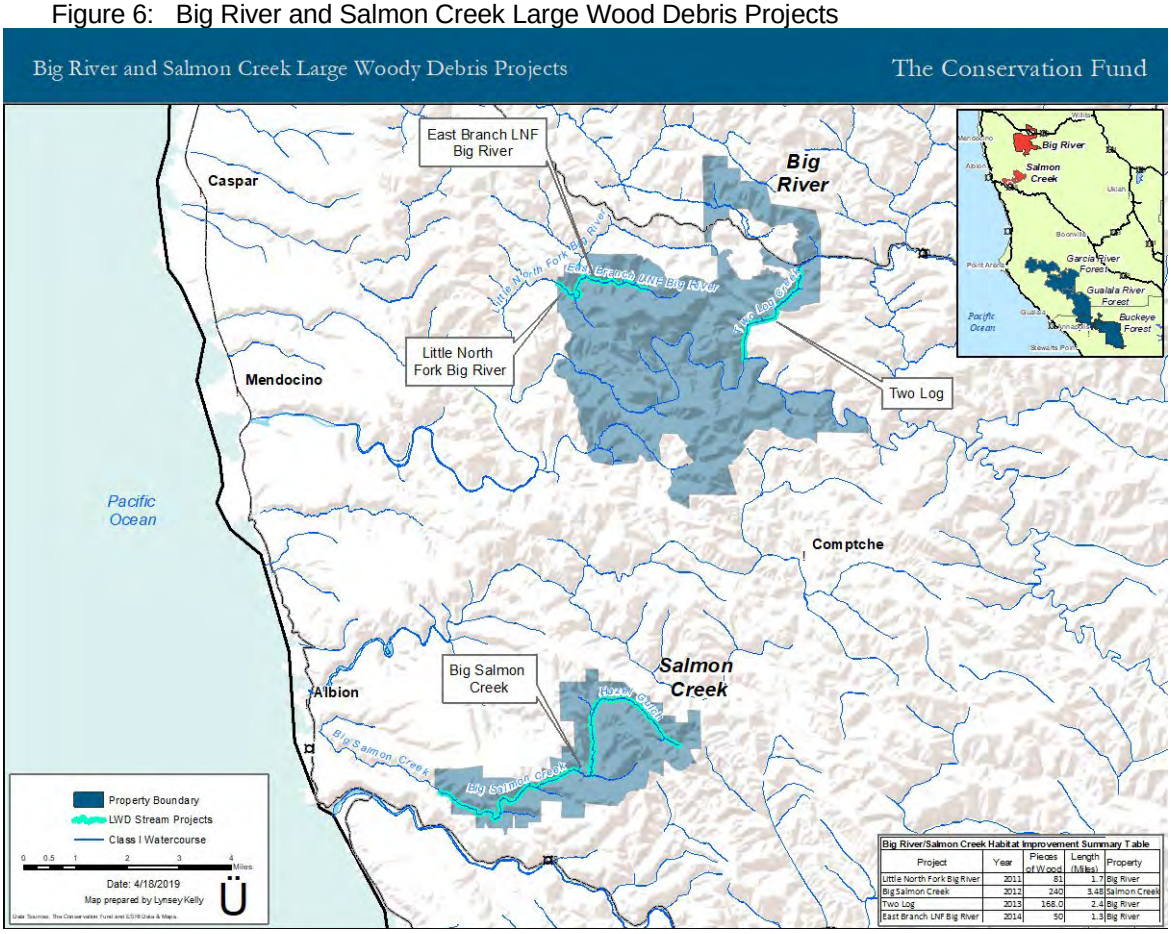
4.3.2 Aquatic Habitat Restoration

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. Also, the removal of LWD both via log 'drives' during splash-dam operations which occurred in the watershed for about 50 years and a process called 'stream fording' that was conducted to remove logging debris (left behind after splash damming) to provide access for salmonid migrations. .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 CDF&W.

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 has and will continue to occur in the form of Large Woody Debris projects. The addition of LWD enhances spawning and rearing habitats by providing cover and refuge from peak winter flows, increasing pool complexity, depth and frequency, and sorting and collecting spawning gravels, all of which will increase the quality and quantity of rearing habitat within the project reach. To date the Fund has added 299 pieces of LWD to three Class I streams (Little North Fork, East Branch Little North Fork, Two Log Creek) on BR, totaling 5.4 miles. Figure 6 below shows the location of these LWD projects.

Gravel extraction can be beneficial in some systems with high levels of gravel aggradation because it can promote gravel movement and pool development. However, because of the potential technical and regulatory challenges, instream gravel removal is likely to be a low priority.

Figure 6: Big River and Salmon Creek Large Wood Debris Projects



4.3.3 Aquatic Habitat Restoration Monitoring

Stream habitat monitoring is a long term project because natural changes in habitat occur slowly as riparian canopy matures and stream banks stabilize, thus a 10-15 year monitoring interval may not reveal any significant habitat changes. Because of the slow response time for stream recovery, measuring stream habitat more than once every 10 years is generally not recommended. As such streams are not routinely inventoried and we rely on our Best Management Practices to initiate and maintain positive changes to our stream environment.

The Fund expects positive changes from the road and riparian protection practices mentioned in the previous sections. Instream stored sediment is slow to respond; however, the addition of LWD aids significantly in sorting gravels, creating pools and providing cover therefore habitat changes as a result of instream habitat manipulation through the addition of large wood can be detected more easily.

Habitat improvements resulting from the addition of large wood are monitored using stream habitat data derived from the habitat sampling methodology found in the California Salmonid Stream Habitat Restoration Manual (Flosi et al., 2010) currently in use by CDF&W.CDF&W. Three Class I stream restoration projects--on Little North Fork, East Branch Little North Fork and Two Log Creek--have had pre and post project habitat assessment surveys as part the grants funded by CDF&W's Fisheries Restoration Grant Program to assess the effectiveness of the projects.

The Fund also maintains a network of instream temperature monitoring with remote water and air temperature sensing probes (HOBO Data Loggers) that were initially installed by Hawthorn Timber Co. prior to our ownership, providing a 15+ yearlong temperature data set. The five probes are located on Mainstem Big River (upstream and downstream of property line), Two Log Creek (upper and lower) and Little North Fork Big River.

Additionally, the Fund will seek to expand on the CDF&W spawner survey reaches as the program develops.

4.4 Invasive Weed Management

Many of the more conspicuous exotics are associated with the roads that traverse the forests and represent disturbed habitat. Two species, pampas/jubata grass (*Cortaderia jubata*) and French Broom (*Genista monspessulana*) are on the California Invasive Plant Council (Cal-IPC) List A-1 (Most Invasive Wildland Pest Plants: Widespread) and have been observed along the forest roadways. These species, once established, have the most potential to displace native species. 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. 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. Mendocino County conducts an eradication program for distaff thistle removal.

The Fund may employ chemical and mechanical control techniques to slow and possibly reverse the spread of invasive species. 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 reinvading a site once the initial treatment has occurred.

Addressing the invasives promptly is a high priority; 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.

4.4.1 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 primarily in the context of timber harvest planning. Additional evaluation

projects will monitor the effectiveness of treatment efforts by long-term survivorship of individual populations. In THP-related botanical surveys, 158 invasive plants on Big River Forest were identified and prioritized (Heise, 2018).

4.5 Role of Forests and the Atmosphere

A rapidly growing forest can sequester and store a remarkable amount of carbon dioxide, a greenhouse gas and the driver of global climate change. As a result, how forests are managed influences our atmosphere. 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 forests can play a role in reducing net greenhouse gas emissions. As a conserved working forest, the BRF can have a positive climatic 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.

4.5.1 California Air Resources Board

The Forest is registered as an offset project meeting the requirements of Sub article 13 of Title 17, California Code of Regulations ("**CCR**"), sections 95801-96022 dated April 1, 2019 (the "**Regulation**"). The Regulation requires a verifiable field inventory system that generates statistically reliable estimates of carbon within the forest (including living trees, snags and below-ground carbon in trees). General information on the CARB Forest Project Protocol can be found at https://www.arb.ca.gov/cc/capandtrade/offsets/offsets.htm. Specific project details are available at https://www.climateactionreserve.org.

4.5.2 Preparing for Likely Climate Change

Planning for the future of the forests 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). However, there will be significant changes in species' ranges (some expanding, some contracting, for both plants and animals).

While details of the future climate cannot be known with certainty, the general indication is summers will get hotter and winter storms will likely increase in severity. Some practical conclusions can be drawn relative to management of the forest in anticipation of climate change:

- 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 forests. 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 forests, therefore, should continue to be focused on maintaining shade to retain soil moisture through the use of uneven-age management, maintain mixed species stands that are well stocked and retain wildlife habitat features.

- Invasive species may 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.

- An expected increase in the severity of winter storms only increases the importance of storm-proofing the road system, an effort already well underway.

- If severity of winter storms increases, and/or fewer storms come in more concentrated rainfall events, providing winter-time flow refuge habitat for juvenile salmonids will become more important. Adding LWD is one important way to reconnect stream channels to their floodplains and provide flow refuge habitat.

- 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.

Photo by Rixanne Wehren

5 Community Use and Involvement

The Fund will provide opportunities for community use and involvement consistent with the protection of natural resources, long-term restoration and enhancement, and active forest management.

To foster community involvement and support, the Fund provides guided tours of areas intended for timber harvests, road improvement and restoration projects. These programs familiarize the public with sustainable management methods and goals and build community partnerships.

5.1 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. The Fund 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.

5.2 Recreational Access Activities and Policies

5.2.1 Recreational Uses

Permission for additional recreational activities may be expanded on a case-by-case basis. Currently walking, mountain biking, swimming and fishing are allowed activities on the forests, and access can be gained by acquiring an entry permit from the Fund. Evaluations of requests will be based on safety, potential resource damage, community benefit and administrative impact.

5.2.2 Unauthorized Activities

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

5.3 Outreach Activities

The Fund will provide guided tours of timber harvest areas, road improvements and restoration projects. 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 forests 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 forests.

List of Acronyms and Abbreviations

ARBOC
Air Resources Board Offset Credit

Basin Plan
Water Quality Control Plan for the North Coast Region

BMP
Best Management Practice

BRF
Big River Forest

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

CARB
California Air Resources Board

CCR
California Code of Regulations

CDF&W
California Department of Fish and Wildlife

CE
conservation easement

CEQA
California Environmental Quality Act

CESA
California Endangered Species Act

CFI
Continuous Forest Inventory

CHRIS
California Historic Resources Information System

CMZ
channel migration zone

CNDDB
California Natural Diversity Database

CNPS
California Native Plant Society

CWA
Clean Water Act

DBH
diameter at breast height

DO
dissolved oxygen

HER
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

MBF
million board feet

MRC
Mendocino Redwood Company

MWAT
Maximum Weekly Average Temperature

MWMT
Maximum Weekly Maximum 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
SCAPOSD
Sonoma County Agricultural Preservation and Open Space District
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
SISRFEUP
Strategy for Implementing State Revolving Fund for Expanding Use Project
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

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" x 12" x 12")

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: Water Quality Control Plan for the North Coast Region

BLUE LINE STREAM: 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 seasonally or perennially

CLASS II STREAM: watercourse providing aquatic habitat for nonfish species

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

COBBLE: stream substrate particles measuring 2.5-10” (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 THE FUND and a qualified conservation organization that restricts usage rights of the property, such as real estate development and commercial and industrial uses

CORD: measure of fuel-wood volume (a stacked cord occupies 128 cubic feet [4' x 4' x 8'] 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 CDF&W to model the interactions between wildlife species and their habitats

DBH: diameter at breast height, tree diameter in inches, measured outside bark 4.5' 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

DO: Dissolved Oxygen, 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” (6 mm)

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

GIS: Geographic Information System, 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" (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: nonconifer trees (e.g. tanoak, madrone, live oak, black and white oaks)

HERBACEOUS: nonwoody 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 premerchantable 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: seasonal stream in contact with the groundwater table that flows only at certain times of the year when the groundwater 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

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

LWD: Large Woody Debris, large piece of relatively stable woody material having a diameter greater than 12" (30 cm) and a length greater than 6' (2 m) that intrudes into the stream channel. Large organic debris

MAI: Mean Annual Increment, 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

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

MELANGE: 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

PLUGS: seedling stock grown in plastic foam nursery containers

POLES: trees 4-11" DBH
PRECOMMERCIAL THINNING: cutting in a premerchantable 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: shallow area extending across a streambed over which water rushes quickly and is broken into waves by obstructions under the water

RILL: erosion channel that typically forms where rainfall and surface runoff is concentrated on slopes. If the channel is larger than 1 square foot, 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: 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 2.5-10” (64-256 mm) 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 streambed by flowing water, 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: series of relatively transitory plant communities that develop during ecological succession from bare ground to the climax stage

SILVICULTURE: care and cultivation of forest trees; forestry

SITE CLASS, SITE INDEX: 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 that shows the number of trees of each diameter class per acre STAND: tree community sharing characteristics that can be silviculturally managed as a unit

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

STREAM CORRIDOR: 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: a method of harvesting or using a resource so that it is not depleted or permanently damaged

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 amount of sediment filling a stream pool with deposits such as silt, sand and gravel compared with the total volume of water and sediment

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 or basin)

WATERSHEDS WITH THREATENED OR IMPAIRED VALUES: any planning watershed where populations of anadromous salmonids that are listed as threatened, endangered, or candidates 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 noninundated areas

WHITE WOODS: grand fir and hemlock

WORKING FOREST: forest managed for or including timber production
YARDER: logging machine that uses a suspended cable to lift logs

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