



April 2019  
Greater Prairie Creek Ecosystem Restoration Project

---

# Draft Initial Study/Negative Declaration and Environmental Assessment

Prepared for Redwoods Rising

**REDWOODS  
RISING™**



# Initial Study/Negative Declaration and Environmental Assessment

**Project:** Greater Prairie Creek Ecosystem Restoration Project

**Lead Agencies:** California Department of Parks and Recreation (CDPR; California Environmental Quality Act [CEQA] lead) and National Park Service (NPS; National Environmental Policy Act [NEPA] lead)

**Project Description:** CDPR and NPS are proposing to complete forest and aquatic restoration and road removal activities over 9,200 acres within the Greater Prairie Creek watersheds (the Proposed Action). Restoration activities would occur in phases over time. Forest restoration would entail forest thinning to reduce stand density and enhance forest health using two operational methods: lop and scatter and biomass removal. Proposed aquatic restoration would include placement of large wood in streams, riparian planting, and enhancement of existing riparian stands. The Proposed Action would include the removal of logging roads and related road infrastructure that threaten aquatic resources through the recontouring of these disturbed areas to pre-logging conditions. Some roads would be retained for administrative purposes and maintained. Proposed Action implementation is anticipated to commence in late 2019.

**Impact Summary:** The Proposed Action would result in either less-than-significant or no impacts on the environment. Less-than-significant impacts would be temporary in duration. The Proposed Action is anticipated to result in long-term benefits to aesthetics, biological resources, greenhouse gas emissions, hydrology and water quality, and reduced wildfire risk in the project area.

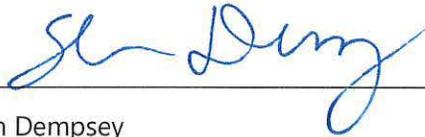
**Availability of Documents:** This joint Initial Study/Negative Declaration and Environmental Assessment (ISND/EA) is available for review at <http://parkplanning.nps.gov/GPC>, [https://www.parks.ca.gov/?page\\_id=980](https://www.parks.ca.gov/?page_id=980), and at the following locations:

- Arcata Library, 500 7th Street, Arcata, California 95521
- California Department of Parks and Recreation, North Coast Redwoods District, 3431 Fort Avenue, Eureka, California 95503
- California Department of Parks and Recreation, Northern Service Center, One Capitol Mall, Suite 410, Sacramento, California 95814
- Del Norte County Library, 190 Prince Mall, Crescent City, California 95531
- Humboldt County Library, 1313 3rd Street, Eureka, California 95501
- Humboldt State University Library, 1 Harpst Street, Arcata, California 95521
- McKinleyville Library, 1606 Pickett Road, McKinleyville, California 95519
- National Park Service, South Operations Center, 121200 U.S. Highway 101, Orick, California 95555
- Redwood National and State Parks, 1111 Second Street, Crescent City, California 95531
- Thomas H. Kuchel Visitor Center, US-101 and Redwood Highway, Orick, California 95555

**Public Comments:** Questions or comments regarding this document should be addressed to both CDPR and NPS at the following addresses:

- California Department of Parks and Recreation, Fort Humboldt, ATTN: Shannon Dempsey, P.O. Box 2006, Eureka, California 95502
- National Park Service, South Operations Center, ATTN: Leonel Arguello, P.O. Box 7, Orick, California 95555.

**Findings:** A copy of the IS is incorporated into this document. CDPR and NPS have independently reviewed and analyzed this ISND/EA for the Proposed Action and finds that the document reflects the independent judgement of CDPR and NPS. As the CEQA and NEPA lead agencies, respectively, these agencies confirm that the standard project requirements/project-specific requirements detailed in this document are feasible and will be implemented as stated in the ISND/EA.



4-4-2019

---

Shannon Dempsey  
California Department of Parks and Recreation  
District Environmental Coordinator

Date

# TABLE OF CONTENTS

Initial Study/Negative Declaration and Environmental Assessment .....	i
Table of Contents .....	iii
<b>1 Introduction .....</b>	<b>1</b>
1.1 Regulatory Guidance .....	1
1.2 Lead Agencies.....	2
1.3 Project Location.....	2
1.4 Project Background.....	2
1.5 Purpose and Need for Action.....	3
1.6 Relevant Policies and Plans .....	3
1.7 Public Involvement .....	4
<b>2 Alternatives.....</b>	<b>4</b>
2.1 No Action Alternative .....	4
2.2 Proposed Action .....	5
<b>3 Affected Environment and Environmental Consequences.....</b>	<b>13</b>
3.1 Introduction.....	13
3.2 Environmental Checklist .....	16
3.3 Aesthetics .....	18
3.4 Agriculture and Forestry Resources .....	20
3.5 Air Quality .....	22
3.6 Biological Resources .....	25
3.7 Cultural Resources .....	40
3.8 Tribal Cultural Resources.....	46
3.9 Geology and Soils .....	48
3.10 Greenhouse Gas Emissions.....	53
3.11 Hazards and Hazardous Materials.....	55
3.12 Hydrology and Water Quality .....	57
3.13 Land Use and Planning .....	62
3.14 Noise .....	63
3.15 Recreation .....	65
3.16 Socioeconomics.....	66
3.17 Transportation.....	67
3.18 Wildfire.....	69
3.19 Mandatory Findings of Significance .....	72

## APPENDICES

Appendix A	Abbreviations
Appendix B	Glossary
Appendix C	Tables
Appendix D	Figures
Appendix E	Agency Consultations and Required Approvals
Appendix F	Alternatives Considered but Eliminated
Appendix G	Photographs
Appendix H	Special-Status Species Tables
Appendix I	List of Preparers
Appendix J	References

# 1 Introduction

The Greater Prairie Creek (GPC) Ecosystem Restoration Project (hereafter referred to as the Proposed Action) is being proposed by Redwood National and State Parks (RNSP), consisting of the California Department of Parks and Recreation (CDPR) and National Park Service (NPS). Redwoods Rising is a partnership among CDPR, NPS, and the Save the Redwoods League (League). This partnership builds upon decades of efforts to protect and improve the health of the redwood forest ecosystems, and offers a unified approach to expand and connect the precious remaining 40,000 acres of old-growth trees and accelerate the recovery of previously logged stands, setting them on the path to once again becoming old-growth forests. It coordinates and integrates existing efforts to restore stream health and critical wildlife habitat and create landscapes that will be resilient in the face of future change. It works in tandem with essential collaborators and brings additional financial support to bear on a shared restoration for RNSP. Redwoods Rising brings together the existing RNSP partnership and the League to more strategically and holistically address restoration needs. It serves to formalize the existing relationships among these organizations and further leverage the strengths of each partner to more efficiently and effectively restore and protect RNSP's redwood forest ecosystems. A separate environmental compliance document is being prepared for the Greater Mill Creek Ecosystem Restoration Project, which is also being proposed.

This document is organized to present introductory information on the Proposed Action (Section 1), alternatives evaluated (Section 2), and affected environment and environmental consequences (Section 3). It also contains numerous appendices, some of which have global reference throughout the document, including abbreviations (Appendix A), glossary (Appendix B), tables (Appendix C), figures (Appendix D), agency consultations and required approvals (Appendix E), alternatives considered but eliminated (Appendix F), photographs (Appendix G), special-status species tables (Appendix H), document preparers (Appendix I), and references (Appendix J).

## 1.1 Regulatory Guidance

This Initial Study (IS)/Negative Declaration (ND) and Environmental Assessment (EA) has been jointly prepared by CDPR and NPS to evaluate the potential environmental effects of the Proposed Action within RNSP in Humboldt County, California. This document has been prepared to meet the requirements of the California Environmental Quality Act (CEQA; Public Resources Code [PRC] Section 21000 et seq.), the State CEQA Guidelines (California Code of Regulations [CCR] Section 15000 et seq.), and the National Environmental Policy Act (NEPA; 42 United States Code [USC] 4321 et seq.).

Under CEQA, an IS is conducted by a lead agency to determine whether a project may have a significant effect on the environment (CEQA Guidelines Section 15063[a]). If there is substantial evidence that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) must be prepared in accordance with CEQA Guidelines Section 15064(a). However, if the lead agency determines that there is no substantial evidence that the project plans or any of its aspects may cause a significant effect on the environment, a Negative Declaration (ND) may be prepared. In this case, the lead agency prepares a written statement describing the reasons a proposed project would not have a significant effect on the environment and, therefore, why an EIR need not be prepared.

Similarly, under NEPA, an Environmental Assessment (EA) is prepared to determine whether a federal action has the potential to cause significant environmental effects. If the lead agency determines that the action would not have significant environmental impacts, the agency issues a Finding of No Significant Impact (FONSI). A FONSI presents the reasons why the agency has concluded that there are no significant environmental impacts projected to occur upon implementation of the action. If the EA determines that the environmental impacts of a proposed federal action would be significant, an Environmental Impact Statement (EIS) is prepared.

## **1.2 Lead Agencies**

The CEQA lead agency is the public (state or local) agency with primary approval authority over the Proposed Action. In accordance with CEQA Guidelines Section 15051(b) (1), "the lead agency will normally be an agency with general governmental powers, such as a city or county, rather than an agency with a single or limited purpose." The NEPA lead agency is the federal agency with primary responsibility for NEPA compliance and is generally the federal agency with greatest responsibility for approving or denying approval of the Proposed Action. For the Proposed Action, CDPR is the CEQA lead agency and NPS is the NEPA lead agency.

## **1.3 Project Location**

The Proposed Action is located primarily in the lower portions of the Prairie Creek watershed within RNSP (Figure 1). The approximately 10,300-acre project area includes 9,200 acres that would be restored and 1,100 acres of existing old-growth stands, and incorporates the following subbasins: Skunk Cabbage Creek, Berry Glen, Little Lost Man Creek, Streelow Creek, May Creek, Boyes Creek, and a portion of Redwood Creek along Bald Hills Road. This area also includes the Gold Bluffs watersheds from Home Creek in the north to Major Creek in the south.

## **1.4 Project Background**

Redwood National Park was established by Congress in 1968 to "preserve significant examples of the coastal redwood forests and the streams and seashores with which they are associated for purposes of public inspiration, enjoyment, and scientific study" (Public Law 90-545). Most of the project area was extensively logged from the 1930s until the expansion of Redwood National Park in 1978 (NPS 2008, 2014). These stands have been unmanaged since the 1970s and consist of unnaturally dense forests where growth is hindered, species composition has shifted, and biodiversity is low. Unmaintained logging roads, skid trails, and stream crossings have eroded since construction, leading to fill material entering nearby stream channels and stream crossing subsidence. These historical uses have degraded aquatic habitat, and the mainstem of lower Prairie Creek is without large pieces of wood needed for fish habitat.

The project area is a high priority for restoration because of its location in context with the surrounding landscape. To the north and south lie two of the largest remaining redwood old-growth forests, and addressing issues related to forest structure, species composition, and understory stand development in the planning area would accelerate the connectivity of habitat between these two large old-growth redwood forests. Restoration would shorten the time for the development of habitat conditions in the project area that would benefit threatened and endangered species that use old-growth forests.

NPS implemented large-scale thinning treatments in the South and Middle Forks of Lost Man Creek from 2009 to 2011 and 2015 to the present, respectively (NPS 2008, 2014). With the Proposed Action, C DPR and NPS propose to continue restoration efforts in the GPC watershed through a combination of forest and aquatic restoration and road removal activities.

## 1.5 Purpose and Need for Action

The purpose of the project is rehabilitation of the GPC watershed and restoration of ecosystem processes that have been degraded by historical land use. Rehabilitation would be accomplished through thinning second growth forests to reduce stand density and alter species composition to promote growth of remaining trees, understory vegetation, and development of multi-story canopy; removing or maintaining roads to reduce the potential for erosion and sedimentation into streams; restoring in-stream habitat complexity; and augmenting riparian corridors by planting native vegetation. These actions are needed to accelerate development of forest characteristics more typical of late-seral forests, prevent chronic and catastrophic sediment inputs to creeks, and enhance habitat for populations of aquatic and terrestrial species.

C DPR and NPS have identified the following project objectives:

- **Forest restoration objectives:** reestablish old-growth connectivity in the GPC watershed; enhance structural complexity of the forest; encourage the development of the forest understory; establish multi-aged stands; recover desired composition of overstory tree species; and increase resilience to environmental stressors (e.g., disease/pathogens and drought)
- **Aquatic restoration objectives:** increase in-channel complexity; maintain habitat values, ecological health, and function while long-term recovery occurs; and reestablish riparian function
- **Road removal objectives:** reduce erosion and sediment delivery from existing infrastructure into streams; and reestablish natural stream morphology, hydrology, stream function, and fish passage

## 1.6 Relevant Policies and Plans

There is a history of legislation applicable to management of second-growth forests in the project area. Early efforts of the League and other conservationists led to the founding of Prairie Creek Redwoods State Park, Del Norte Coast Redwoods State Park, and Jedediah Smith Redwoods State Park in the 1920s, and Redwood National Park was established in 1968 and expanded in 1978. Legislation that established Redwood National Park directed NPS to minimize human-induced impacts to terrestrial and aquatic resources within the park (Public Law 90-245 Section 3[e]). The 1978 expansion legislation authorized NPS to implement a program of watershed rehabilitation within and upstream of the park and directed NPS to develop a comprehensive general management plan (GMP) with objectives, goals, and proposed actions designed to assure the preservation and perpetuation of a natural redwood forest ecosystem (Public Law 95-250 Section 104[b][1]). The 1980 GMP described initial research being conducted to characterize succession on cutover forestlands, with a goal of reestablishing a more nearly natural vegetation pattern on the disturbed lands. In 2005, the Department of the Interior published a final rule (48 Code of Federal Regulations [CFR] 1437 and 1452) under the authority found in the NPS Organic Act (16 USC 1) outlining procedures to allow service contractors the option to remove woody biomass by-products generated as a result of

NPS land management activities whenever ecologically appropriate. Ecological benefits of removing woody biomass include improved forest health, wildlife habitat, and watershed protection.

RNSP is comprised of four park units: Redwood National Park, Jedediah Smith Redwoods State Park, Del Norte Coast Redwoods State Park, and Prairie Creek Redwoods State Park. NPS and CDPR jointly manage RNSP under a cooperative management agreement first signed in 1994. This agreement was designed to streamline management of the parks by allowing staff, funds, and resources to be shared and used by both agencies. The agencies worked together to prepare the *RNSP 1999 Final General Management Plan/General Plan, Environmental Impact Statement/Environmental Impact Report*, a joint GMP/General Plan (GP) accompanied by a Final EIS/EIR, in 1999/2000 to guide joint management of the parks for 15 to 20 years (NPS/CDPR 1999). The GPC Ecosystem Restoration Project ISND/EA is consistent with that document, which directed that forest restoration activities in the parks emphasize use of silvicultural methods in second-growth forests to re-attain old-growth characteristics in the shortest time possible, and that watershed restoration activities in the parks emphasize partial landform restoration, with complete removal of all major logging roads and limited removal of the minor roads that pose the greatest threat to park resources.

## 1.7 Public Involvement

Public scoping for the Proposed Action was conducted from June 26 through August 6, 2018. To initiate the public scoping process, CDPR and NPS sent a brochure describing the planning process, purpose and need, alternatives under consideration, and general description of the Proposed Action to 78 recipients, including individuals, agencies, and organizations. The brochure was also emailed to 59 addresses. During the public scoping period, two public scoping meetings were held: the first was held at the Arcata, California office of the U.S. Fish and Wildlife Service, on July 17, 2018, and the second was held at the NPS North Operations Center in Crescent City, California on July 18, 2018. Both meetings presented information about the purpose, need, and objectives of the project in an open-house format. Members of the public were able to submit comments by mail, in person at the meetings, or electronically at the NPS Planning, Environment, and Public Comment website (<http://parkplanning.nps.gov/GPC>).

Comments were received from a total of 16 individuals, agencies, and organizations through the public scoping process. Comments primarily related to the following: voicing support for the Proposed Action; suggesting the addition of out-of-scope elements to the Proposed Action; and suggesting that NPS and CDPR coordinate and consult with organizations, tribes, and companies as part of the Proposed Action.

## 2 Alternatives

No alternatives besides the No Action Alternative and Proposed Action were identified that would meet the purpose and need of and have meaningful differences in environmental effects from the Proposed Action.

### 2.1 No Action Alternative

The No Action Alternative is required under NPS guidelines for compliance with NEPA and is used to compare existing conditions with the other evaluated alternatives. "No Action" means either a continuation of existing management practices or "no project." In this case, "No Action" means that, in the project area, CDPR and NPS would not undertake large-scale forest thinning to accelerate the

development of old-growth characteristics, in-stream habitat and riparian corridors would not be restored or reestablished, and road removal would not occur. Within the project area, existing unnatural overstocked forest conditions would persist, existing abandoned logging roads would remain, and fill material would remain in streams. In other areas of the park, ecosystem restoration projects could occur on a project-by-project basis, as has been the case in the South and Middle Forks of Lost Man Creek. Regular monitoring and maintenance activities would continue as they historically have throughout the project area.

## **2.2 Proposed Action**

Under the Proposed Action, forest and aquatic restoration and road removal would occur throughout the approximately 10,300-acre project area over the course of approximately 10 to 15 years in three phases. The following sections provide further detail on these activities.

### **2.2.1 Forest Restoration**

The Proposed Action includes forest restoration throughout the project area, as shown in Figure 2. A forest restoration treatment includes a thinning method and an operational method. These treatments, and how they would be applied under the Proposed Action, are described in the following subsections.

#### **2.2.1.1 Thinning Methods**

Thinning method refers to any silvicultural treatment intended to reduce stand density, redistribute growth among the remaining trees, and enhance forest health. The primary thinning method that would be used under the Proposed Action is variable density thinning (VDT), which focuses on the enhancement of spatial heterogeneity (i.e., uneven variation of tree spatial pattern over areas and time) across the landscape by prescribing fine-scale variation to the forest structure. VDT can take many forms, and in the case of the Proposed Action may incorporate a mixture of silvicultural treatments, including the following:

- Low thinning (thinning from below) focuses on the removal of trees from the lower crown classes (i.e., suppressed, intermediate, and co-dominant crown classes) to benefit trees in the upper crown classes (i.e., co-dominant and dominant crown classes), and generally removes the smallest diameter trees. If this method is employed, trees in the lowest-diameter class (generally less than 24 inches diameter at breast height [DBH]) would be removed first, with successively larger trees removed until the desired basal area retention is met.
- Crown thinning focuses on the removal of trees from the dominant or co-dominant crown classes to benefit adjacent trees of the same crown class. While diameter class ranges vary from stand to stand, most trees cut would be in the middle-diameter class (8 to 30 inches DBH) as opposed to the smaller-diameter class cut in the low thinning method.
- Gaps (areas with few trees and up to 0.5 acre in size) that mimic natural disturbance may be used to establish and maintain a new cohort of trees, encourage a robust assemblage of understory vegetation, and promote landscape-scale heterogeneity. If this method is employed, all trees larger than 30 inches DBH would be retained in gaps (an average of 10 per acre), and no more than 10% of the area within in any unit would be treated with forest gaps.
- Skips refer to areas where few to no trees would be cut. Skips may be established at the same size and frequency as gaps to further increase stand heterogeneity.

- Conifer release removes competition from around individual trees or small groups of trees that are retained. For example, every tree that falls within the drip line of a retention tree or retention group would be cut. This method may be implemented in hardwood-dominated stands to release conifers.

Under the Proposed Action, forest thinning treatments would vary in intensity to encourage heterogeneity throughout the project area. Regardless of thinning method, no tree larger than 30 inches DBH would be cut, except for the removal of non-native species (e.g., hybrid Monterey pine). Different thinning methods would be identified in the field based on site-specific conditions to further promote landscape-scale heterogeneity. The thinning method would vary according to current conditions and landscape context, per the following treatment considerations:

- In some areas, previous logging activities have altered the species composition (e.g., redwood is underrepresented, excessive alder in-growth, inland Sitka spruce). Thinning treatments would aim to shift species composition, which can result in patchy thinning intensities and removal of undesired tree species (e.g., exotic and overrepresented tree species).
- While there is no upper limit to implementing forest thinning operations on steep slopes, the thinning intensity may be reduced to maintain slope stability.
- Existing snags would be retained, and following forest thinning operations, additional snags may be created by girdling selected trees.

Table 1 summarizes existing and post-treatment stand characteristics for trees larger than 4.5 inches DBH within the project area. When averaging across an entire forest inventory unit,<sup>1</sup> treatments would not exceed a 50% reduction in the basal area, and the basal area (the sum of cross-sectional areas of tree trunks at breast height for a given area) would be reduced by 40% or less in most locations. All treatments would generally retain more than 100 trees per acre and the Quadratic Mean Diameter (QMD, the diameter at breast height corresponding to the tree of arithmetic mean basal area on a given plot of land) would increase following treatment.

### 2.2.1.2 Operational Methods

Operational method refers to the method by which trees are felled (mechanized heavy equipment or manually with chainsaws) and how woody material is treated and/or removed from the treatment area. As shown in Figure 2, two types of operational methods would be used as part of the Proposed Action. Relevant photographs are provided in Appendix F.

#### 2.2.1.2.1 Biomass Removal

Biomass removal refers to removing trees from treatment units to minimize fuel accumulation and encourage understory development. It may also offset the costs of operations. No wood would be removed from the project area until consideration is given to its usefulness for other park restoration projects defined in this ISND/EA, such as aquatic restoration or as on-site coarse large wood. Excess biomass that is not removed from the site would be lopped and scattered on site. The following types of biomass removal operations would be used as part of the Proposed Action:

- **Ground-Based Yarding.** Ground-based yarding refers to the use of ground-based mechanized equipment (e.g., a tractor, feller-buncher, rubber-tired skidder, or shovel harvester/processor) to fell trees and/or skid logs or whole trees from the stump area to the

---

<sup>1</sup> "Forest inventory units" correspond to watershed-based forested units delineated by similar vegetation type, age, physical attributes, or management history.

landing or roadside area. At the landing, a processor would limb and buck the material into lengths appropriate for hauling. Loaders would be used to load log trucks, which would transport the logs to a mill or cogeneration power plant. Tree removal using ground-based operations would be restricted to areas with slopes less than 40%.

- **Skyline Yarding.** Skyline yarding refers to the use of a stationary cable yarding machine (an overhead system of winch-driven cables), to pull logs or whole trees from the stump area to the landing or roadside area. All trees would be felled and processed (cut to log length and limbed) using chainsaws prior to skyline yarding. Trees to be removed would be skyline yarded to a landing, skid trail, or road using a cable yarder or yoader. A slack-pulling carriage would be used to skid felled trees to the main cable yarding pathway or corridor. Tree removal from skyline operations would be restricted to areas with slopes greater than 40%.
- **Tethered Harvesting Systems.** These systems, such as cut-to-length, are a variation on traditional ground-based operations. In tethered systems, a winch is mounted to the back of a harvester or a forwarder and secures the equipment to an anchor point. This allows that piece of equipment to lower itself down or climb up steep slopes. These types of systems differ from other ground-based operational methods in that the harvester fells, processes, and bucks the trees at the stump. Tree limbs and tops are placed in front of the harvester and are driven over as the machine moves ahead, minimizing ground disturbance. The forwarder follows in the harvester's trail, loads the cut logs into log bunks on the machine, and transports the logs to the landing area. Tethered systems could be used on slopes up to 85%. This would be implemented on a small scale before applying to other applicable portions of the project area.

#### 2.2.1.2.2 *Lop-and-scatter Operations*

Lop-and-scatter refers to an operational method where felled trees are cut (i.e., lopped) and broadcast (i.e., scattered) throughout the treatment area for natural decomposition. No felled trees would be removed. These would be areas where the equipment necessary to remove biomass cannot access the stand because of steep slopes, special management zones, or because the area lacks existing haul roads. Lop-and-scatter is a default option across the entire project area; if it is determined that biomass removal is not feasible in an area, the operational method would switch to lop-and-scatter. If biomass removal operations cannot be implemented (e.g., road access is no longer available, or no contractor bids are submitted) then those areas would be treated with lop-and-scatter operations using the prescribed silvicultural method and thinning intensity.

Table 2 presents the proposed operational methods to be implemented throughout the project area as part of the Proposed Action.

#### 2.2.2 *Roads and Road Removal*

Roads within the project area have been inventoried and categorized based on landscape position, including inner gorge, mid-slope, and ridge (Figure 3). Inner gorge and mid-slope roads are the highest priority for removal. Road activities to be implemented under the Proposed Action would involve the following stages:

1. Prior to forest and aquatic restoration activities, targeted logging roads would be reoccupied for access to forest restoration. Stream crossing structures that restrict streamflow and fish passage would be replaced with correctly sized temporary stream crossing structures to provide access

to forest restoration sites. During forest and aquatic restoration activities, access roads would be maintained and winterized during and between field seasons.

2. Upon completing forest and aquatic restoration activities, all haul roads and stream crossings, not identified as administrative roads, would be removed. Skid roads would be treated for partial landform restoration (see Section 2.2.2.2 for more detail) in high-risk areas. Low-risk haul and skid roads (e.g., stable ridgetop roads without erosion issues) would be treated for long-term abandonment.

### **2.2.2.1 Road and Stream Crossing Reoccupation**

Throughout the project area, many abandoned and long-unmaintained haul roads, skid trails, and landings require maintenance to provide access for forest and aquatic restoration activities. Prior to maintenance, slopes, soils, mass wasting potential, and natural drainages would be evaluated to minimize detrimental effects of road reoccupation. This preparation work would be guided by forest restoration planning and treatment area selection. After the evaluation phase, road and stream crossing maintenance would occur as follows:

- Undersized culverts and failing stream crossings would be replaced with new culverts or temporary bridges. Temporary stream crossings and bridges would be sized to pass the 100-year recurrence interval discharge during the seasons they remain in place and would be capable of holding highway loads.
- Structures, such as rolling dips, may also be installed to limit concentration of runoff and erosion on roads used during restoration activities. Vegetation would be removed and roads would be maintained to provide proper drainage in these areas.

The Geneva Pit in the northeastern corner of the Berry Glen unit is an old outcrop that was used as a source of rock prior to RNSP. Approximately 3,000 tons of rock have fallen within the pit. This rock could be used for rocking roads in the Berry Glen unit during Phase 1. The pit could also be used as a disposal site for exported fill material, if needed in future phases of work.

### **2.2.2.2 Road and Stream Crossing Removal**

After forest thinning and aquatic restoration activities are complete, road and stream crossing removal would occur. Roads are the biggest threat to aquatic resources within the park (NPS/CDPR 1999). Road removal is described as partial landform restoration and would involve complete removal of all haul roads (except identified administrative roads) and limited removal of the skid roads. Implementation would include removing all fill and associated drainage structures (e.g., culverts) from stream crossings, excavating unstable fill from road prisms and landings, and hydrologically disconnecting the road from the stream network.

Approximately 446 legacy stream crossings have been identified, 250 on haul roads and the remainder on associated skid roads in the project area. Most of these crossings were constructed with earthen fill, dirt, or wood that interfere with streamflow and fish passage. These crossings have been eroding since their construction in the 1950s and 1960s, leading to severely degraded aquatic habitat conditions. Relevant photographs are provided in Appendix F. Approximately 448,460 cubic yards would be excavated from 27.5 miles of inventoried haul road and associated skid roads. Based on information collected on the inventoried roads, the average crossing contains 1,500 cubic yards of fill requiring removal (ranging from 200 to 2,500 cubic yards per crossing). An additional 24.5 miles of haul road and associated skid roads have not yet been inventoried but are estimated to have a similar order of magnitude of required excavation as inventoried roads (Table 3).

Any excess fill would be placed either in its location of origin or in another stable location. Temporary crossings and bridges would be removed, and the disturbed area would be recontoured to pre-logging conditions that restore hydrologic connectivity and natural stream channel morphology. Once road removal is complete, the site would be mulched.

#### *2.2.2.2.1 Low-threat Roads*

Haul and skid roads with little to no threat of delivering sediment to streams would be minimally treated. Typically, these roads are on ridges or gentle slopes where erosion potentials are minimal or nonexistent. Some of these roads may be maintained for administrative purposes. Roads determined not to be needed would be closed and treated to improve drainage to ensure that they are not contributing sediment to aquatic systems.

### *2.2.3 Aquatic Restoration*

The Proposed Action involves placement of large wood in streams, planting trees in the riparian corridors and around wetlands, and treatment of a planted alder forest (Davison Mitigation Site) along mainstem Prairie, StreeLOW, and May creeks.

#### **2.2.3.1 Large Wood Placement**

Large wood would be placed in streams to create complex fish habitat by creating areas of lower velocity during higher flows, providing additional instream cover, scouring pools, and recruiting wood. The Proposed Action involves placing large wood in the mainstem of Prairie, StreeLOW, and May creeks throughout any project phase (as wood becomes available) to restore instream habitat complexity.

##### *2.2.3.1.1 Mainstem Prairie Creek*

The Proposed Action includes the placement of large wood within the channel and planting of riparian conifers along the mainstem of Prairie Creek. Reintroduction of large wood to the channel is an interim measure until the planted riparian conifer trees can provide future large wood for natural recruitment to the channel. Large wood placement locations within the channel were identified based on adequate site access and avoiding impacts to large established conifers (Figure 4). Where access allows, approximately 40 to 50 pieces of large wood would be placed in the channel between the Elk Meadow Cabins and the causeway, with about half of the wood distributed north of the Davison Road Bridge and the other half south of the bridge. In addition, several large alders would be removed from the right bank downstream of the bridge and placed in the wetland pond at the Elk Meadows Picnic area to provide cover for juvenile salmonids using the pond. Himalayan blackberry and other invasive plants would be removed where they are found within reach of the excavator at equipment location sites.

Large wood would be placed using heavy equipment along mainstem Prairie Creek using the following two operational methods:

- Large alders would be pushed or pulled into the channel from the bank with roots remaining attached to the banks if possible. These trees would recruit wood and provide instream cover and velocity refugia. Selective removal of riparian trees would not create large openings in the canopy or compromise bank stability.

- Single or multiple pieces of large wood, ideally with the rootwad attached, would be wedged between riparian trees to anchor the wood in place. Large wood would function similarly to the riparian trees dropped into the stream and would have the potential to create pools.

A loader would be used to move large wood into place and an excavator would be used to place wood in streams or push or pull alders on the banks into the channel. Crane mats would be temporarily laid down on top of the floodplain and wetland vegetation to protect the integrity of the soils, and heavy equipment would be transported on top of the crane mats. Cable and rebar would not be used to anchor large wood due to safety risks and aesthetic concerns. Large wood is expected to be dynamic in the channel and may break loose and deposit naturally at downstream sites.

The target size for the large wood to be placed in the channel (subject to availability) is greater than 3 feet in diameter and 50 feet in length, with the rootwad attached. Where possible, large wood would be acquired from other projects within the project area, including non-native Monterey pines with rootwads to be removed from the NPS property at Berry Glen and from downed wood recovered during road, landing, and stream crossing excavation as part of the Proposed Action. Large wood would be stockpiled until needed.

#### *2.2.3.1.2 Streeflow and May Creeks*

Large wood placement would also occur opportunistically in Streeflow Creek and May Creek as wood becomes available. Large wood project reaches for these Prairie Creek tributaries are shown in Figure 4. The upper limits of large wood loading would be up to 69 pieces per mile of wood greater than 24 inches in diameter and 50 feet in length. This target is based on large wood surveys on Godwood Creek (a reference reach; Ozaki and Truesdell 2017).

The following techniques would be used to place large wood in tributary streams:

- With heavy equipment: Large wood would be placed in streams using heavy equipment from road locations adjacent to stream channels. Heavy equipment would not cross floodplains or streams and would only use existing roads for equipment access.
- Without heavy equipment: Entry to streams would be on foot and use chainsaws to drop wood into the channel, or large wood may be pulled into the stream from the banks and/or floodplain. A come-a-long winch would be used to move and position large wood in the channels.

As with mainstem Prairie Creek, cable and rebar would not be used to anchor large wood.

#### **2.2.3.2 Riparian and Wetland Plantings**

The Proposed Action involves riparian and wetland plantings to increase the extent and diversity of tree species in the riparian zones and around wetlands. As planted trees grow, they would provide large wood to the stream channels and help shade out invasive plant species along streambanks and wetlands. Riparian and wetland plantings would occur within the mainstem of Prairie Creek following placement of large wood, which would occur as wood becomes available during any project phase. Where conditions allow, wetland and riparian plantings would generally be conducted in late summer or early fall when site conditions are most likely to be dry.

A variable spacing of riparian trees and understory vegetation would be planted within 200 feet on both sides of Prairie Creek adjacent to the large wood placement reach, which extends from the Elk Meadow cabins downstream to the Davison Mitigation Site (Figure 4). In this same area, appropriate

species would also be planted within wetlands dominated by invasive mangrass (*Glyceria* spp.) and/or reed canarygrass (*Phalaris arundinacea*) and trees would be planted in areas lacking adequate overstory tree cover. Sitka spruce (*Picea sitchensis*), redwood (*Sequoia sempervirens*), big leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), willow (*Salix* spp.), or other appropriate species would be planted along well-drained soils within 200 feet of both sides of the stream channel. Saplings would be between 5 and 8 feet tall and 1 to 2 inches in diameter, and would be grown from stock appropriate to the site.

Elk exclusion fencing may be used to protect the young saplings and understory vegetation from elk browsing for several years after planting. If temporary exclusion fencing is used, it would be raised 1 to 2 feet above the ground to allow for travel of smaller animals and greater flow of water and debris across the Prairie Creek floodplain. The fencing would be removed once adequate vegetation is established.

### 2.2.3.3 Davison Mitigation Site Enhancement

The existing Davison Mitigation Site would also be treated as part of the Proposed Action. The forest would be thinned as described in Section 2.2.1.1 to increase variability in tree spacing, and native shrubs and trees would be planted as described in Section 2.2.3.2 to increase diversity. Exotic plants are present on site but are currently suppressed due to the dense red alder canopy. Understory plantings would discourage the growth and spread of exotic plants.

## 2.2.4 Proposed Action Sequencing

The phasing of the Proposed Action was determined based on a combination of factors, including the urgency in addressing sedimentation threats or problems, proximity to old-growth stands, and stand density. The overall sequence of the Proposed Action is as follows (Figure 5):

- **Phase 1:** Stree-low-Gold Bluffs and Berry Glen
- **Phase 2:** Harding Mill, Mainstem Stree-low Creek, Prairie Creek North, and Stree-low Headwater-Davison-Skunk Cabbage
- **Phase 3:** Davison and May Creek

Several proposed activities could occur throughout the restoration project. Large wood placement would occur within the mainstem of Prairie Creek, May Creek, and Stree-low Creek as wood becomes available throughout any project phase. Riparian and wetland plantings would also occur along mainstem Prairie Creek during any phase after placement of large wood. Direct road access would not be required for lop-and-scatter treatment areas because biomass would not be removed from these areas. Therefore, lop-and-scatter treatment, which is anticipated to occur in portions of the Gold Bluffs Beach, Prairie Creek North, and Harding Mill areas, and as an option in all other areas, could occur during any of the phases.

Sequencing within each phase would be based on a roadshed approach (i.e., road flow from secondary roads to primary roads). Specifically, the most distant areas within a roadshed would be prioritized, and work (including forest and aquatic restoration as well as road removal) would progress back towards the direction of the entry point. Each phase would consist of a series of implementation planning sub-units developed to facilitate treatment operations and planning. Treatments within each sub-unit would vary based on stand conditions, topography, access, and landscape context. In general, the order of ecosystem restoration activities within a given implementation planning sub-unit that uses heavy equipment would occur as shown in Table 4.

Phase 1 treatment areas would include Streelow-Gold Bluffs and Berry Glen. The implementation planning sequence for Phase 1 is shown in Figure 6. Phase 1 activities could be expected to commence as early as fall 2019.

Ecosystem restoration activities in future Phases 2 and 3 would be implemented like those undertaken under Phase 1, using the following approach:

- Sub-units would be delineated within planning areas.
- Sequencing would be determined using the roadshed approach, which would be based on road flow and intersections between the main roads and secondary roads. This approach would prioritize the areas within a roadshed that are the farthest away and work back towards the entry point.
- Road and bridge improvements would be identified and incorporated into the sequencing for each planning area.
- Activities within the sequencing units would progress as detailed in Table 4.

### *2.2.5 Actions Within the Scope of this ISND/EA*

This ISND/EA covers NPS and CDPR performing the following actions within the project area: forest restoration, as detailed in Section 2.2.1; road and stream crossing reoccupation and removal, as detailed in Section 2.2.2; and placement of large wood in Prairie, May, and Streelow creeks and riparian and wetland plantings, as detailed in Section 2.2.3.

Before NPS or CDPR undertake these types of actions, outside those identified as Phase 1 implementation, a project description that incorporates all appropriate Standard Project Requirements (SPRs) and Project-Specific Requirements (PSRs) listed in Section 2.2.6 would be developed. The project-level project description would be evaluated by CDPR resources staff using CDPR's Project Evaluation Form (PEF) and NPS resources staff using NPS's Environmental Screening Form (ESF) to ensure actions and impacts are within the scope of this ISND/EA. If resources staff confirm that the action is within the scope of this ISND/EA, no additional CEQA or NEPA documentation would be required. If the PEF or ESF indicate that all or portions of the action are outside the scope of this ISND/EA, then NPS and CDPR would conduct additional environmental review and determine the appropriate type of NEPA and CEQA documentation needed for the action.

### *2.2.6 Project Requirements*

CDPR maintains a list of SPRs that have been standardized statewide for avoiding significant project-related impacts to the environment. They are assigned to all CDPR projects as appropriate and address requirements regarding air quality, vegetation, wildlife, cultural resources, erosion prevention, soil stability, hazards, and hydrology. In addition to SPRs, CDPR also uses PSRs to address projects with unique issues that would not typically be standardized for at a statewide level. A summary of all SPRs and PSRs relevant to activities proposed as part of the Proposed Action is presented in Table 5. CDPR and NPS have grouped the requirements thematically into air quality (AIR), biological resources (BIO), visual resources (VIS), cultural resources (CULT), geology and soils (GEO), hydrology and water quality (HYDRO), potential hazards and hazardous materials (HAZ), noise (NOISE), and utilities (UTIL).

## 2.2.7 *Monitoring*

Compliance monitoring would occur during all phases of the Proposed Action. CDPR and NPS staff would accompany contractors during operations and would be responsible for assuring that all requirements (see Section 2.2.5) listed in this document are adhered to. Inspectors would be required to complete daily activity logs documenting the work conducted by the contractors. If CDPR or NPS determines that work is not in compliance, then the contractors, project manager, and responsible CDPR and NPS staff would be notified so that corrective measures can be taken. If problems continue, work would cease while the project is reevaluated and workers are instructed on measures necessary to improve work standards. Persistent breaches of compliance would result in termination of the contractor's contract.

Reports would be filed annually with CDPR and NPS regional offices and with the regulatory agencies, as required by permits, which would summarize the quality and quantity of work accomplished. Any breaches of compliance with the terms of this ISND/EA would be noted along with recommendations to improve future efforts.

Completed restoration areas would be visited on a regular basis after completion, as safety permits. Photograph points that were established during original surveys would be re-photographed. CDPR and NPS vegetation management staff would establish permanent plots to determine the stand characteristics before and after restoration is completed to monitoring effectiveness and recovery in treated areas.

## 3 **Affected Environment and Environmental Consequences**

This chapter describes the existing resources within the project area and the anticipated effects on these resources caused by the Proposed Action or No Action Alternative.

### 3.1 **Introduction**

#### 3.1.1 *Resources Eliminated from Detailed Analysis*

The following impact topics will not be evaluated in the ISND/EA because it was found through screening that they would not be affected at all by the alternatives or are not relevant to the project area: energy, mineral resources, population and housing, public services, utilities and service systems, accessibility, and environmental justice.

#### 3.1.2 *Methodology and Significance Criteria*

Impacts on resources are predicted based on impacts observed and measured from similar projects, relevant scientific research and publications, and the best professional judgment of park specialists, registered professional foresters and other forestry professionals, and environmental specialists.

The format for this ISND/EA is largely based on the CEQA environmental checklist included as Appendix G of the CEQA Guidelines. Under CEQA, thresholds are used to determine if project-related changes to the environment are significant (CEQA Guidelines Section 15064.7). Per NEPA regulations (40 CFR 1508.27), significance is based on context and intensity. Usage of the term "significance" in this document is made pursuant to CEQA only, and the evaluation of environmental factors pursuant to CEQA significance thresholds is presented in the checklist. Under NEPA, all impacts are discussed regardless of the threshold amount and each resource area discusses the context and intensity of

environmental impacts and mitigation measures. One resource topic—socioeconomics, which is not included in the checklist—is included in this ISND/EA for consistency with NEPA and past NPS environmental documents. Significance thresholds for this resource are presented in its impact analysis section.

### 3.1.3 *Cumulative Impact Scenario*

Cumulative impacts result from the “incremental impact of the action when added to other past, present, or reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions” (40 CFR 1508). When considering cumulative impacts, the analysis must consider the increment contributed by the direct and indirect impacts of the proposed action and the total impact that would result when the impacts from the proposed action are added to the impacts of the other actions. Therefore, it is important to determine the scope of the cumulative impact analysis to identify the potential for incremental increased environmental effects caused by a series of actions.

Past activities in the project area have encouraged the development of logging roads within the forest and changes in natural species composition through clearcutting old-growth trees. More recently, NPS and CDPR have developed ongoing ecosystem restoration and maintenance plans to manage and restore forest resources on public land. Private harvesting practices in the region have also changed in response to regulation. Other past, present, and reasonably foreseeable future projects occurring in the vicinity of the Proposed Action include the following projects:

- Orick Mill A Project: The League is working with partners to establish a visitor center and restore habitat at the Orick Mill site. The habitat restoration component of the project is intended to restore natural processes and reconnect the Prairie Creek channel with its floodplain, provide off-channel habitat for rearing juvenile salmonids, increase wetland size and restore function, remove and control invasive plants through overstory planting, control or remove livestock, provide habitat for migratory and resident avian species, expand and enhance habitat for non-salmonid species of concern, and provide resilience against climate change-induced loss of anadromous fish rearing habitat (Coastal Conservancy 2017). Completion of the project is expected to occur in summer 2022. Besides the long-term benefits of this project to fish and wildlife, there could be potential short-term impacts associated with this project, including increased suspended sediment in the channel when reconnecting it to the floodplain and direct impacts from construction equipment occurring within the footprint of the project.
- Greater Mill Creek Ecosystem Restoration Project: The purpose of this project is to continue Redwoods Rising restoration efforts in the Greater Mill Creek (parts of Del Norte Coast Redwoods State Park and Redwood National Park) area through a combination of vegetation management, aquatic restoration, and road removal activities. These actions are expected to rehabilitate the Greater Mill Creek area and restore ecosystem function and processes that have been degraded by historical land use activities, including intensive forest management. Short-term impacts of this project are generally expected to be similar to those of the Proposed Action. Project implementation activities include 34,080 acres and are scheduled to commence as early as fall 2019 and to span approximately 30 years.

Cumulative impacts are evaluated in this chapter by comparing the impacts of the action alternatives under evaluation with those of these past, present, and reasonably foreseeable future projects.

### 3.2 Environmental Checklist

<b>Project Information</b>	
<b>1. Project Title:</b>	Greater Prairie Creek Ecosystem Restoration Project
<b>2. Lead Agency Name and Address:</b>	<p>California Department of Parks and Recreation            North Coast Redwoods District            ATTN: Shannon Dempsey            3431 Fort Avenue            Eureka, California 95503</p> <p>National Park Service            South Operations Center            ATTN: Leonel Arguello            P.O. Box 7            Orick, California 95555</p>
<b>3. Contact Person &amp; Phone Number</b>	<p>Shannon Dempsey; (707) 445-5344            Leonel Arguello; (707) 465-7780</p>
<b>4. Project Location:</b>	Redwood National and State Parks
<b>5. Project Sponsor and Address</b>	<p>California Department of Parks and Recreation            North Coast Redwoods District            3431 Fort Avenue            Eureka, California 95503</p> <p>National Park Service            South Operations Center            P.O. Box 7            Orick, California 95555</p>
<b>6. General Plan Designation:</b>	Redwood National and State Parks
<b>7. Description of Project:</b>	<p>CDPR and NPS are proposing to complete forest and aquatic restoration and road removal activities over 9,200 acres within the Greater Prairie Creek watersheds (the Proposed Action). Restoration activities would occur in phases over time. Forest restoration would entail forest thinning to reduce stand density and enhance forest health using two operational methods: lop and scatter and biomass removal. Proposed aquatic restoration would include placement of large wood in streams, riparian planting, and enhancement of existing riparian stands. The Proposed Action would include the removal of logging roads and related road infrastructure that threaten aquatic resources through the recontouring of these disturbed areas to pre-logging conditions. Some roads would be retained and maintained. Proposed Action implementation is anticipated to commence in late 2019.</p>
<b>8. Surrounding Land Use and Setting:</b>	See Section 3.13
<b>9. Approval Required from Other Public Agencies:</b>	See Appendix E

**Environmental Factors Potentially Affected**

If implemented as written, this project could result in a "Potentially Significant Impact" involving at least one area of the environmental factors checked below, as indicated in the Initial Study on the following pages.

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> Aesthetics                         | <input type="checkbox"/> Agricultural Resources  | <input type="checkbox"/> Air Quality                 |
| <input type="checkbox"/> Biological Resources               | <input type="checkbox"/> Cultural Resources      | <input type="checkbox"/> Geology/Soils               |
| <input type="checkbox"/> Hazards & Hazardous Materials      | <input type="checkbox"/> Hydrology/Water Quality | <input type="checkbox"/> Land Use/Planning           |
| <input type="checkbox"/> Mineral Resources                  | <input type="checkbox"/> Noise                   | <input type="checkbox"/> Population/Housing          |
| <input type="checkbox"/> Public Services                    | <input type="checkbox"/> Recreation              | <input type="checkbox"/> Transportation              |
| <input type="checkbox"/> Wildfire                           | <input type="checkbox"/> Energy                  | <input type="checkbox"/> Utilities & Service Systems |
| <input type="checkbox"/> Mandatory Findings of Significance | <input checked="" type="checkbox"/> None         |  |

**Determination**

On the basis of this initial evaluation:

I find that the proposed project **COULD NOT** have a significant effect on the environment and a **NEGATIVE DECLARATION** will be prepared.

I find that, although the original scope of the proposed project **COULD** have had a significant effect on the environment, there **WILL NOT** be a significant effect because revisions/mitigations to the project have been made by or agreed to by the applicant. A **MITIGATED NEGATIVE DECLARATION** will be prepared.

I find that the proposed project **MAY** have a significant effect on the environment and an **ENVIRONMENTAL IMPACT REPORT** or its functional equivalent will be prepared.

I find that the proposed project **MAY** have a "potentially significant impact" or "potentially significant unless mitigated impact" on the environment. However, at least one impact has been adequately analyzed in an earlier document, pursuant to applicable legal standards, and has been addressed by mitigation measures based on the earlier analysis, as described in the report's attachments. An **ENVIRONMENTAL IMPACT REPORT** is required, but it will analyze only the impacts not sufficiently addressed in previous documents.

I find that, although the proposed project could have had a significant effect on the environment, all potentially significant effects have been adequately analyzed in an earlier EIR or Negative Declaration, pursuant to applicable standards, and have been avoided or mitigated, pursuant to an earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project. Therefore, all impacts have been avoided or mitigated to a less-than-significant level and no further action is required.



4-4-2019

Shannon Dempsey  
California Department of Parks and Recreation  
District Environmental Coordinator

Date

## 3.3 Aesthetics

### 3.3.1 Existing Conditions

Forestland defines the visual landscape of Humboldt County and is abundant both in protected parkland and lands outside the park. The scenic value of these natural resources is of great importance to the area's character. The project area features a diverse mosaic of natural communities associated with creeks and their tributaries, grassy meadows and fern valley, areas of remaining old-growth redwood stands, and coastal beach access (CDPR 2010). Old-growth redwood stands are specifically recognized for their aesthetic value. The project area has been heavily altered from its natural condition because of a long history of commercial logging. Therefore, it contains a mix of habitats and conditions. The primary scenic resources within the project area are the coastal redwood forest and open grasslands areas near mainstem Prairie Creek, especially a large grassy meadow known as Elk Prairie. Clearcut blocks are still visible as distinct and sometimes abrupt vegetation changes on the forested hillslopes within and surrounding the project area. Road scars are visible within the project area, although the roads are becoming less visible as the forest canopy grows.

Within the project area, there are open areas within the project area that allow for general scenic vistas, including sweeping coastal vistas at Golds Bluff and Fern Canyon which provide views of beaches and the Pacific Ocean to the west. Open meadow areas provide views of wide-open grasslands. The park supports numerous hiking, biking, and equestrian trails affording views of multiple habitats. There is one California Department of Transportation (Caltrans) vista point at U.S. Highway 101 milepost 118.93, which is located 3 miles south of Orick (Caltrans 2011).

There are no officially designated State Scenic Highways in Humboldt County. However, a number of roadways are eligible for designation, including U.S. Highway 101 and the Newton B. Drury Scenic Parkway, which runs through the project area (Caltrans 2011). The Newton B. Drury Scenic Highway is a 10-mile stretch of roadway through old-growth redwood forest in the park and is described by NPS as a scenic alternative to U.S. Highway 101. In addition, the Prairie Creek Scenic Corridor, located south of the park, serves as the public's gateway to RNSP from the south and contains a long and narrow stretch of privately held lands surrounded by park lands. The corridor has been identified by NPS as a high priority for acquisition to create seamless protected lands along Prairie Creek, restoring the area for its long-term aesthetic, ecological, and recreational benefits.

Existing sources of light and glare in the project area are minimal and restricted to park resources and campgrounds. Lights from vehicles are also visible along the Newton B. Drury Scenic Parkway.

### 3.3.2 Proposed Action Impacts

Except as provided in Public Resources Code Section 21099, would the project:		Less Than Significant Impact	No Impact
a.	Have a substantial adverse effect on a scenic vista?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b.	Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings along a scenic highway?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c.	In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d.	Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**A.** Impacts to scenic vistas could occur if the Proposed Action were to alter conditions such that existing scenic views would no longer be accessible to park visitors, if a structure were to be installed and block such views, or if a landscape were to be substantially altered that could affect scenic vistas of the park itself. As discussed, there is one Caltrans vista point located near the project area. However, this vista point provides views of the coast and ocean and the project area is not visible to viewers at this vista point.

Most of the Proposed Action elements would occur within forested areas. Scenic quality would be affected initially during thinning operations because spaces between trees and decomposing slash from thinning operations; excavation or grading from road reoccupation and removal activities; and large wood placement activities could be visible in the short term to park visitors traversing the project area on hiking, biking, or equestrian trails, or viewing it from a scenic vantage point. The Proposed Action is intended to enhance, among other values, the long-term aesthetic quality of the project area by facilitating the redevelopment of old-growth forests and aquatic ecosystems. Scenic quality would likely improve over decades, as thinned forests develop diverse understory vegetation and the forest canopy stratifies, although the project area would not be considered highly scenic until it achieves and maintains the characteristics of an old-growth forest.

Large wood placement along the mainstem of Prairie, Streelow, and May creeks would be visible to people walking through the areas. Trees planted in the riparian corridors and around wetlands as well as road removal activities would be visible during implementation activities but would contribute to enhancing the overall aesthetics of the Park in the longer term. For these reasons, impacts on scenic vistas would be less than significant.

**B.** As discussed above, there are no officially designated State Scenic Highways in Humboldt County. However, a number of area roadways are eligible for designation and the Newton B. Drury Scenic Parkway is a described scenic byway. Implementation activities associated with the Proposed Action have the potential to be viewed from segments of the Newton B. Drury Scenic Parkway and U.S. Highway 101 in the short term. However, the Proposed Action would enhance the aesthetic views from these highways in the long term and no scenic resources would be damaged. For these reasons, there would be a less-than-significant impact to resources along scenic highways.

**C.** The Proposed Action could result in temporary impacts to the visual character or quality of public views of the project area. However, as noted above, scenic quality of the project area would likely improve over decades as thinned forests develop diverse understory vegetation and the forest canopy stratifies. Impacts on visual character and quality of public views would be less than significant.

**D.** No new permanent light sources would be introduced into the landscape as part of the Proposed Action. Implementation activities would generally be limited to daylight hours, minimizing the need for construction work lights. Worker vehicles may travel through the project area before dawn or after dusk. Temporary lighting resulting from implementation activities or headlights would neither produce a substantial amount of light, nor would they be visible from the park campgrounds or from any private land. Larger trees, which moderate light intensities and provide shade within the project area, would be preserved within the treatment areas. There would be no impact associated with new sources of light or glare.

**Cumulative Impacts.** The Proposed Action is intended to enhance, among other values, the long-term aesthetic quality of the project area by facilitating the redevelopment of old-growth forests and aquatic ecosystem, thereby addressing past impacts of over-harvesting and road development. Combined with other present and future forest restoration and maintenance activities, the Proposed Action would have a cumulative benefit to aesthetic resources.

### *3.3.3 No Action Alternative Impacts*

Under the No Action Alternative, there would be no implementation activities and therefore no temporary impacts to the visual appeal of the project area from implementation activities. However, as compared to the Proposed Action, the long-term aesthetic enhancements to RNSP resources would not occur and the scenic quality would remain degraded because unnatural overstocked forest conditions, abandoned logging roads, and stream infills would remain unchanged. NPS and CDPR could continue to treat stands, road systems, and riparian areas on a project-by-project basis if funding allows. However, this would occur in a fragmented manner and at a slower pace as compared to the Proposed Action. There would be no new sources of light or glare.

## **3.4 Agriculture and Forestry Resources**

### *3.4.1 Existing Conditions*

There are no agriculture resources or agricultural zoning in the project area (Humboldt County 2018). Some parcels adjacent to the project area on the south are zoned Agriculture General (AG) and Residential Agriculture (RA). Adjacent to the project area to the east are industrial timberlands zoned Timber Production Zone (TPZ). For example, Green Diamond Resource Company owns property in the Tectah Creek watershed, which is east of the project area and the U.S. Highway 101 park bypass corridor. Privately managed timberlands are also present in the Redwood Creek watershed outside of the CDPR and NPS boundaries. The State Forest Practice rules require a "Special Treatment Area" within 200 feet of the State and National Park boundaries that provides additional restrictions on timber harvest and road construction (Cal Fire 2017).

Forest stands within the project area have been mostly unmanaged since the 1970s and consist of unnaturally dense forests where growth is hindered, species composition has shifted, and biodiversity is low. However, there was a watershed restoration project in the Berry Glen unit in the

1970s. In addition to excessive tree density in the proposed treatment areas, the understory vegetation layer is suppressed, which leads to reduced biodiversity within the forests. Existing stand conditions within each of the proposed treatment units are described in Table 1 and summarized as follows:

- Densities range from 101 to 656 trees per acre
- Basal area varies from 280 to 535 square feet per acre
- Volumes range from 35.2 to 108.6 mbf per acre
- QMDs range from 10.2 to 27.8 inches DBH

### 3.4.2 Proposed Action Impacts

Would the project:		Less Than Significant Impact	No Impact
a.	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b.	Conflict with existing zoning for agricultural use or conflict with a Williamson Act contract?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c.	Conflict with existing zoning for or cause rezoning of forest land, timberland, or timberland zoned Timberland Production?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d.	Result in the loss of forest land or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e.	Involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**A.** No land in the project area is zoned agricultural (Humboldt County 2018) or considered Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as defined by the Farmland Mapping and Monitoring Program. There would be no impact on any category of California farmland.

**B.** The project area is part of the CDPR and NPS systems, which do not allow for agricultural use, contain any land zoned for agriculture, or use Williamson Act contracts. There would be no impact on agricultural zoning or Williamson Act contracts.

**C.** The project area is part of the CDPR and NPS systems. The Proposed Action would not result in any zoning change. There would be no impact on forest or timberland zoning.

**D.** The Proposed Action would result in the restoration of forest land and accelerated return to old-growth conditions. Restoration would be accomplished through reducing stand density and shifting species composition to promote growth of remaining trees and understory vegetation and development of a multi-story canopy. The Proposed Action would not result in the loss of forest or conversion of forest types to non-forest types, and there would be no impact.

**E.** There are no other changes expected to the existing environments associated with the Proposed Action that could convert forest land to non-forest use. There are no agriculture lands in the project area. There would be no impacts associated with farmland conversions.

**Cumulative Impacts.** Historic timber management practices (clearcut tractor logging, road building, and minimal road maintenance) have had substantial direct adverse effects on forestry resources. The Proposed Action is designed to result in improved forest conditions, not the loss or conversion of forestland to non-forest uses. The other projects listed in Section 3.1.3 would not result in the loss or conversion of forestland. The Proposed Action would not result in cumulatively considerable impacts to agriculture or forestry resources.

### 3.4.3 *No Action Alternative Impacts*

The No Action Alternative involves no changes to existing forestry and agricultural conditions in the project area. There would be no impact on any category of California farmland because the project area does not include areas of agriculture and zoning would not be affected. However, the project area would continue to consist of unnaturally dense forests with hindered growth, which would be considered degraded forest resources. NPS and CDPR could continue to treat forests, road systems, and riparian areas on a project-by-project basis if funding allows. However, this would occur in a fragmented manner and at a slower pace as compared to the Proposed Action.

## 3.5 Air Quality

### 3.5.1 *Existing Conditions*

The project area is in the North Coast Air Basin (Basin) in Humboldt County which is under the jurisdiction of the North Coast Unified Air Quality Management District (NCUAQMD), overseen by the California Air Resources Board (CARB) and the United States Environmental Protection Agency (USEPA), Region IX, under the Clean Air Act (CAA). NCUAQMD regulates sources of air pollution within Humboldt, Trinity, and Del Norte counties, with the primary responsibility of controlling air pollution from stationary sources. Redwood National Park is designated as a Class I airshed pursuant to Part C of the CAA, as amended (42 USC 7401 et seq.). Class I designations are given to areas where air quality is cleaner than the national ambient air quality standards (NAAQS). Class I areas have the most stringent regulations for the protection of air quality, permitting the lowest increments of air quality degradation.

Air pollutants are defined as the following two general types: 1) criteria air pollutants, representing pollutants for which USEPA and CARB have set health- and welfare-protective ambient air quality standards (NAAQS and California ambient air quality standards [CAAQS]); and 2) toxic air contaminants (TACs), which may lead to serious illness or increased mortality even when present at relatively low concentrations. TACs generally do not have ambient air quality standards.

USEPA and CARB classify an area as attainment, unclassified, or nonattainment depending on whether the monitored ambient air quality data show compliance, lack of data, or noncompliance with the ambient air quality standards, respectively. With frequent rains, ocean winds, low levels of commuter traffic, and a small industrial base, the air quality in the Basin is generally good and Humboldt County is currently in attainment for all NAAQS and CAAQS except for the state's 24-hour standard for particulate matter 10 microns or smaller in diameter (PM<sub>10</sub>). The two pollutants of greatest concern in the region are ozone (O<sub>3</sub>) and particulate matter (PM) (NCUAQMD 2018). O<sub>3</sub> is formed via chemical reactions between reactive organic gases (ROG) and nitrogen oxides (NO<sub>x</sub>) in the presence of ultraviolet radiation or sunlight. Tiny particles of solids or liquids (excluding pure water) that are suspended in the atmosphere are known as PM and are classified according to their diameter as either particulate matter 2.5 microns or smaller in diameter (PM<sub>2.5</sub>) or PM<sub>10</sub>. PM can be

emitted directly (primary PM, such as dust or soot), or can form in the atmosphere through photochemical reactions or gaseous precursors (secondary PM). The major sources of emissions are burning (wood smoke), combustion (from automobiles and diesel engines), and dust. As shown in Table 7, prolonged exposure to PM and O<sub>3</sub> at levels higher than set standards can lead to a host of respiratory issues, including breathing difficulties, lung damage, and disease. Table 7 also presents the national and state standards for criteria pollutants, as well as the most common health effects.

TACs are airborne compounds that are known or suspected to cause adverse human health effects after long-term and/or short-term exposure. Examples of TAC sources are diesel- and gasoline-powered internal combustion engines in mobile sources and naturally occurring minerals. Sensitive receptors are children, elderly, asthmatics, and others who are at a heightened risk of negative health outcomes due to exposure to air pollution. The locations where these sensitive receptors congregate for periods of time are considered sensitive receptor locations (CARB 2018). The closest residential sensitive receptors to the project area are located along U.S. Highway 101, with homes located nearly adjacent to the project area, and in the Orick community, with homes located within 0.5 mile of the project area. Sensitive receptors could also include park visitors using educational centers; campgrounds; or hiking, biking, and equestrian trails in the project area.

Air quality in RNSP is considered good to excellent because of the low population, scarcity of pollutant sources, and prevailing westerly ocean winds. Local views and scenes are often obscured by fog, rain, low clouds, salt spray haze, and natural forest haze inversion. All federal standards for regulated air pollutants are consistently achieved, including those for O<sub>3</sub>, carbon monoxide, particulate matter, nitrogen dioxide, sulfur dioxide, and lead. The most significant air pollutants in the parks are PM<sub>10</sub> and PM<sub>2.5</sub>, primarily from widespread non-industrial burning, including prescribed fire, wildland fire, and industrial burning of slash piles. In the past, total suspended particulates exceeded air quality standards, but improved technology, better use of materials, and fewer sawmills (and especially wood waste or “beehive” burners) in the region have resulted in a reduction in suspended particulates (RNP 1987).

The following determinations were based on regional significance thresholds, which are designed to assist CEQA lead agencies in analyzing localized air quality impacts from proposed projects as determined by NCUAQMD, and federal requirements under the CAA. In determining whether a project has significant air quality impacts on the environment, planners typically apply their local air district's thresholds of significance to projects in the review process. However, NCUAQMD has not formally adopted significance thresholds, and instead uses Best Available Control Technologies (BACT) and various control strategies.

### 3.5.2 Proposed Action Impacts

<b>When available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:</b>		<b>Less Than Significant Impact</b>	<b>No Impact</b>
a.	Conflict with or obstruct implementation of the applicable air quality plan?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b.	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a nonattainment area for an applicable federal or state ambient air quality standard?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c.	Expose sensitive receptors to substantial pollutant concentrations?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

When available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:		Less Than Significant Impact	No Impact
d.	Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**A.** Forest management activities in general have the potential to reduce long-term emissions of air pollutants by lessening the incidence and severity of fires, which is a major source of periodic air emissions in the state. The Proposed Action would also reduce the number of unpaved roads in the area, thereby reducing fugitive dust. However, while limited in overall scope and intermittent, the short-term use of heavy equipment would emit criteria air pollutants, TACs, and fugitive dust (PM<sub>10</sub>). In addition, grading and soil movement has the potential to generate dust. Increased emissions of PM<sub>10</sub>, ROG, and NO<sub>x</sub> could contribute to existing non-attainment of PM<sub>10</sub> conditions and interfere with achieving the projected attainment standards.

As discussed above, Humboldt County is currently in attainment for all NAAQS and CAAQS except for the state's 24-hour standard for PM<sub>10</sub>. NCUAQMD has not established numerical standards to limit air emissions and instead relies on several BACT and control strategies to maintain attainment status. Fugitive emissions as a result of vehicular traffic on unpaved roadways is the largest source of PM emissions within NCUAQMD, and dust control is key to NCUAQMD's attainment strategy. The Proposed Action includes the following project requirements which are consistent with NCUAQMD guidance to control fugitive dust, including PM<sub>10</sub>, and criteria pollutants: requirements for proper maintenance of equipment (SPR-AIR-1), watering during implementation to minimize fugitive dust (PSR-AIR-2), 5-minute maximum idling restrictions (SPR-AIR-3), and fugitive dust-related excavation/grading restrictions (PSR-AIR-4). The Proposed Action would not conflict with or obstruct implementation of any applicable air quality plan for the Park or the Basin.

**B.** As described in the response to Question A, the Proposed Action is in an area of attainment except for the state 24-hour PM<sub>10</sub> standard. However, the Proposed Action would not emit any long-term air contaminants at a level that, by themselves or cumulatively, would violate any air quality standard or contribute to a permanent or long-term increase in any air contaminant which would threaten attainment. The Proposed Action is consistent with NCUAQMD guidance to control fugitive dust, including PM<sub>10</sub> and criteria pollutants. Short-term construction emissions would be consistent with efforts to meet the state's 24-hour PM<sub>10</sub> standard for the basin. Impacts would be less than significant.

**C.** As noted above, the closest sensitive residential receptors are located along U.S. Highway 101 and in the Orick community. Sensitive receptors could also include park visitors within the project area. Areas of active implementation would be closed to the public and a closure order specifying closure dates would be posted on all sections of public trail where implementation activities would be conducted. The closure would also be noticed in a news release and update on both the NPS and CDPR websites. While the Proposed Action would generate emissions during implementation activities, emissions would be short term, localized, and minor and would not violate air quality standards. Impacts would be less than significant.

**D.** During implementation, diesel exhaust produced by off-road equipment could generate odors. Several pieces of equipment would need to operate near receptors and concurrently in a relatively small area to generate a constant plume of diesel exhaust. However, such conditions are not likely to

occur under the Proposed Action and prevailing winds and dilution of odors from project sites would prevent concentration of odors. There would be no impact.

**Cumulative Impacts.** Combined with other past present and future forest restoration and maintenance activities, which include emissions from road construction or logging equipment, smoke from wildfires, dust from vehicles on U.S. Highway 101, and emissions from wood stoves or pile burning from urban zones, the Proposed Action would contribute to overall emissions. However, emissions would be short term, localized, and minor and would not violate air quality standards. The Proposed Action would not result in a substantial cumulative contribution to air quality impacts.

### 3.5.3 *No Action Alternative Impacts*

The No Action Alternative would not result in heavy equipment or other short-term emissions. However, the No Action Alternative has the potential to result in long-term and sustained impacts to regional air quality because the forests would not benefit from management techniques that help increase resiliency to severe wildfires. NPS and CDPR could continue some forest management on a project-by-project basis if funding allows. However, this would occur in a fragmented manner and at a slower pace as compared to the Proposed Action.

## 3.6 Biological Resources

### 3.6.1 *Existing Conditions*

The list of special-status species known, or with the potential to occur, in the project area for terrestrial and aquatic resources was developed by querying the following: California Natural Diversity Database (CNDDDB) list of state species of special concern and state and federal proposed endangered, threatened, and candidate species, including those with Bureau of Land Management sensitive status (CDFW 2018b); USFWS list of federally listed and proposed endangered, threatened, and candidate species (USFWS 2018); California Native Plant Society (CNPS) online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2018); NMFS West Coast Region species list of endangered and threatened species and critical habitat (NMFS 2018); State Parks (CDPR 2016); and eBird (2019).

The database queries for CNDDDB, USFWS, and CNPS were each based on a search of the greater project vicinity, which includes the U.S. Geological Survey 7.5-minute quadrangles in which the Proposed Action is located and the adjacent quadrangles (Rodgers Peak, Holter Ridge, Bald Hills, Fern Canyon, Orick, Ah Pah Ridge, Requa, and Klamath Glen). Occurrence information for special-status species was based on prior studies and analyses conducted by RNSP.

#### 3.6.1.1 **Vegetation**

Vegetation in the project area includes coniferous forest dominated by coastal redwood (*Sequoia sempervirens*), Sitka spruce (*Picea sitchensis*), and Douglas-fir (*Pseudotsuga menziesii*). Some regions of old-growth coastal redwood forest remain in the southern portion of the project area in the Streelow Headwaters-Davison-Skunk Cabbage planning region and in the May Creek planning region in the northeastern portion of the project area. However, most of the project area is currently densely vegetated with regenerated stands of spruce, grand-fir (*Abies concolor*), Douglas-fir, coast redwood, and red alder (*Alnus rubra*). The overstory in these second-growth stands is typically dominated by spruce, redwood, or Douglas-fir with redwood sprouting from old-growth stumps. Grand-fir (*Abies grandis*) and western hemlock (*Tsuga heterophylla*) trees are present in the overstory.

These dense second-growth forests typically have limited species diversity and stand structure. Where present, a sparse understory of herbaceous species and shrubs includes salal (*Gaultheria shallon*), evergreen huckleberry (*Vaccinium ovatum*), rhododendron (*Rhododendron occidentale*) and sword fern (*Polystichum munitum*). Tree regeneration via natural seeding or stump/root sprouting tends to be suppressed.

Over the past 100 years, a large portion of the lower Prairie Creek floodplain wetlands and riparian forests have been converted to other uses; substantially impacted by hydrologic alterations, development, and use of the U.S. Highway 101 corridor; and overwhelmed by non-native invasive plants. Except for the Prairie Creek channel and floodplain, wetlands and waters in the project area are mostly limited to streams with limited floodplains and riparian zones. Road building, timber harvesting, and associated bank erosion and landslides have altered the original riparian vegetation along creeks in the project area. The second-growth riparian forests are dominated by red alder, Douglas-fir and redwood. Sword fern and reed canary grass (along Prairie Creek) dominates the riparian understory at moderate to high density. Restoration opportunities have been identified along Prairie Creek, which would consist of installation of large woody in the channel, conifer planting, and invasive plant control.

Sixty-six special-status plant species<sup>2</sup> and three sensitive natural communities<sup>3</sup> were identified from the database queries as having the potential to occur in GPC (Appendix G). Twenty-six of these special-status plant species were eliminated from further consideration because no suitable habitat is present in the project area or the project area is outside of the species' current range. The following 40 special-status plant species and three special-status vegetation communities have moderate or high potential to occur in the project area:

- Plants
  - Bald Mountain milk-vetch (*Astragalus umbraticus*)
  - False gray horsehair lichen (*Bryoria pseudocapillaris*)
  - Bolander's reed grass (*Calamagrostis bolanderi*)
  - Leafy reed grass (*Calamagrostis foliosa*)
  - Seaside bittercress (*Cardamine angulata*)
  - Lagoon sedge (*Carex lenticularis* var. *limnophila*)
  - Deceiving sedge (*Carex saliniformis*)
  - Siskiyou sedge (*Carex scabriuscula*)
  - Green yellow sedge (*Carex viridula* ssp. *viridula*)
  - Pacific golden saxifrage (*Chrysosplenium glechomifolium*)
  - Oregon goldthread (*Coptis laciniata*)
  - California lady's-slipper (*Cypripedium californicum*)
  - Del Norte buckwheat (*Eriogonum nudum* var. *paralinum*)
  - Coast fawn lily (*Erythronium revolutum*)
  - Minute pocket moss (*Fissidens pauperculus*)

---

<sup>2</sup> Special-status plant species are defined as those listed, proposed, or under review as threatened or endangered under the federal ESA and/or CESA; designated as rare under the California Native Plant Protection Act; and/or taxa that meet the criteria for listing as described in Section 15380 of the CEQA Guidelines, including plants with a California Rare Plant Rank of 1, 2, 3, or 4, and/or considered a locally significant species (i.e., rare or uncommon in the county or region).

<sup>3</sup> Sensitive natural communities are defined as those natural community types (i.e., legacy natural communities in CDFW's CNDDb, vegetation alliances and/or associations) with a state ranking of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) on CDFW's California Sensitive Natural Communities List (CDFW 2018c) or in the CNDDb.

- California globe mallow (*Iliamna latibracteata*)
- Thompson's iris (*Iris thompsonii*)
- Small groundcone (*Kopsiopsis hookeri*)
- Marsh pea (*Lathyrus palustris*)
- Heart-leaved twayblade (*Listera cordata*)
- Inundated bog club moss (*Lycopodiella inundata*)
- Running pine (*Lycopodium clavatum*)
- Marshall's saxifrage (*Micranthes marshallii*)
- Leafy-stemmed miterwort (*Mitellastra caulescens*)
- Woodnymph (*Moneses uniflora*)
- Ghost pipe (*Monotropa uniflora*)
- Howell's montia (*Montia howellii*)
- White-flowered rein orchid (*Piperia candida*)
- California pinefoot (*Pityopus californicus*)
- Nodding semaphore grass (*Pleuropogon refractus*)
- Oregon polemonium (*Polemonium carneum*)
- Trailing black currant (*Ribes laxiflorum*)
- Maple-leaved checkerbloom (*Sidalcea malachroides*)
- Siskiyou checkerbloom (*Sidalcea malviflora* ssp. *patula*)
- Slender false lupine (*Thermopsis gracilis*)
- Robust false lupine (*Thermopsis robusta*)
- Trifoliolate laceflower (*Tiarella trifoliata* var. *trifoliata*)
- Cylindrical trichodon (*Trichodon cylindricus*)
- Coastal triquetrella (*Triquetrella californica*)
- Methuselah's beard lichen (*Usnea longissima*)
- Vegetation Communities
  - Sitka Spruce Forest
  - Coastal and Valley Freshwater Marsh
  - Redwood Forest<sup>4</sup>

### 3.6.1.2 Fish and Wildlife

Wildlife diversity within the project area is generally very high. However, species diversity is lower in the upland younger-aged redwood forest community in comparison to other plant communities (such as riparian forests) because of lower plant diversity and less structural complexity in the canopy of second-growth forests. Species diversity is especially low in the youngest second-growth stands that were reseeded without subsequent thinning, creating dense stands of small trees with minimal canopy development and understory vegetation.

Thirty-five special-status fish and wildlife (fish, amphibian, reptile, bird, and mammal) species were identified from the database queries as having the potential to occur in the project area (Appendix G). Two of these species were eliminated from further consideration, because no suitable habitat is present in the project area, or the project area is outside of the species' current range. Eliminated species include the green sturgeon because no suitable habitat is present, and tidewater

---

<sup>4</sup> This sensitive natural community was not identified during the database queries; however, RNSP has completed alliance-level vegetation mapping throughout the entire project area, and it is known that the *Sequoia sempervirens* (Redwood forest) Alliance (G3 S3.2) is present.

goby because they were extirpated in the 1980s. Seven species were considered to have low potential to occur and are not discussed further, including the western pearlshell mussel, longfin smelt, western pond turtle (because of low water temperatures outside of the turtle's range), golden eagle (because no suitable nesting habitat is present), western snowy plover and bank swallow (because no suitable habitat is present in the active project area), and western yellow-billed cuckoo (because the closest sighting is 25 miles south in Arcata). The following 28 special-status wildlife species have moderate or high potential to occur in the project area:

- Fish
  - Pacific lamprey (*Entosphenus tridentatus*)
  - Eulachon (*Thaleichthys pacificus*) southern distinct population segment (DPS)
  - Coho salmon (*Oncorhynchus kisutch*), Southern Oregon/Northern California Coast Evolutionarily Significant Unit (ESU)
  - Chinook salmon (*O. tshawytscha*), California Coastal ESU
  - Steelhead, northern California coast DPS (*O. mykiss irideus*)
  - Coastal cutthroat trout (*O. clarkii clarkii*)
- Amphibians
  - Southern torrent salamander (*Rhyacotriton variegatus*)
  - Pacific tailed frog (*Ascaphus truei*)
  - Northern red-legged frog (*Rana aurora*)
  - Foothill yellow-legged frog (*Rana boylei*)
- Birds
  - White-tailed kite (*Elanus leucurus*)
  - Bald eagle (*Haliaeetus leucocephalus*)
  - Northern harrier (*Circus cyaneus*)
  - American peregrine falcon (*Falco peregrinus anatum*)
  - Marbled murrelet (*Brachyramphus marmoratus*)
  - Northern spotted owl (*Strix occidentalis caurina*)
  - Vaux's swift (*Chaetura vauxi*)
  - Olive-sided flycatcher (*Contopus cooperi*)
  - Willow flycatcher (*Empidonax traillii*)
  - Bank swallow (*Riparia riparia*)
  - Yellow warbler (*Setophaga petechia*)
- Mammals
  - Sonoma tree vole (*Arborimus pomo*)
  - White-footed vole (*Arborimus albipes*)
  - Townsend's big-eared bat (*Corynorhinus townsendii*)
  - Pallid bat (*Antrozous pallidus*)
  - Humboldt marten (*Martes caurina humboldtensis*)
  - Fisher, west coast DPS (*Pekania pennanti*)

Prairie Creek and its tributaries support self-sustaining populations of four species of salmonid fishes: Chinook salmon, Coho salmon, resident and anadromous coastal rainbow trout/steelhead, and coastal cutthroat trout (Wilzbach and Ozaki 2017). Chinook salmon and steelhead are listed as federally threatened under the ESA, coho salmon is listed as threatened under the ESA and California Endangered Species Act (CESA), and coastal cutthroat trout is protected by CDFW as a species of special concern. In addition, small numbers of chum salmon (*Oncorhynchus keta*) and pink salmon

(*Oncorhynchus gorbuscha*), both non-special status species, have also been observed (Smedley 1952; Wilzbach and Ozaki 2017). Other special-status fishes include Pacific lamprey (*Entosphenus tridentatus*) and eulachon, a small anadromous smelt that is listed as threatened under the ESA (Wilzbach et al. 2016, 2017; Wilzbach and Ozaki 2017). Eulachon are considered by USFWS to likely be extirpated in Redwood Creek, and individuals had not been observed since the 1970s. The last large runs of eulachon occurred in 1967 (Van Kirk 1994) and 1973 (Rogers 1973). However, a few eulachon were observed in Redwood Creek in 2016 and 2017 (Wilzbach and Ozaki 2017). Tidewater goby is another ESA-listed species that has been extirpated from Prairie Creek. The last tidewater goby observation occurred in the early 1980s (NPS 2017b).

The instream habitat quality in the project area varies depending on land use history. For example, the volume per mile of instream large wood in unmanaged channels was 1.6 times higher than in managed channels in Prairie Creek (Ozaki and Truesdell 2017). In addition, the volume of large wood in Godwood and upper Prairie creeks (unmanaged channels) was more than twice that found in Streeflow Creek (formerly managed as timberland prior to establishment of RNSP; Ozaki and Truesdell 2017). Similarly, the number of pools in Prairie Creek is higher in the upstream unmanaged channel than in the managed reaches downstream.

The project area provides high-quality habitat for several special-status amphibians. These include the southern torrent salamander, Pacific tailed frog, northern red-legged frog, and foothill yellow-legged frog. All these amphibians are California state species of special concern and the foothill yellow-legged frog is a candidate for a threatened listing under CESA. The southern torrent salamander occurs in permanent seeps, headwater springs, and high-gradient streams that contain coarse rocky substrates (Thomson et al. 2016). Southern torrent salamanders and the tailed frogs tolerate a narrow thermal range and are both susceptible to increased sediment loads (Thomson et al. 2016). Northern red-legged frogs breed in small backwater streams and ponds (California Herps 2019), and juveniles and adults can also be found in smaller perennial streams far uphill from breeding areas and upslope areas. Juvenile and adult northern red-legged frogs may use coastal streams for dispersal, and in one study the species was detected within 5 meters of water 90% of the time. However, they also have been documented hundreds of meters away from water within densely vegetated or down cover (Haggard 2000). Foothill yellow-legged frogs prefer open gravel bars associated with streams and rivers for breeding. Breeding habitat for foothill yellow-legged frog generally occurs along Prairie Creek but is lacking in smaller tributaries. Adult and juvenile foothill yellow-legged frogs can also be found in smaller perennial watercourses far uphill from breeding areas.

Special-status bird species in the RSNP boundary include resident species such as marbled murrelet and northern spotted owl, and migrants, such as Vaux's swift, willow flycatcher, olive-sided flycatcher, and yellow warbler.

The northern spotted owl is a federally and state threatened species that may be absent in the project area due to past management practices of former land owners and the influx of barred owls (*Strix varia*). Suitable spotted owl nesting and roosting habitat occurs throughout and immediately adjacent to the project area (RNP 2019b). Four spotted owl activity centers were historically present within the project area with the last recorded occupancy occurring in 1995 (RNP 2019b). No spotted owls were detected during various inventory surveys on the fringes of the project area between 1995 and 2014. The most recent spotted owl inventory surveys, conducted in 2018, detected no spotted owls in the entire Phase One (Streeflow-Gold Bluffs and Berry Glen) area. Barred owls, however, were

detected on 16 different survey nights in approximately six locations throughout the Phase 1 area (RNP 2019b).

Marbled murrelet, an old-growth-associated species that is federally threatened and state endangered, occurs within the project area. Marbled murrelet are commonly detected throughout old-growth stands in the project area. Approximately 1,116 acres of suitable marbled murrelet nesting habitat is within the project area (the seven isolated old growth stands) and 3,406 acres are within 0.25 mile of the project area (RNP 2019b). Individual marbled murrelet nests have been found in the large contiguous block of habitat immediately to the east of the project area as well as in two of the isolated stands of old growth within the project area (RNP 2019b). Signs of marbled murrelet nesting (egg shell fragments found on the forest floor) have also been recorded in both of the large contiguous blocks of habitat north and east of the project area as well as one of the isolated old growth stands within the project area over the past 10 years. It is assumed that all suitable nesting marbled murrelet habitat within and adjacent to the project area is occupied by murrelets during the breeding season (March 24 through September 15; RNP 2019b).

White-tailed kite, a state fully protected species, is frequently observed throughout the project area and nesting and foraging habitat is present. Nesting and foraging habitat is present in the project area for bald eagle, a state endangered species; however, no known bald eagle nests are known to occur in the project area. Vaux's swift relies on large conifers with basal hollows or chimneys for roosting and is present in Humboldt County between mid-February through mid-October, with most activity occurring between early-April and mid-October (eBird 2019). Olive-sided flycatcher, a state species of special concern, and willow flycatcher, a state endangered species, are present in the project area along the pasture and riparian areas of Prairie Creek. The olive-sided flycatcher has been documented in Humboldt County between mid-April and late September and the willow flycatcher between early May and mid-October (eBird 2019); however, occurrences of breeding willow flycatchers in Humboldt County are currently rare and localized (Hunter et al. 2005). Yellow warbler is known to occur in the RNSP boundary and nests in second-growth woodlands, scrub, and riparian habitats, and has been documented in Humboldt County year-round, with the greatest activity levels recorded between mid-April through late-October (Ehrlich et al. 1998; eBird 2019).

The RNSP boundary includes numerous non-special-status migratory bird species that have been documented to increase in activity in Humboldt County between early March and mid-October (eBird 2019). The following migratory species were documented at Prairie Creek Redwood State Park on July 13, 2018 (eBird 2019): Pacific-slope flycatcher (present in Humboldt County from early March through late October), Swainson's thrush (mid-April through mid-November), Wilson's warbler (increase in activity late March through mid-October; low activity year-round), and black-headed grosbeak (early April through late October). Species present year-round included brown creeper, song sparrow, Steller's jay, common raven, Pacific wren, Hutton's vireo, chestnut-backed chickadee, Pacific wren, golden-crowned kinglet, wrentit, and orange-crowned warbler.

There are six special-status mammal species that have either been documented to occur in the project area or for which there is a moderate to high potential for occurrence based on habitat presence. The Sonoma tree vole, a state species of special concern, is known to occur in the project area and feeds exclusively on Douglas-fir needles within coastal mature coniferous forests. White-footed vole, a state species of special concern, has a potential to occur in the project area based on the presence of suitable habitat. Pallid and Townsend's big-eared bats have not been documented in the project area, but suitable habitat is present in the project area, including basal hollows of large

trees. The Humboldt marten, a state endangered species and species of special concern, was recently rediscovered north of the project area in Prairie Creek Redwoods State Park, after decades of being considered extirpated and is associated with mid- to advanced successional stands of conifer with complex structure near the ground and dense canopy closure. Fishers, a species of special concern in northern California, have been observed in the Lost Man Creek watershed, on the eastern side of the project area in areas immediately to the north and east of the project area and use cavities in large trees for denning.

### 3.6.2 Proposed Action Impacts

Would the project:		Less Than Significant Impact	No Impact
a.	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b.	Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c.	Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marshes, vernal pools, coastal wetlands, etc.) through direct removal, filling, hydrological interruption, or other means?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d.	Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e.	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f.	Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**A.** The purpose of the Proposed Action is rehabilitation of the project area through thinning second growth forests to reduce stand density and alter species composition to promote growth of remaining trees, understory vegetation, and development of multi-story canopy; removing or maintaining roads to reduce the potential for erosion and sedimentation into streams; restoring in-stream habitat complexity; and augmenting riparian corridors by planting native vegetation. These actions may cause limited short-term impacts to special-status species; however, these actions are needed to expand and enhance habitat for populations of aquatic and terrestrial species, including special-status species, by accelerating development of forest characteristics more typical of late-seral forests and preventing chronic and catastrophic sediment inputs to creeks. As a result of implementing the Proposed Action, habitat conditions for special-status species in the project area are expected to be substantially improved in the long term.

**Plants and Vegetation Communities.** The Proposed Action would use heavy equipment to assist in the thinning of dense second-growth forests and remove legacy roads and/or stream crossings, which could impact populations of special-status plants. Only one of the special-status plants with a moderate or high potential to occur in the project area has a state listing (leafy reed grass

[*Calamagrostis foliosa*], listed as rare by the state of California); none of the plants with potential to occur in the project area are federally protected (Appendix G).

Prior to the start of implementation activities, special-status plant surveys would be conducted (SPR-BIO-1). Any individual or populations of rare, threatened, endangered plants, and those listed as CNPS Ranks 1 and 2 identified during pre-implementation special-status plant surveys (SPR-BIO-1) would be clearly marked with an appropriate buffer and avoided (PSR-BIO-2). If avoidance is not possible, then CDFW would be consulted to determine a mutually agreeable strategy. For some species, the temporary disturbance associated with vegetation management activities would result in a net benefit to special-status plant populations, especially thinning that would create openings in the forest. The Proposed Action includes invasive plant and pathogen controls (SPR-BIO-3) to manage the spread of invasive non-native plants and pathogens into adjacent populations of special-status plants by implementing best management practices (BMPs) such as prevention training, pre-implementation site assessments for invasive plant infestations, and designated equipment and vehicle cleaning and inspection areas. Impacts on special-status plants would be less than significant.

**Fish.** The Proposed Action includes implementation activities that would occur within and adjacent to habitats that support special-status fish species. The Proposed Action would: 1) replace stream crossing structures to allow for fish passage during operations; 2) remove haul roads following completion of forest and aquatic restoration activities; 3) place large wood in streams to create instream structures using heavy equipment to push or pull large trees into the stream or using chainsaws to drop wood in the channels; and 4) plant trees in riparian corridors. Depending on habitat conditions, these actions could increase sediment delivery to streams that support special-status fish and could result in impacts on special-status fish species or their habitat during operations.

The Proposed Action would improve fish passage at culverts and remove legacy roads and stream crossings, which would improve habitat conditions for fish in the long-term. However, these actions could increase sediment delivery to area streams in the short term. Increased sediment delivery could adversely affect spawning and rearing habitat for special-status<sup>5</sup> fish species in the first winter following road treatments as the re-established channels stabilize. Many of the tributaries are currently buried and would not transport as much sediment as an unburied channel because of the lack of delivery pathways from adjacent slopes. Proposed Action implementation activities associated with heavy equipment would occur during the non-rainy season (PSR-HYDRO-5). Stream crossing excavations and culvert replacements would occur in dry channels or in channels where stream flow is diverted around the excavation site (PSR-HYDRO-6). A fish rescue and relocation protocol would be implemented when conducting dewatering activities within special-status fish-bearing streams. The Proposed Action would follow all ESA and CESA documentation requirements (PSR-BIO-12). Erosion control measures such as placing mulch to reduce runoff into stream channels would be implemented (PSR-HYDRO-8 and PSR-BIO-13) to reduce project-related sediment delivery into area streams. Large wood encountered during stream crossing excavations would be retained on site or used as in-channel habitat (PSR-BIO-10). Equipment exclusion zones would be set to buffer perennial, intermittent, and ephemeral streams from activities on dry lands (i.e., those not associated with stream crossings, instream large wood placement, and road removal operations; PSR-HYDRO-1).

---

<sup>5</sup> Special-status wildlife species are defined as those listed, proposed, or under review as threatened or endangered under the federal ESA and/or CESA or designated as a state species of special concern.

The Proposed Action would have a less-than-significant short-term impact on special-status fish species and their habitat from sediment delivery to streams from road and stream crossing modifications and removal and would result in long-term benefits to fish and their habitat by improving fish passage and reducing the overall sediment load into streams.

Large wood would be placed into the channel by pushing over alders along the streambank, directly placing conifer logs/rootwads with an excavator, or felling trees using a chainsaw. The intent of this activity is to aid in the development of complex fish habitat by creating areas of lower velocity during higher flows, providing additional instream cover, scouring pools, and recruiting wood. The placement of large wood in streams would improve habitat conditions and be beneficial for fish. While individual fish may be flushed from cover areas when logs or whole trees are set into the creeks, this disturbance is expected to be minor and very short lived because individual fish should easily move short distances away from the wood placement areas to find cover. The Proposed Action would follow all ESA and CESA documentation requirements (PSR-BIO-12). The Proposed Action would have a less-than-significant impact on special-status fish species from placement of large wood and large wood structures.

If water drafting or pumped diversions become necessary components of the Proposed Action, pumping would be conducted as described in the NMFS Water Drafting Specifications (NMFS 2001; PSR-HYDRO-11). Screening devices would be used for water drafting pumps to minimize removal of aquatic species, including juvenile fish, amphibian egg masses, and tadpoles, from aquatic habitats. Drafting sites would be planned to avoid adverse effects to special-status aquatic species and associated habitat, instream flows, and depletion of pool habitat. Water drafting/pumping would have a less-than-significant impact on special-status fish and amphibian species.

Because forest thinning operations would occur within stream zones, at least 60% of canopy cover adjacent to streams would be retained so that water temperature would not increase. Forest thinning operations would have a less-than-significant impact on special-status fish species.

Planting of riparian trees along the mainstem of Prairie Creek would eventually provide future large wood for natural recruitment to the channel. These activities would neither encroach into the stream channel nor result in increased sediment delivery to Prairie Creek. Planting of trees in the Prairie Creek riparian zone would result in a long-term beneficial impact on special-status fish species or their habitat.

**Amphibians.** There are four amphibian species within the project area that primarily inhabit aquatic habitats: southern torrent salamander, Pacific tailed frog, northern red-legged frog, and foothill yellow-legged frog. As discussed above, seeps, springs, streams, rivers, and riparian habitats that support these species are present within the project area. The Proposed Action includes project components that would occur within and adjacent to habitats that support these special-status amphibian species, including: 1) replacing or removing stream crossing structures to reestablish sections of the natural drainage networks and reduce sediment delivery from inboard ditches and road surfaces; 2) removing haul roads following completion of forest and aquatic restoration activities; 3) placing large wood in streams using heavy equipment to push or pull large trees into the stream or using chainsaws to drop wood in the channels; and 4) planting trees in riparian corridors. These actions could result in direct impacts on individuals; change in canopy coverage, which could warm ground and water temperatures; and increased sediment delivery to streams that support habitat for these special-status amphibians.

Portions of the Proposed Action that could lead to increased sedimentation would occur during the non-rainy season (PSR-HYDRO-5). Stream crossing excavations and culvert replacements would be implemented in dry channels or in channels where stream flow is diverted around the excavation site (PSR-HYDRO-6). Equipment exclusion zones would be established for perennial, intermittent, and ephemeral streams for forest thinning activities on dry lands (i.e., those not associated with stream crossings, instream large wood placement, and road removal operations; PSR-HYDRO-1). Erosion control measures, such as placing mulch to reduce sediment delivery into stream channels, would be implemented (PSR-HYDRO-8 and PSR-BIO-13). Increased sedimentation in the project area would not reach levels detrimental to special-status amphibians during implementation and the Proposed Action would have a less-than-significant short-term impact from sediment delivery into streams that provide habitat for southern torrent salamander, Pacific tailed frog, northern red-legged frog, and foothill yellow-legged frog. The Proposed action would result in long-term benefits to amphibian habitat by reducing the overall sediment load into the streams.

Proposed Action activities are anticipated to primarily occur during the dry season (i.e., summer and fall months). However, implementation activities may extend into winter. Amphibians breeding and metamorphosing in aquatic habitats have the potential to be present and directly affected by Proposed Action activities (Table 8). Amphibian survey requirements, habitat modification, and operational restrictions for all activities would be implemented in conformance with CDFW CESA requirements (PSR-BIO-12). A foothill yellow-legged frog survey would be conducted prior to operations to determine whether frogs are occupying the project site (PSR-BIO-14). If foothill yellow-legged frogs, or other amphibians are found to be occupying a site, then protection measures would be implemented to minimize take of individuals (PSR-BIO-14). Prior to implementation of activities on dry lands, (i.e., those not associated with stream crossings, instream large wood placement, and road removal operations) equipment exclusion zones (PSR-HYDRO-1) would be established in areas near streams. Water drafting requirements (PSR-HYDRO-11) would be employed. The Proposed Action would have a less-than-significant impact on special-status amphibian species.

The Proposed Action includes forest thinning operations within stream zones. At least 60% of canopy cover adjacent to streams would be retained so that sustained increases in water-temperature would not occur in Pacific tailed frog and southern torrent salamander habitat. After thinning treatments, the forest canopy would be more open in the short term, resulting in more sunlight reaching the forest floor, which can elevate stream temperatures and dry the forest floor. However, the canopy would close within 5 to 10 years of implementation and establishment of stream buffers with their associated canopy retention measures would not result in sustained increases in water temperatures. The impacts of the Proposed Action on southern torrent salamanders and tailed frogs would be less than significant.

Planting of trees along streams in the project area would eventually provide future large wood for natural recruitment to the channel. These activities would neither encroach into the stream channel nor result in increased sediment delivery. Planting of trees within the riparian zone would have a less-than-significant impact on special-status amphibian species or their habitat.

**Birds.** The Proposed Action includes activities that could result in habitat and noise disturbance by removing trees and vegetation and use of equipment, which could result in disturbance to or mortality of nesting birds. Potential impacts could result from adult nest abandonment due to noise above ambient conditions (e.g., from chainsaws or heavy equipment), as well as habitat removal resulting in physical harm to young or eggs. Special-status species that have the potential to be

present include marbled murrelet, northern spotted owl, raptors (white-tailed kite, northern harrier, bald eagle, American peregrine falcon), willow flycatcher, Vaux's swift, olive-sided flycatcher, and yellow warbler.

Marbled murrelet are known to exist in the old-growth stands in the project area and have the potential to be impacted by implementation activities that occur within 0.25 mile of their breeding habitat during the breeding season. Bird species, especially marbled murrelet, would benefit from the forest thinning activities, which would promote the development of late successional conditions more rapidly than is currently occurring in the overstocked stands. Improved late successional conditions would aid in connecting isolated marbled murrelet stands in Redwood Creek and Prairie Creek. Forest restoration activities would retain all trees that are 30 inches DBH or larger (PSR-BIO-5). The Proposed Action also incorporates wildlife tree retention standards (PSR-BIO-15), which would preserve suitable nesting structure within the project area, and would conform with all minimization measures and requirements identified in USFWS's Biological Opinion or CESA documents (PSR-BIO-7). Several measures are proposed for implementation as part of the ongoing ESA consultation for the Proposed Action, including the following: 1) All above-ambient-noise-producing work that would occur during the marbled murrelet noise restriction period (March 24 to September 15) within 1,320 feet (0.25 mile) of suitable marbled murrelet nesting habitat would comply with the USFWS noise restriction guidelines, be restricted to between 2 hours after sunrise to 2 hours before sunset, and/or comply with measures specified in the USFWS Biological Opinion; and 2) Contractors and RNSP staff working in the project area would pack out all food scraps and trash, including fruit cores and peels and other uneaten food items, to ensure that corvids and other murrelet predators are not increasingly attracted to the vicinity of suitable marbled murrelet habitat during and upon completion of project work. The Proposed Action would have a less-than-significant impact as a result of noise disturbance on marbled murrelet and a beneficial impact as a result of developing late-successional forest conditions.

Similar to marbled murrelets, forest thinning of overstocked stands and removal of roads has the potential to result in disturbance on nesting spotted owls from noise and habitat removal. The Proposed Action would result in improvements in northern spotted owl habitat by increasing the forest floor shrub layer, which would provide habitat for small mammal prey species (e.g., voles and woodrats). There is the potential that nesting northern spotted owl could be affected by noise or habitat removal resulting from the Proposed Action. Forest restoration activities would retain all trees that are 30 inches DBH or larger (PSR-BIO-5). The Proposed Action also incorporates wildlife tree retention standards (PSR-BIO-15), which would preserve suitable nesting structure within the project area, and would conform with all surveys, minimization measures, and requirements identified in USFWS's Biological Opinion or CESA documents (PSR-BIO-7). Several measures are proposed for implementation as part of the ongoing ESA consultation for the Proposed Action, including the following: 1) Active northern spotted owl nests would be buffered from implementation activities, with the buffer widths and any associated thinning activities within the buffers determined through consultation with the USFWS and/or CDFW; and 2) Forest canopy would average at least 60% over forest restoration units. The Proposed Action would have a less-than-significant impact as a result of noise disturbance or habitat removal on northern spotted owl and a beneficial impact as a result of developing late-successional forest conditions.

There are several special-status raptor species that have been recorded in the project area or for which suitable foraging or nesting habitat is present, including American peregrine falcon, northern

harrier, white-tailed kite, and bald eagle. Peregrine falcon foraging habitat is present, but no nesting habitat is present; therefore, the species is not likely to be affected because it can move to other foraging habitats. Northern harriers nest in grasses or wetland vegetation, and thinning operations would not expect to affect habitats that would support nesting. Similar to marbled murrelet and northern spotted owl, thinning of overstocked stands would result in higher-quality nesting habitat for bald eagle and possibly white-tailed kite through the development of an advanced-successional conifer forest at a more rapid rate than if treatments were not conducted. There is a potential that noise created from thinning operations and habitat improvement actions could impact these species if they are breeding in the area. Project activities that modify or disturb vegetation would not occur during the peak nesting season between May 1 to June 30 to avoid nesting migratory birds, and if any vegetation manipulation or road removal is deemed necessary during the typical breeding period (May 1 to July 31), an RNSP biologist would conduct weekly breeding bird surveys within the area of potential disturbance. If occupied nests are detected, work would either be suspended until the birds have fledged, or a spatial buffer would be applied to protect the nest. The size of the spatial buffer would be determined by the RNSP biologist based on the species found and the nest site specifics (PSR-BIO-6). The Proposed Action would conform with all minimization measures and requirements identified in CESA documentation or USFWS's Biological Opinion (PSR-BIO-7). Implementation activities would not occur within raptor temporal and spatial buffers (PSR-BIO-8). The Proposed Action would have a less-than-significant impact as a result of noise disturbance or habitat removal on American peregrine falcon, white-tailed kite, bald eagle, and northern harrier, and a beneficial impact on bald eagle and northern harrier as a result of developing late-successional forest conditions.

Willow flycatcher is known to occur in the riparian woodlands along Prairie Creek; however, occurrences of breeding willow flycatchers in Humboldt County are currently rare and localized (Hunter et al. 2005). This species is unlikely to be affected by the more upslope forest thinning or road rehabilitation and removal operations because their preferred multi-storied deciduous riparian stands are generally located along the low-gradient habitats found along the main channel of Prairie Creek. There is the potential that instream wood placement could affect this species, if present. CDPR and NPS would conduct nesting bird surveys as part of the Proposed Action in accordance with PSR-BIO-6. The Proposed Action would conform with all minimization measures and requirements identified in CESA documentation or USFWS's Biological Opinion (PSR-BIO-7). The Proposed Action would have a less-than-significant impact on willow flycatchers from noise disturbance or habitat removal.

Vaux's swift, olive-sided flycatcher, and yellow warbler are also special-status migrants to the area. As discussed above, Vaux's swift is present in Humboldt County from mid-February through mid-October, with most activity occurring between early-April and mid-October, olive-sided flycatcher between mid-April and late September, and yellow warbler between mid-April and late October (eBird 2019). Thinning of overstocked stands would result in higher-quality nesting habitat for Vaux's swifts, which nest in tree holes or cavities found in late-successional forest. However, there is a potential for habitat removal through tree removal or noise disturbance as a result of implementing the Proposed Action. CDPR and NPS would conduct nesting bird surveys as part of the Proposed Action in accordance with PSR-BIO-6. The Proposed Action would conform with all minimization measures and requirements identified in CESA documentation or USFWS's Biological Opinion (PSR-BIO-7). The Proposed Action would have a less-than-significant impact as a result of noise

disturbance or habitat removal on Vaux's swift, olive-sided flycatcher, and yellow warbler, and a beneficial impact on Vaux's swift as a result of developing late-successional forest conditions.

**Mammals.** The Proposed Action would promote tree species composition and structural changes that together favor the development of a late-seral forest conditions. Features such as hollows in large trees, snags, and complex structure would benefit habitat for special-status mammals such as Sonoma tree vole, Townsend's big-eared bat, pallid bat, Humboldt marten, and fisher. The preferred habitat of the white-footed vole is most associated with young alder riparian stands (Bean et al. 2016) and project-related impacts to these habitats have the potential to result in direct mortality to individuals. However, impacts would not result in population-level changes and would be less than significant. The vegetation to be removed is likely too young to support Sonoma tree vole nesting habitat, which is associated with late-seral/old-growth forest attributes such as large diameter, older, and variably sized trees (Dunk and Hawley 2009); therefore, no impacts are anticipated. Similarly, Townsend's big-eared bat and pallid bat roosting habitat includes late-seral attributes such as tree cavities and basal hollows in large trees and Humboldt marten or fisher habitat consists of advanced-successional conifer forest with denning features in hollow trees. A portion of intermediate trees or snags would be retained (PSR-BIO-4), the largest trees in the stand would be retained (PSR-BIO-5), striking residual old-growth trees would be avoided (SPR-BIO-11), and wildlife trees that have characteristics such as cavities, hollows, and snag tops would be retained (PSR-BIO-15). All snags that do not pose a threat to human safety would be retained. In addition, road removal activities associated with the Proposed Action would result in reduced habitat fragmentation, reduced generalist carnivores that prey on forest specialists such as the Humboldt marten and Pacific fisher, and reduced human disturbance of these species. The expected increase in the forest floor shrub layer would provide increased understory habitat for small mammal species (e.g., voles and woodrats) that are the prey base for larger animals such as Pacific fisher and Humboldt marten. The Proposed Action would have a less-than-significant short-term impact on special-status mammals from habitat removal and a long-term benefit.

**B.** The sensitive natural communities *Picea sitchensis* (Sitka spruce forest) and the *Sequoia sempervirens* (Redwood forest) occur in the project area and would be impacted during the Proposed Action. The Proposed Action includes forest thinning and road removal throughout the project area. The forest stands that would be thinned during the Proposed Action consist of unnaturally dense young forests that have been degraded by historical land use activities. Consistent with the *RNSP General Management Plan/General Plan* (GMP/GP; NPS/CDPR 1999), the Proposed Action would rehabilitate sensitive natural communities within the project area and restore ecosystem function and processes to these degraded habitats.

The Proposed Action includes riparian restoration activities, which would improve vegetative conditions along Prairie Creek and the adjacent wetlands by shading out invasive reed canary grass over time. Sitka spruce, redwood, big leaf maple, or other appropriate species would be planted along well-drained soils within 200 feet of both sides of the stream channel. These activities would improve the conditions of riparian zones in the project area that have been altered by past road building, timber harvesting, and associated bank erosion and landslides.

Pre-implementation special-status plant surveys (SPR-BIO-1) in the project area would identify sensitive natural communities prior to the start of implementation activities. Any sensitive natural communities that are not a component of the Proposed Action, such as forest thinning and riparian planting, would be clearly marked with an appropriate buffer and avoided (PSR-BIO-2). If avoidance

is not possible, then CDFW would be consulted to determine a mutually agreeable strategy. In most cases, the temporary disturbance on sensitive natural communities associated with the Proposed Action would result in a net benefit to the ecosystem. Invasive plant and pathogen control (SPR-BIO-3) would reduce the spread of invasive non-native plants and pathogens into adjacent sensitive natural communities by implementing BMPs such as prevention training, pre-implementation site assessments for invasive plant infestations, and designated equipment and vehicle cleaning and inspection areas. In addition, the Proposed Action would retain an equipment exclusion zone of 25 to 100 feet from streams (PSR-HYDRO-1). Impacts on riparian habitat and other sensitive natural communities would be less than significant.

**C.** The Proposed Action could temporarily impact state or federally protected wetlands in the project area during road reoccupation and removal (i.e., culvert upgrades and stream crossing removal) and large wood placement. However, these activities would have a long-term benefit on wetlands by reducing sediment input and stream crossing removal would result in additional wetland and riparian areas that were previously occupied by road prisms or culverts. Riparian and wetland plantings would also have a long-term benefit on wetlands in the project area. To minimize impacts on wetlands, the Proposed Action would include special-status plant surveys conducted by a Park plant ecologist prior to the start of implementation activities (SPR-BIO-1). Any individual or populations of rare, threatened, endangered plants, those listed as CNPS Ranks 1 and 2, or sensitive natural communities identified during pre-implementation special-status plant surveys (SPR-BIO-1) would be clearly marked with an appropriate buffer and avoided (PSR-BIO-2). If avoidance is not possible, then CDFW would be consulted to determine a mutually agreeable strategy. The Proposed Action would retain an equipment exclusion zone of 25 to 100 feet from streams (PSR-HYDRO-1). In addition, decontamination of heavy equipment would occur prior to delivery onto Park lands (SPR-HYDRO-3) and trees would be fully suspended in the air when travelling near streams (PSR-HYDRO-4). Work in wetland or riparian areas and stream channels may require heavy equipment to cross wetlands to access treatment sites. Crane mats or other appropriate cover material would be placed along the heavy equipment access routes that cross wetlands and herbaceous-dominated habitats (e.g., pasture, grasslands; PSR-BIO-16) to avoid wetland impacts. The Proposed Action would have a less-than-significant impact on wetlands.

**D.** The Proposed Action is designed to increase the development of late-successional forest structure through thinning of dense stands, which would release the retained trees and improve their growth rates. One of the main goals of the Proposed Action is to use the thinning operations to improve migration corridors for native wildlife species that are dependent on late-successional forest conditions. For example, thinning in the Streeflow Creek and May Creek areas would improve the ability of wildlife species to move, migrate, and promote gene flow between the old-growth stands in north Prairie Creek and those in the southern watershed and the Redwood Creek watershed. This would result in long-term benefits for several species including, but not limited to, marbled murrelet, northern spotted owl, fisher, and Humboldt marten. In addition, removal of roads and crossings would reduce habitat fragmentation and improve the ability of fish and amphibians to move between habitats needed for different life-history stages and use areas where access is currently limited. The stabilization of erosion sites along the road system would reduce sediment delivery and improve anadromous fish spawning habitat in fish-bearing streams. Finally, the introduction of large wood in the project area streams would improve the ability of juvenile anadromous salmonids to find cover and survive high-flow periods during their transition period from their natal streams to adult habitat.

Wildlife movement could be affected during active implementation operations. However, these impacts would be short term and there are nearby unaffected areas to which wildlife could move during implementation activities. Bird surveys would be conducted during the breeding season, and if a nest is documented, a noise and habitat disturbance buffer would be implemented until the young have fledged (PSR-BIO-6 and PSR-BIO-7). The presence of any northern spotted owl would be identified through protocol-level surveys (USFWS 2012) for activities scheduled to occur during the breeding season that have the potential to impact the species. Suitable northern spotted owl nesting and roosting habitat would be retained (PSR-BIO-5 and PSR-BIO-15). Protective measures would minimize impacts on marbled murrelets and their nesting habitat during the breeding season. The impact of the Proposed Action on any native resident or migratory fish or wildlife species, established native resident or migratory wildlife corridors, or native wildlife nursery sites would be less than significant.

Non-special-status nesting birds are also protected by California Department of Fish and Game Code Sections 3503 and 3503.5, which indicate that "It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto" and "It is unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Although not a comprehensive list, the following species have been documented to occur in Humboldt County between early-March and mid-October (eBird 2019) and may breed in the project area (see location and timing details given above): Pacific-slope flycatcher, Swainson's thrush, Wilson's warbler, and black-headed grosbeak. CDPR and NPS would conduct nesting bird surveys as part of the Proposed Action in accordance with PSR-BIO-6. The Proposed Action would conform with all minimization measures and requirements identified in CESA documentation or USFWS's Biological Opinion (PSR-BIO-7). Spatial and temporal buffers would be established around all identified raptor nests (PSR-BIO-8) during the nesting period. The Proposed Action would have a less-than-significant impact on non-special-status active bird nests.

**E.** The Proposed Action is being conducted in conformance with the policies and directions of CDPR and NPS. There would be no conflict with local policies or ordinances protecting biological resources.

**F.** There are no applicable Habitat Conservation Plans, Natural Community Conservation Plans, or other such approved local, regional, or state habitat conservation plan for these state and federal lands. The Proposed Action would comply with existing park management plans and policies. There would be no conflict with any conservation plans.

**Cumulative Impacts.** The Proposed Action is designed to result in improved habitat features for avian, terrestrial, and aquatic-dependent species in the long term. Short-term impacts on biological resources would be less than significant. Future regional projects considered as part of the cumulative analysis would also be subject to permitting and environmental review processes which would avoid, minimize, or mitigate impacts on biological resources. The Proposed Action, when combined with future actions in the region, would not result in cumulatively considerable impacts.

### *3.6.3 No Action Alternative Impacts*

Under the No Action Alternative, the development of forest stands would continue toward late successional conditions, but at a much slower rate than under the Proposed Action. NPS and CDPR could continue to treat stands on a project-by-project basis as funding allows, but such an approach

would be fragmented and would occur over smaller areas as compared to the Proposed Action. Compared to the Proposed Action, the No Action Alternative would not only result in fewer short-term operations-related impacts on wildlife resources, but also maintain the current level of chronic legacy effects of previous timber and road management actions. In addition, the risk of road system sediment delivery to streams and associated impacts on aquatic habitats would likely increase under the No Action Alternative as old culverts and substandard crossings fail at an increasing rate. This could result in impacts on fish and amphibians by hindering migration and reducing habitat.

## 3.7 Cultural Resources

### 3.7.1 Existing Conditions

Under NEPA, cultural resources are historic properties (prehistoric or historic districts, sites, buildings, structures or objects) that are eligible for listing in the National Register of Historic Places (NRHP).

To be eligible for listing in the NRHP, a property must have significance, integrity, and generally must be at least 50 years old. A historic property can be significant under one more of the following criteria. Historic properties include those: a) that are associated with events that have made a significant contribution to the broad patterns of our history; b) that are associated with the lives of significant persons in our past; c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or d) that have yielded or may be likely to yield, information important in history or prehistory. An NRHP-eligible property must also possess one or more of the seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association.

Under CEQA, cultural resources are resources of architectural, historical, archaeological, and cultural significance that are: 1) eligible for listing in the California Register of Historical Resources (CRHR); 2) included in a local preservation register; 3) identified as significant in a cultural resources survey; or 4) determined significant by the CEQA lead agency.

To be eligible for listing in the CRHR, a resource must have significance, integrity, and generally must be at least 45 years old. A resource can be significant under one or more of the following criteria: 1) associated with events that have made a significant contribution to the broad patterns or California's history and cultural heritage; 2) associated with the lives of persons important in our past; 3) embodies the distinctive characteristics of a type, period, region, or method of construction or represents the work of an important creative individual, or possesses high artistic values; or 4) has yielded, or may be likely to yield, information important in prehistory or history. A CRHR-eligible property retains integrity, defined as the authenticity of the resource's physical identity.

This analysis uses the term "potential cultural resources" to describe properties that may be NRHP- or CRHP-eligible but that have not been evaluated, and "cultural resources" to describe properties that have been determined eligible for the NRHP, the CRHR, or both.

The CEQA checklist questions regarding impacts divide cultural resources into two categories: historical resources (standing structures and buildings) and archaeological resources (surface or buried sites, features, and objects of any era). Historic-era buried sites, surface artifact scatters, or road grades are examples of archaeological resources. Bridges, culverts, or standing outbuildings are examples of historical resources.

The likelihood that cultural resources in the project area would be adversely impacted depends on how the area was used in the past, the potential for preservation of cultural materials that would have been left behind by those uses, and the potential for implementation activities to encounter such materials. A review of the environmental and cultural history in the vicinity forms the basis for identifying what kinds of cultural resources could be present and assessing the potential for adverse project impacts. The following review is summarized from the *Research Design and Cultural Resources Inventory Work Plan for the Redwoods Rising Project, Greater Mill Creek and Greater Prairie Creek, Humboldt and Del Norte Counties, California* (Allen et al. 2018).

The project area is in the northern part of the Coast Ranges geomorphic region, a series of low mountain ranges shaped by the San Andreas Fault system (CGS 2015). Streams and rivers occupy valleys and gorges, and level ground is rare. At present, natural vegetation communities consist mostly of redwood composite habitat, which hosts mule deer, pronghorn, and elk, as well as a wide variety of small mammals and birds. The natural environment would have varied in the past with climatic shifts, affecting the location and density of resources available to people living in the area (Benson et al. 2002).

A variety of cultural themes could be applicable to the project area, including specific temporal and cultural sequences for the northern coast of California and the Great Basin. The general summary presented here describes these themes within the context of the geological epochs (e.g., Pleistocene and Holocene) in which they occurred, and in terms of geographically widespread general cultural traditions (Periods), and locally distinct expressions of those Periods (patterns).

The oldest archaeological sites in the north Coast Ranges area likely date to the late Pleistocene, known as the Paleoindian Period (locally expressed as the Post pattern). However, none of the sites attributed to this period are securely dated, and artifacts generally consist only of isolated stone tools.

In the Early and Middle Holocene (about 10,000 to 4,500 years ago), the Borax Lake pattern (a local expression of the Middle and Lower Archaic Periods) was found in the north Coast Ranges. The pattern is characterized by projectile points, but also includes the introduction of millstones and manos, milling slabs, drills, cobble tools, and flaked stone crescents. In the interior, Borax Lake pattern sites "reflect a subsistence orientation around hunting and seed gathering, with little or no evidence of fishing" (Justice 2002). However, on the coast during the Middle Holocene (coinciding with the latter part of the Borax Lake pattern), net sinkers and bone fishhooks are evidence of a focus on fishing. Mortars and pestles also appear on the coast, as does asphaltum basketry (Erlandson 1997).

In the Late Holocene (about 4,500 years ago to European American contact), sites before 1,500 years ago are attributed to the Mendocino pattern (a local expression of the Upper Archaic Period). During this time, residential patterns shifted to the use of specialized hunting camps in upland settings with more permanent villages in riverine and coastal environments (Hildebrandt 2007). Artifact assemblages included specialized lithic tools, manos, and milling slabs. After 1,500 years ago, archaeological assemblages indicate increased coastal resource use and permanent residential sites (Hildebrandt 2007). This is known as the Emergent Period; the local expression is the Gunther or Tuluwat pattern. Sites from this period are mostly coastal, with a strong focus on fish, shellfish, and marine mammal procurement. Typical artifacts include net sinkers, bone and antler spears, harpoons, and hooks. The faunal assemblages also represent this focused subsistence pattern with a high

occurrence of marine animals (Hildebrandt 2007). These sites correspond closely with ethnographically reported cultures.

The project area is in the traditional territory of the Yurok, an Algic-speaking group whose ancestral territory occupies a region generally between the modern town of Trinidad and the mouth of the Klamath River, and includes 42 miles of the Klamath River watershed and 30 miles of Pacific Coast (Huntsinger and McCaffrey 1995). Ethnographically recorded villages were concentrated along the Klamath River corridor approximately between the ocean and Weitchpec, while hunting, fishing, gathering, and religious activities occurred throughout the territory (Huntsinger and McCaffrey 1995, Yurok Tribe 2018).

At the time of European American contact, the Yurok were using a variety of coastal and terrestrial resources, including hunting large mammals such as bear, deer, and elk, along with a variety of small game. Chinook and Coho salmon, steelhead, Pacific lamprey, eulachon, coastal cutthroat, and green sturgeon were caught with a variety of spear, harpoon, and trap methods along the Klamath and its tributaries (Driver 1939). Smelt were caught using nets in the ocean surf. The prairies along Prairie Creek were sources of manzanita, nettle, iris, huckleberry, soap root, pepperwood, bear grass, and acorns. These prairies were managed with burning to maintain subsistence resources.

Early European explorers are known to have sailed towards the north Coast Ranges area in the 1500s, and Captain George Vancouver's expedition passed by 1792. Although these parties did not appear to have spent more than a few days at anchor in the area, Native American communities were impacted by introduced diseases prior to land-based contact, and Russian sailors in 1803 found Native villages deserted (Erlandson and Bartoy 1995; Bearss 1969). The first documented European American exploration on land was by fur trapper Jedediah Smith's party in 1828. The remote region was still little visited until the Gold Rush of the 1850s, which spurred population growth and the development of infrastructure. This growth also ushered in the state-sanctioned genocide of Native American peoples, which resulted in the murder of thousands of men, women, and children in northern California, primarily by roving militia groups and the United States military (Heizer 1993). Native communities also experienced the degradation of their subsistence base, forced removal from their homes, and formal and informal suppression of language and culture. Nevertheless, tribal communities persisted and continue to practice cultural traditions; the Yurok are now the largest Native American group in California and are a vibrant part of the communities in northwest California.

While the Gold Rush brought miners in great numbers to northern California, few settled in Humboldt County. One of the most consistently profitable districts, the Orick/Gold Bluff Beach District, is located in the project area. Mining began at Gold Bluffs Beach in 1852 where deposits occurred along the beach. Prospectors at first used sluice boxes on the beach, and later mining companies used larger-scale placer and hydraulic methods. Other than Gold Bluffs, most mines in the project area were unprofitable and quickly abandoned. While exploration for mining was generally unsuccessful, it did lead to homestead claims. Lands along Prairie Creek became available for public sale between 1878 and 1882. While timber speculators purchased most of the land, some offered long-term leases to ranchers. Some of the Gold Bluff miners stayed in the project area and established ranches.

Logging was booming in Humboldt County by the 1850s. Logging companies and mills shifted from individual concerns to conglomerate companies and back with boom and bust cycles. Logging

around Humboldt Bay boomed in the 1850s, while milling and logging near the mouth of the Klamath and the town of Orick did not begin until the 1930s. A variety of mills operated in Orick until the mid-1950s. Much of Arcata Redwood Company lands were acquired for Redwood National Park in 1968, after most of it had been logged. Logging declined with increasing environmental regulation and decreasing old-growth. The town of Orick, once a thriving post-war community, could not sustain its population as local dairy and lumber industries failed in the 21st century.

Given the cultural history described here, a number of types of cultural resources could be present in the project area, including (but potentially not limited to) the following:

- Precontact Sites: Village sites, short-term or temporary habitation sites, resource procurement or processing locations, lithic scatters, quarries, or isolates, rock art, rock features, or other ceremonial or sacred places, and trails or other transportation features
- Historic-era Sites: Native American village and habitation sites with evidence of historic contact, direct or indirect evidence of European American and Indian conflicts or warfare, mining equipment and infrastructure, agricultural equipment and infrastructure, historic debris scatters and dumps, borrow and prospect pits, linear features (roads, rail lines, utilities, and trails), domestic residences, townsites, and a variety of logging-related sites (spring boxes, notched stumps, blaze marks, steam donkeys, flumes, and others)

A number of cultural resources and potential cultural resources are recorded in the project area. A search of the California Historical Resources Information System was conducted in June 2018 and records provided by NPS and CDPR were reviewed. In addition, a cultural resources survey of Phase 1 project areas was conducted in 2018. The records searches and survey revealed 42 resources. These include the following: historic-era isolated finds, such as a single piece of equipment (10); road segments older than 45 years (10); historic-era debris scatters or dump sites (five); precontact occupation sites (four); historic-era agricultural complexes (ranches, homesteads) and other structures (four); bridges older than 45 years (four, plus one more that is part of a road counted above); logging camps (two); ethnographic locations (two); and a multi-component site with a historic mine and precontact lithic scatter.

Forty-one of these resources have not yet been fully evaluated to determine NRHP or CRHR eligibility and should be considered potential cultural resources. One precontact occupation site, the Espa Lagoon Village Site (CA-HUM-0133), has been nominated to the NRHP, but it is not in the Phase 1 project area.

Of these 42 resources, 17 are in the Phase 1 project area, and none have been fully evaluated for NRHP or CRHR eligibility. These potential cultural resources in the Phase 1 area include all five historic debris scatters, all four bridges, three road segments (one of which includes the fifth bridge), and five historic-era isolated finds.

### 3.7.2 Proposed Action Impacts

Would the project:		Less Than Significant Impact	No Impact
a.	Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b.	Cause a substantial adverse change in the significance of an archaeological resource?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

<b>Would the project:</b>		<b>Less Than Significant Impact</b>	<b>No Impact</b>
c.	Disturb any human remains, including those interred outside of dedicated cemeteries?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

In general, ground disturbance has the potential to adversely affect the integrity of archaeological resources. Archaeological sites may have features or components that are not visible from the ground surface. These elements may be damaged by digging through the intact stratigraphy of an archaeological site, thereby compromising the ability of those resources to be eligible for or listed in the NRHP or CRHR. Modification or demolition of a structure, or change in its setting or location, could compromise the ability of historical resources to be eligible for the NRHP or CRHR. Potential impacts of the various activities proposed as part of the Proposed Action include the following:

- Forest thinning could result in ground disturbance where heavy equipment traverses off-road areas, where trees fall or are cable-yarded, or where fixed equipment is anchored in the ground. Falling trees or moving equipment could also potentially damage structures.
- Placement of large wood for aquatic restoration could result in ground disturbance where vegetation is pulled from streambank to stream channel, or where heavy equipment traverses off-road areas.
- Riparian planting could result in ground disturbance where trees and understory vegetation is planted, or where invasive vegetation is removed by methods that include root removal.
- Road removal could result in partial or total demolition of historic road grades, or damage to historic structures such as bridges or culverts.
- Road improvements could result in the removal or modification of bridges or culverts.

Projects with federal funding or approvals, or that take place on NPS property, are subject to review under Section 106 of the NHPA. NPS is developing a Programmatic Agreement (PA), in consultation with the SHPO and Native American tribes, for future phases of the Proposed Action that will assist the agency in meeting its consultation requirements under Section 106 of the NHPA and its implementing regulation at 36 CFR 800. The PA will be attached to the final Finding of No Significant Impact.

**A.** Five potential historical resources have been identified in the Phase 1 project area. All five are log bridges, and one is part of a combined property, the Watch Step Road and Bridge. All are in the Streelow-Gold-Bluffs area except for Little Lost Man Creek Bridge, which is in the Berry Glen area. Implementation activities planned in both areas consist of forest thinning by cable-yarding, lop-and-scatter, and skyline operations, as well as road reoccupation and removal. Forest thinning would not affect bridges, but they may be removed or altered as part of road removal and improvement activities. Preliminary evaluation indicates that these structures are not NRHP or CRHR eligible. If further research and consultation indicates that any of the bridges are eligible for the NRHP or CRHR, they would not be altered or removed.

For future phases of the Proposed Action, project areas would be surveyed for historical resources prior to implementation. For projects with NPS involvement, a survey would occur as described in the PA, which includes a detailed research design and consultation requirements. For projects without NPS involvement, reports would be submitted to and reviewed by the NCRD Archaeologist, and PRC 5024 compliance documentation would be completed (PSR-CULT-1).

The Proposed Action is not anticipated to result in substantial adverse change in the significance of a historical resource and impacts would be less than significant, because the historical resource may be completely avoided and protected from Phase 1 project activities. Future phases would be defined and implemented to avoid impacts on historical resources (as is the case for Phase 1).

**B.** Archaeological resources identified in the area of Phase 1 projects, where a cultural resources survey has been completed, include five historic-era debris scatters (three in the Streelow-Gold Bluffs area and two in the Berry Glen area), three road segments (Davidson Road, Watch Step Road and Bridge, and Squashann Creek Road; all in the Streelow-Gold Bluffs area), and five historic isolates (three in the Berry Glen area and two in the Streelow-Gold Bluffs area). Implementation activities planned in both areas consist of forest thinning by cable-yarding, lop-and-scatter, and skyline operations, as well as road reoccupation and removal.

Forest thinning would not affect the road segments, but they may be removed or altered as part of road improvement and removal activities. Preliminary evaluation indicates that the segments are not NRHP or CRHR eligible. If further research and consultation indicates that any of the road segments are eligible, they would not be altered or removed.

Forest thinning and road reoccupation and removal activities may include ground disturbance. The five debris scatters and five historic isolates would be protected unless they are determined not to be NRHP or CRHR eligible. Protection would include flagging the area and establishing a minimal 30-foot protective buffer during implementation (PSR-CULT-1) and adhering to aerial suspension removal requirements as described in SPR-CULT-4. No Proposed Action activities would be allowed to traverse the buffer area, nor would any trees be allowed to fall in the buffer area.

For future phases of the Proposed Action, project areas would be surveyed for archaeological resources prior to operations. For projects with NPS involvement, archaeological survey would occur as described in the PA, which includes a detailed research design and consultation requirements. For projects without NPS involvement, reports would be submitted to and reviewed by the NCRD Archaeologist, and PRC 5024 compliance documentation would be completed (PSR-CULT-1). Future phases would be defined and implemented to avoid impacts on archaeological resources (as is the case for Phase 1).

If archaeological materials are discovered during implementation of activities with NPS involvement, response would occur as described in the PA. For projects without NPS involvement, work would be suspended until CDPR has evaluated the find in consultation with the SHPO and Native American tribes (as appropriate; SPR-CULT-2).

The Proposed Action is not anticipated to result in substantial adverse change in the significance of an archaeological resource, and impacts would be less than significant.

**C.** No cemeteries or other locations where human remains are likely to be present have been identified in the area of Phase 1 projects, where cultural resources inventory has been completed. For future phases of the Proposed Action, project areas would be surveyed for such locations. If any are located, the following would occur:

- For activities with NPS involvement through funding or approvals, but not occurring on NPS land, human remains would be treated as described in the PA.
- For activities on NPS land, provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) would apply.

- For activities without NPS involvement, reports would be submitted to and reviewed by the NCRD Archaeologist, and PRC 5024 compliance documentation would be completed (PSR-CULT-1).

Future phases would be defined and implemented to avoid impacts on cemeteries or human remains (as is the case for Phase 1).

If human remains or suspected human remains are discovered during construction, work would stop immediately and the provisions of the PA, NAGPRA, or SPR-CULT-3 would be followed as appropriate.

The Proposed Action is not anticipated to result in substantial adverse change in the significance of a cemetery or other location where human remains may be present, and impacts would be less than significant.

**Cumulative Impacts.** Impacts from actions within the project area prior to NPS and CDPR management likely included destruction and loss of integrity of cultural resources. There have also likely been more recent impacts from such natural processes as erosion, weathering, modification of structures, and fire, as well as disturbance from use, access, vandalism, and unauthorized collection. The potential for impacts on cultural resources would continue, but adverse effects would be avoided or minimized through compliance with applicable laws. The potential for adverse impacts associated with the Proposed Action is unlikely to contribute to significant impacts to cultural resources, when combined with past, present, and reasonably foreseeable future activities.

### 3.7.3 *No Action Alternative Impacts*

Under the No Action Alternative, NPS and CDPR could continue to treat forest stands, road systems, and riparian areas on a project-by-project basis as funding allows. Projects that move forward into construction could have impacts to cultural resources, but the geographic extent of activities would probably be smaller absent a coordinated ecosystem restoration plan; therefore, there would be a lower potential for impacts. Impacts would be considered less than significant.

## 3.8 Tribal Cultural Resources

### 3.8.1 *Existing Conditions*

A tribal cultural resource is defined as a property, landscape, or object which is of cultural value to a tribe and is eligible for the CRHR or a local historic register (or is determined by the lead agency to be a tribal cultural resource). Tribal cultural resources review is required under CEQA, but not specifically under NEPA. NRHP-eligible historic properties (evaluated as cultural resources under NEPA) could include Traditional Cultural Properties (TCPs) or cultural landscapes, either of which could be eligible in part for importance to a Native American tribe. A TCP or cultural landscape that is of importance to a tribe would likely also be a tribal cultural resource under CEQA.

The four precontact sites and two ethnographic locations in the project area may be of cultural value to Yurok people, in whose ancestral homelands these resources are located. Consultation with the Yurok has not included describing these four locations as tribal cultural resources. If consultation on this draft document or other documents indicates that tribal cultural resources are present, then this document will be updated. No potential tribal cultural resources have been identified in the Phase 1 project area to date.

### 3.8.2 Proposed Action Impacts

Would the project:		Less Than Significant Impact	No Impact
a.	Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:		
	Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**A.** No tribal cultural resources have been identified in the Phase 1 project area, and Phase 1 would not result in impacts to any potential tribal cultural resources (the precontact sites or ethnographic location). For future phases of the Proposed Action, tribal consultation would occur throughout and prior to implementation planning. Projects would be defined and implemented to avoid impacts to tribal cultural resources.

The Proposed Action is not anticipated to result in substantial adverse change to a tribal cultural resource, and impacts would be less than significant.

**Cumulative Impacts.** Impacts from actions within the project area prior to NPS and CDPD management likely included destruction and loss of integrity of tribal cultural resources. There have also likely been more recent impacts from such natural processes as erosion, weathering, modification of structures, and fire, as well as disturbance from use, access, vandalism, and unauthorized collection. The potential for impacts on tribal cultural resources would continue, but adverse effects would be avoided or minimized through compliance with applicable laws. The potential for adverse impacts associated with the Proposed Action is unlikely to contribute to significant impacts on tribal cultural resources, when combined with past, present, and reasonably foreseeable future activities.

### 3.8.3 No Action Alternative Impacts

Under the No Action Alternative, NPS and CDPD could continue to treat forest stands, road systems, and riparian areas on a project-by-project basis as funding allows. Projects that move forward into construction could have impacts to tribal cultural resources, but the geographic extent of activities would probably be smaller absent a coordinated ecosystem restoration plan; therefore, there would be a lower potential for impacts. Impacts would be considered less than significant.

## 3.9 Geology and Soils

### 3.9.1 Existing Conditions

The project area lies in a tectonically active and geologically complex area, with some of the highest uplift rates and seismic activity in North America (Cashman et al. 1995). Most of the underlying bedrock in the region has been faulted, folded, and sheared by tectonic forces, making it relatively weak, easily weathered, and inherently susceptible to erosion and landsliding. The geology of the project area, and the surrounding region of northwestern California, is controlled by several parallel north-northwest trending faults, including the Bald Mountain, Grogan, Lost Man, Surpur Creek, and Coast Range Thrust faults (Figure 7; Harden et al. 1982; Cashman et al. 1995). These faults range from low-angle thrust faults to vertical faults and form the boundaries between the major lithologic units in the region.

#### 3.9.1.1 Bedrock Geology

The project area is primarily underlain by the Prairie Creek Formation (also mapped as the “Gold Bluffs Formation” in Cashman et al. 1995) and Franciscan Complex (Cashman et al. 1995, Falls et al. 2003). The southern and eastern portions of the project area are underlain by different units of the Franciscan Complex Eastern Belt. The southwestern portion of the project area (to the west of the Grogan Fault) is primarily underlain by Cretaceous-Jurassic Redwood Creek Schist and Quaternary marine terraces that form broad ridge tops.

The Prairie Creek Formation is composed of weakly consolidated shallow marine and alluvial sediments that are derived from the ancestral Klamath River. It is dominantly composed of fluvial sediments but also includes near-shore marine sands and beach and estuarine deposit (Cashman et al. 1995). The Formation is considered Plio-Pleistocene based on marine fossils. There may be fossils present in Prairie Creek Formation and Franciscan Complex bedrock, of which there are outcroppings in the project area. These fossils include a diverse assemblage of marine invertebrates. Marine vertebrate fossils are present, but scarce (Hilton 2003). While the Formation is relatively stable from a landslide perspective, it is prone to surface erosion because of its small particle size and weak consolidation.

#### 3.9.1.2 Faulting and Seismicity

The project area and surrounding region are in a seismically active area that experiences faulting along major regional tectonic plate boundaries (i.e., the Cascadia subduction zone) as well as along smaller faults within individual plates (Atwater et al. 1995, Goldfinger et al. 2012). Goldfinger et al. (2012) estimated the probability for a magnitude 8 Cascadia subduction zone earthquake event capable of producing severe groundshaking and permanent ground elevation changes along portions of the northern California, Oregon, and Washington coasts, at between 37 and 42% by 2062; and estimated a 7 to 10% probability over the same time period for a magnitude 9 earthquake. Because of its capability, recurrence interval, and timing of its last known earthquake (AD 1700), this is the largest source of consideration for earthquake hazards potentially affecting the Proposed Action.

The Grogan and Lost Man faults trend north-northwest and bisect the project area. The faults are considered quaternary, suggesting they have been active within the past 1.6 million years (Cashman et al. 1995). They are easily recognized by their topographic expression and the fact that they offset the Prairie Creek Formation deposits (Cashman et al. 1995).

### **3.9.1.3 Geomorphology**

Stream channel geomorphology in the Prairie Creek watershed is largely controlled by regional faulting, tectonic uplift, and underlying lithology (Falls et al. 2003). The orientations of major drainages within the basin reflect local faults and trend northwest to north-northwest. Secondary drainages are typically perpendicular to this northwest trend and are oriented southwest to west-southwest (Falls et al. 2003).

Prairie Creek is the largest tributary to Redwood Creek and primarily consists of a narrow, incised channel separated from a wide floodplain with well-defined banks. Channel substrate is typically silty and sandy with pebble gravel and small cobbles (Wilzbach and Ozaki 2017). Sediment erosion, transport, and deposition along Prairie Creek is summarized approximately as the following: 16% source/erosion reaches; 43% transport reaches; and 41% deposition/response reaches (Falls et al. 2003). The larger drainages on the west side of Prairie Creek typically have gentle headwater gradients in relatively wide, gently sloping valleys. Stream longitudinal profiles steepen towards the Redwood Creek confluence rather than transitioning from steep to gentle gradients as is more common for channel profiles (Falls et al. 2003). This reversed trend in stream profiles appears to be in response to regional deformation and uplift. Drainages on the east side of Prairie Creek are steeper and have headwater reaches underlain by Franciscan rocks that have been uplifted along the Lost Man fault. Inner gorges are common near the lower reaches of drainages just east of U.S. Highway 101.

### **3.9.1.4 Soils**

Soils types within the project area are dominated by the U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS 2008) Ossagon-Goldbluffs-Squashan general soil map unit. These soil types are derived from the weakly consolidated fluvial sediments of the Prairie Creek Formation and are typically deep and well drained. These soils tend to have loam to gravelly loam surface textures with 3 to 5% organic matter content and clay loam to extremely gravelly loamy sand subsoils. Other prominent general soil map units in the project area include Ladybird-Stonehill, primarily in the Skunk Cabbage Creek drainage, and Coppercreek-Slidecreek-Lacks creek, primarily in the upper May and Boyes creek drainages (USDA NRCS 2008). Ladybird-Stonehill soils are typically deep, well drained, and have gravelly loam surface textures with gravelly silt clay loam subsoils. Coppercreek-Slidecreek-Lacks creek soils are typically very deep, well drained, and have gravelly loam surface textures with very gravelly clay loam subsoils.

Management concerns with all the major soil units in the project area are seasonally saturated soil conditions, the potential for mass wasting on unstable slopes, and low soil strength. On steep, highly dissected slopes, saturation is the most common cause of soil erosion and mass wasting. Erosion on undisturbed forested mountain slopes is infrequent. Thick organic layers and soil layers with abundant pore space allow rainwater to infiltrate into the soil. Soil erosion can occur when the organic and mineral surface layers are removed or compacted as a result of logging, road building, or other disturbances. Compaction and gullying reduce the diffuse movement of water into soil and tend to increase surface runoff and erosion. The weakly consolidated sediments of the Prairie Creek Formation are readily mobilized by surface runoff, especially where the sediments have been cut and side-cast to construct roads, and natural drainage patterns have been altered by logging.

### 3.9.1.5 Landsliding/Mass Wasting

As described above, the project area is geologically diverse and has varying degrees of landslide potential and slope failure modes, both natural and disturbance-induced, and largely dependent on underlying lithology. Within the Prairie Creek Formation, landsliding typically occurs in the form of occasional rock slides and debris slides when it occurs. The Formation is generally stable from a landsliding perspective and large mass-wasting features are rare. However, hillslopes in southern and eastern portions of the Prairie Creek watershed, which are underlain by Franciscan lithologies contain active and dormant large-scale landsliding (Dell’Osso et al. 2002). This part of the watershed also contains rotational and translational landslides and earthflows.

### 3.9.2 Proposed Action Impacts

Would the project:		Less Than Significant Impact	No Impact
Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:			
Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Strong seismic groundshaking?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Seismic-related ground failure, including liquefaction?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Landslides?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
b.	Result in substantial soil erosion or the loss of topsoil?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c.	Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project and potentially result in an on-site or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d.	Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating direct or indirect substantial risks to life or property?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e.	Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f.	Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**A.** There are no mapped Alquist-Priolo earthquake fault zones within the project area. The Grogan and Lost Man faults bisect the project area. These faults are considered quaternary, which means they have likely been active during the past 1.6 million years, but further refinement of the age of their last activity is undetermined. Faults with this undifferentiated age determination are not considered active under the Alquist-Priolo Earthquake Fault Zoning Act.

Strong seismic groundshaking could occur within the project area in the event of a large magnitude earthquake on a nearby fault; however, the Proposed Action would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death, should a seismic event occur. Although those working on restoration components of the Proposed Action would be exposed to any event that might occur, the entire region is seismically active and lives with a risk of being exposed to groundshaking. The Proposed Action is specifically designed to avoid sites with potential

hazards associated with strong groundshaking. Restoration actions would avoid unstable areas, and nearby substantial earthquakes would trigger consultation and approval with an earth sciences/physical sciences professional before any treatment year (PSR-GEO-1 and PSR-GEO-2). Existing roads and landings proposed for reuse in areas susceptible to strong seismic groundshaking would be evaluated by an earth sciences/physical sciences professional who would provide necessary reconstruction and/or maintenance prescriptions (PSR-GEO-9). Seismic groundshaking impacts associated with the Proposed Action would be less than significant.

Portions of the project area are underlain by alluvial deposits, primarily in valley floor locations, which are potentially susceptible to liquefaction. Alluvial deposits in the project area are typically well graded and contain coarse sands, gravels, and cobbles, which minimizes the chance for liquefaction to occur. However, in addition to implementing PSR-GEO-2 (described above) as part of the Proposed Action, existing roads and landings proposed for reuse in areas containing soils potentially susceptible to liquefaction would be evaluated by an earth sciences/physical sciences professional who would provide necessary reconstruction and/or maintenance prescriptions (PSR-GEO-9). New landings would be constructed outside of geologically unstable areas and preferentially placed outside of stream buffers, reducing the exposure to sites potentially susceptible to liquefaction (PSR-GEO-6). Liquefaction impacts associated with implementation of the Proposed Action would be less than significant.

Individual project components of the Proposed Action would be selected specifically to avoid areas with potential landslide hazards. In addition to implementing PSR-GEO-1 and PSR-GEO-2 (described above) as part of the Proposed Action, slope limitations for forest thinning operations would avoid potentially unstable steep hillslopes (PSR-GEO-3 and PSR-GEO-4). Winterization and seasonal-use requirements would prevent erosion and concentrated runoff that could initiate slope instability (PSR-GEO-5). Existing roads and landings proposed for reuse in areas of potential slope instability would be evaluated by an earth sciences/physical sciences professional who would provide necessary reconstruction and/or maintenance prescriptions (PSR-GEO-9). Equipment operators at road construction and removal sites would minimize exposure to unstable slopes (PSR-GEO-10). New landings would be constructed outside of geologically unstable areas reducing the exposure to areas with potential landslide hazards (PSR-GEO-6). Landslide-related impacts associated with implementation of the Proposed Action would be less than significant.

**B.** The Proposed Action includes a set of treatments to prevent erosion and control sediment. In addition to implementing PSR-GEO-2 as part of the Proposed Action, forest thinning methods would be selected based on reducing sediment delivery potential (PSR-GEO-3 and PSR-GEO-4). Extensive winterization, seasonal-use requirements, and dispersing cut vegetation across exposed soils would prevent erosion and concentrated runoff (PSR-GEO-5 and PSR-GEO-7). New landings would be constructed to the minimum size needed and existing landings would be used as much as practicable to reduce sediment erosion (PSR-GEO-6). Yarding would be restricted to using equipment capable of one-end log suspension to reduce ground surface disturbance (PSR-GEO-8). Existing roads and landings proposed for reuse would be evaluated by an earth sciences/physical sciences professional who would provide necessary erosion prevention and sediment control prescriptions (PSR-GEO-9). Equipment operators at road construction and removal sites would minimize exposure to unstable slope with the potential to cause soil erosion (PSR-GEO-10). Erosion prevention and sediment control measures would be implemented on skid trails and disturbed soils with the potential for erosion and sediment delivery to waterbodies, floodplains, and wetlands

(PSR-GEO-11). The Proposed Action would not result in substantial soil erosion or the loss of topsoil. In addition, road removal work included in the Proposed Action is specifically being implemented to address existing and future erosion related to legacy logging uses, resulting in an overall benefit related to soil erosion and topsoil loss. Impacts would be less than significant.

**C.** Project operations and locations would be selected to avoid unstable areas or areas that could become unstable as a result of the Proposed Action. Roads, landings, and skid trails would be maintained, upgraded, and constructed to engineering and geologic standards to ensure site stability. PSR-GEO-1, PSR-GEO-2, PSR-GEO-3, PSR-GEO-4, PSR-GEO-5, PSR-GEO-6, PSR-GEO-9, and PSR-GEO-10 (described above) would be implemented as part of the Proposed Action. Impacts on unstable areas associated with implementation of the Proposed Action would be less than significant.

**D.** Expansive soils do not present a substantial potential impact due to the types of soils found within the project area. Additionally, most Proposed Action operations would not be susceptible to effects related to expansive soils. Any potential effects related to expansive soils are most relevant to footings for culvert and bridge structures. Any ground surface cracks or evidence of disrepair related to expansive soils would be evaluated by an earth sciences/physical sciences professional who would provide any necessary reconstruction or maintenance prescriptions (PSR-GEO-9). Bridge crossings would be designed by a licensed professional engineer (PSR-HYDRO-7). Impacts related to expansive soils associated with implementation of the Proposed Action would be less than significant.

**E.** The Proposed Action does not include the use of septic or wastewater disposal systems. There would be no impact.

**F.** There are no known unique paleontological or geologic features in the project area. Any unique geologic features would be detected during site-specific geologic investigations. If unique paleontological or geologic features were detected during future surveys, adverse impacts to these resources would be unlikely because the Proposed Action generally would not include any disturbance of bedrock. Any identified potential impacts would be avoided during site-specific design. Impacts would be less than significant.

**Cumulative Impacts.** Historic timber management practices (clearcut tractor logging, road building, and minimal road maintenance) have had substantial direct adverse effects on soils and led to erosion. The Proposed Action includes treatments to prevent erosion. Combined with other past present and future forest restoration and maintenance activities, the Proposed Action would address restoration of natural systems. In addition, it would not increase exposure of people or structures to loss, injury, or death for seismic or other geological events. The Proposed Action would not result in a substantial cumulative contribution to geology and soils.

### **3.9.3** *No Action Alternative Impacts*

Under the No Action Alternative, there would be no new impacts on geology and soils resources because there would be no new forestry or aquatic restoration activities. However, eroding soils, unstable hillslopes, and degraded aquatic habitats as a result of past logging would continue to persist and represent a negative impact under the No Action Alternative as compared to the Proposed Action, under which geology and soils resources effects due to past forest management practices would be reduced and, in some cases, reversed.

## 3.10 Greenhouse Gas Emissions

### 3.10.1 Existing Conditions

Global climate change results from greenhouse gas (GHG) emissions caused by several activities, including fossil fuel combustion, deforestation, and land use change. GHGs play a critical role in the Earth’s radiation budget by trapping infrared radiation emitted from the Earth’s surface, which otherwise escapes to space. The most prominent GHGs contributing to this process include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). Certain refrigerants also contribute to climate change, including chlorofluorocarbons, hydrochlorofluorocarbons, and hydrofluorocarbons. The greenhouse effect keeps the Earth’s atmosphere near the surface warmer than it would be otherwise and allows for successful habitation by humans and other forms of life.

Recent environmental changes linked to climate change include rising temperatures, shrinking glaciers, thawing permafrost, a lengthened growing season, and shifts in plant and animal ranges (IPCC 1995; Melillo et al. 2014; CCCC 2012). Predictions of long-term negative environmental impacts in California include worsening of air quality problems, a reduction in municipal water supply from the Sierra snowpack, sea level rise, an increase in wild fires, increased periods of drought, damage to marine and terrestrial ecosystems, and an increase in the incidence of infectious diseases, asthma, and other human health problems (CCCC 2012).

GHG emissions in California are regulated under several state-wide measures, most prominently the California Global Warming Solutions Act of 2006, widely known as Assembly Bill (AB) 32, which requires CARB to develop and enforce regulations for the reporting and verification of statewide GHG emissions and sets limits on state emissions. Specific to state parks, and under AB 32, the Forest Climate Action Team (FCAT) was assembled in August 2014. FCAT is comprised of executive-level members from many of the state’s natural resources agencies, state and federal forest land managers, and other key partners directly or indirectly involved in California forestry. On May 10, 2018, the Forest Carbon Plan was released (FCAT 2018). This document outlines a detailed implementation plan for the forest carbon goals embodied in the 2030 Target Scoping Plan Update through *California’s 2017 Climate Change Scoping Plan* (CARB 2017).

### 3.10.2 Proposed Action Impacts

Would the project:		Less Than Significant Impact	No Impact
a.	Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b.	Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**A.** The Proposed Action would result in short-term GHG emissions from implementation activities involving use of diesel- and gas-powered equipment and forest thinning. However, the goals of the project are to rehabilitate the greater GPC watershed and restore ecosystem processes that have been degraded by historical land use activities and have created a relatively homogenous forest landscape. Research conducted as part of the Redwoods and Climate Change Initiative, a cooperative scientific effort between the League, Humboldt State University, and the University of California, Berkeley, indicates that the RNSP ancient coast redwood forests contain more biomass than any

other forest on Earth (Van Pelt et al. 2016). Large widely-spaced redwood trees maintain deep crowns full of leaves, while also providing room on the forest floor for smaller trees and understory vegetation to thrive. This forest structure results in record-breaking forest productivity and carbon storage.

The limited resource availability in these forests (e.g., water and sunlight) stunts growth and reduces annual carbon sequestration. Disturbance events, such as fire, drought, and insects and diseases, accelerate tree loss, which releases stored carbon back to the atmosphere over several decades through decay. Restoration would lead to a more diverse, resilient, and robust ecosystem that can offset Proposed Action implementation emissions, store carbon, resist insect disease, and decrease the risk of accelerated carbon loss through severe fires. While fire is a natural process in California, the incidence of large wildfires and the duration of the wildfire season across much of the United States has increased in part due to warming trends, dry, drought-affected landscapes, and lower fuel moisture associated with climate change (USGS 2018). Rehabilitation of these functions would decrease the incidence and severity of forest fires, which release mass amounts of carbon into the environment. In addition, old-growth forests store more carbon than young-growth forests (Busing and Fujimori 2005; IPCC 2000), and restoration would result in a forest more capable of storing larger amounts of carbon sooner than if the restoration did not occur. Impacts would be less than significant.

**B.** As discussed in the response to Question A, the Proposed Action would likely reduce carbon emissions by increasing carbon sequestration rates region-wide and would therefore not conflict with an applicable plan, policy, or regulation adopted for reducing the emissions of greenhouse gases. The Proposed Action is consistent with the California Forest Carbon Plan (FCAT 2018). There would be no impact.

**Cumulative Impacts.** All the projects listed in Section 3.1.3 would emit GHGs and, because of the nature of climate change, would be additive. Development projects would be required to perform their own analysis of associated GHG impacts, including development of mitigation measures to address these impacts if required. The Proposed Action's GHG emissions would be limited to implementation activities, and would represent a less-than-significant cumulative contribution to climate change because the Proposed Action would result in a net decrease in GHG emissions in the long term through sequestration. The Proposed Action would result in a more dynamic forest that would be more capable of storing larger amounts of carbon in a shorter period than if the restoration were not to occur.

### *3.10.3 No Action Alternative Impacts*

The No Action Alternative would not result in short-term GHG emissions from project implementation. However, the No Action Alternative has the potential to result in long-term and sustained impacts to regional air quality because the forests would not benefit from management techniques that lead to development of old-growth forest characteristics, including the ability to store more carbon at a faster rate and help reduce the incidence and severity of fires, and thereby decrease release of GHG emissions.

### 3.11 Hazards and Hazardous Materials

#### 3.11.1 Existing Conditions

Hazards are potential risks to public safety and the environment related to hazardous materials, airports, emergency response and evacuation plans, and wildland fire. Hazardous materials include all flammable, reactive, corrosive, or toxic substances, which pose potential harm to the public or environment because of these properties. No fuel storage facilities currently exist within or adjacent to the project area.

The nearest public use airport, Andy McBeth Airport in Klamath Glen, is approximately 7 miles northeast of the project area. There are no private air strips in or adjacent to the project area. The nearest school is Orick Elementary School, located about 1 mile south of the project area.

Physical hazards in the project area are similar to any outdoor setting and include steep slopes, rushing water, poisonous plants, wild animals, disease-carrying insects, and inclement weather. The project area is in a remote portion of Humboldt County and transportation to the nearest hospital would require 1 hour of driving time from some locations. Helicopter landing locations have been identified throughout the project area and could be used to evacuate personnel in an emergency.

The California Department of Forestry and Fire Protection (Cal Fire) lists the fire hazard severity for the GPC watershed as mostly high, with areas of very high and moderate severity (Cal Fire 2006). The CDPR lands in the project area are State Responsibility Areas and the NPS lands are Federal Responsibility Areas in the event of a fire. The project area is included in the Humboldt County Community Wildfire Protection Plan (Humboldt County 2019) as part of the Orick-Redwood Park Planning Unit Action Plan. An emergency response and evacuation plan has been developed for the Orick-Redwood Park Planning Unit. Evacuation routes in the Orick-Redwood Park Planning Unit would depend on the location of the community at risk and law enforcement recommendations based on fire behavior, wind patterns, traffic, and ingress of emergency vehicles. Generally, evacuation from within this unit would travel either north or south along U.S. Highway 101. Although U.S. Highway 101 is the central route through most of the unit, Newton B. Drury Scenic Drive runs parallel to U.S. Highway 101 and offers an alternative route through Prairie Creek Redwoods State Park. Bald Hills Road provides access through the southeastern portion of the unit, eventually connecting with U.S. Highway 169. Although U.S. Highway 169 is non-continuous and offers limited northern access, it is connected to U.S. Highway 96, another major transportation corridor, which offers ingress and egress south towards Willow Creek, and northeast towards Orleans.

The California Department of Environmental Protection has the responsibility for compiling (pursuant to California Government Code Section 65962.5) information on hazardous material sites in California that together are known as the Cortese list. A review of this information found no known hazardous materials sites in the project area (CalEPA 2018).

#### 3.11.2 Proposed Action Impacts

<b>Would the project:</b>		<b>Less Than Significant Impact</b>	<b>No Impact</b>
a.	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Would the project:		Less Than Significant Impact	No Impact
b.	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c.	Emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d.	Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e.	Be located within an airport land use plan area or, where such a plan has not been adopted, be within 2 miles of a public airport or public use airport, and result in a safety hazard or excessive noise for people residing or working in the project area?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f.	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g.	Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**A.** The Proposed Action would require the use of certain potentially hazardous materials such as fuels, oils, or other fluids associated with the operation and maintenance of equipment and vehicles. These materials would generally be contained within vessels engineered for safe storage. NPS and CDPR employees and contractors would drive to and from the project area transporting potentially hazardous materials such as fuels, oils, or other fluids associated with the operation and maintenance of vehicles and equipment. Spills, upsets, or other operational accidents could result in a release of fuel or other hazardous substances into the environment. However, as part of the Proposed Action, decontamination of heavy equipment would occur prior to delivery onto park lands (SPR-HYDRO-3); all equipment would be stored, serviced, and fueled at least 150 feet from any stream channel and 50 feet outside of riparian areas and away from unstable slopes and all primary fuel storage containers (fuel tankers) would have secondary containment (SPR-HAZ-1); and spill prevention, monitoring, and response activities would occur (PSR-HAZ-2). Impacts would be less than significant.

**B.** During implementation of the Proposed Action, hazardous substances could be released to the environment from vehicle or equipment fluid spills or leaks. If there is discovery of unknown spillage from, or free product discovered on or adjacent to the project sites, work would be halted or diverted from the immediate vicinity of the find, and the RNSP hazardous materials coordinator would be contacted. Hazardous materials, if present, would be contained and removed from the site prior to resumption of work (SPR-HAZ-8). Removal of all contaminants, including sludge, spill residue, or containers, would be conducted following established procedures and in compliance with all local, state, and federal regulations and guidelines regarding the handling and disposal of hazardous materials. Impacts would be less than significant.

**C.** There are no schools or proposed schools within 0.25 mile of the project area. There would be no impact.

**D.** The project area is not included on a list of hazardous materials sites compiled pursuant to California Government Code Section 65962.5. There would be no impact.

**E.** The planned project sites are not located within 2 miles of a public use airport and would not result in a safety hazard related to airport use. There would be no impact.

**F.** Activities associated with the Proposed Action would not restrict access to or block any public road. The Proposed Action would not conflict with the Community Wildfire Response Plan or restrict travel on evacuation routes. There would be no impact.

**G.** One of the objectives of the Proposed Action is to increase resilience to environmental stressors (e.g., disease/pathogens and drought) while avoiding problems with heavy thinning such as a prolonged increased fire danger due to increased fuel loads and microclimate changes. A detailed analysis of the potential impacts of the Proposed Action related to wildfires is presented in Section 3.18. Through thinning forest stands in the project area, the Proposed Action would reduce the potential risk of wildfire and reduce exposure of the public to pollutant concentrations or the uncontrolled spread of wildfires. As part of the Proposed Action, implementation of equipment requirements for spark arrestors and fire extinguishers (PSR-HAZ-3), vehicle parking restrictions (SPR-HAZ-4), radio dispatch requirements in case of fire (SPR-HAZ-5), road access requirements (PSR-HAZ-6), and fire hazard reduction requirements (PSR-HAZ-7) are included. Impacts associated with exposing people or structures to wildland fires would be less than significant.

**Cumulative Impacts.** The Proposed Action would not result in impacts to hazards or hazardous materials. Several of the projects listed in Section 3.1.3 may include the use, transport, and disposal of hazardous materials. For these projects, potential impacts from hazardous materials on site would likely be localized, and any transport or disposal of materials would occur per federal, state, and local regulations. Implementation of the Proposed Action, cumulatively combined with other related past, present, or probable future projects, would not result in substantial cumulative adverse effects related to hazards and hazardous materials.

### *3.11.3 No Action Alternative Impacts*

Under the No Action Alternative, there would be no change in transport or use of hazardous materials, or emergency response, as compared to existing conditions. Compared to the Proposed Action, there may be fewer impacts because fewer vehicles and pieces of equipment would be operating in the area, reducing the risk of accidental discharge.

## **3.12 Hydrology and Water Quality**

### *3.12.1 Existing Conditions*

Prairie Creek is the largest tributary to Redwood Creek, which drains a 63.7-square-mile area and occupies a narrow channel separated from a wide floodplain by clearly defined banks. Climate exerts an influence on vegetation and soil at regional, local, and micro scales. The project area experiences cool, wet winters and nearly rainless summers, which is typical of northwestern coastal California (Seney et al. 2017). Summer conditions range locally from mild with fog drip on ocean-facing slopes to warm and dry farther inland. RNSP receives an average of 78.7 inches of precipitation annually, most of which falls as rain between October and March (Seney et al. 2017).

It is estimated that there are approximately 22 miles of intermittent streams and 23 miles of perennial streams. Of these 45 miles of streams, it is estimated that approximately 29 miles are buried channels in the project area.

From the 1950s through the early 1970s the Redwood Creek basin experienced several extremely large flood events exceeding 49,000 cubic feet per second, of which the 1964 flood, at 50,500 cubic feet per second (measured in Orick), was the largest. Collectively, these floods caused extensive flooding on the north coast of California, including Redwood Creek. From the mid-1970s through water year 2015, peak discharge on Redwood Creek has exceeded the discharge of a 5-year recurrence interval (32,000 cubic feet per second) only once, in 1997, when the peak flow was estimated to have a 11-year recurrence interval. Klein and Marquette (2010) summarized available annual discharge data within catchments of the Prairie Creek sub-basin. They estimated peak discharge with a 20-year recurrence interval for Prairie Creek above the May Creek confluence (drainage area of 12.6 square miles) to be approximately 1,650 cubic feet per second. The highest discharge that has been measured over the period of record was 778 cubic feet per second. By contrast, during the 2016 low-flow season (mid-July to early October) discharges ranged from 3.5 to 5.9 cubic feet per second in Prairie Creek upstream of the Wolf Creek Bridge, 0.9 to 1.0 cubic feet per second in Godwood Creek, and 1.2 to 0.8 cubic feet per second in Streeflow Creek (Ozaki and Truesdell 2017).

Hydrological function in Prairie Creek is not degraded by dams or large diversions (Wilzback and Ozaki 2017). The extent to which hydrologic function may have been altered or recovered from previous timber harvest or floodplain alteration is not known. Road density can be a useful indicator of altered hydrologic function, as road density affects speed of delivery, path by which water is routed to the stream, and peak flows from storm events. The road density is 1.46 miles per square mile, which places it in the "low" threat category (i.e., less than 1.6 miles per square mile) using NMFS (2014) targets.

In general, water quality characteristics in the project area meet or exceed USEPA objectives. USEPA (1999) concluded that temperatures of approximately 22 to 24°C limit salmonid distribution generally, and they designated 16°C as the 7-day average of the daily maximum temperature that should not be exceeded in areas designated as core rearing locations (USEPA 2003). Since 2008, all stations in the project area either met or were below the 16°C threshold.

The NCRWQCB water quality objective for dissolved oxygen (DO) is a minimum of 6.0 milligrams per liter for cold waters. During critical salmon and steelhead spawning and egg incubation periods, the objective is increased to 9.0 milligrams per liter to maintain adequate intra-gravel oxygen for developing embryos. Mean summer concentrations in 2016 at all stations, except Skunk Cabbage Creek, exceeded this objective (Ozaki and Truesdell 2017). Skunk Cabbage Creek had exceptionally low DO (1.4 milligrams per liter). During the late summer, flow on Skunk Cabbage Creek is difficult to measure because velocities are so low. The low dissolved oxygen was likely due to the lack of streamflow to oxygenate the water and the presence of decaying organic material in the channel and connected wetland. Except for Skunk Cabbage Creek, mean dissolved oxygen concentrations for Prairie Creek streams are suitable for rearing salmonids (Ozaki and Truesdell 2017).

Since 1992, the Redwood Creek basin has been included on California's CWA Section 303(d) list as sediment degraded. High sediment loads and the level of sedimentation in the basin was judged to exceed existing criteria for supporting its cold-water fishery and a total maximum daily load (TMDL) which established instream numeric targets was completed in 1998 to address sediment supply problems. The TMDL for Redwood Creek acknowledged differences in the severity of sediment impairment between Prairie Creek and the rest of the Redwood Creek basin. The TMDL sediment load analysis demonstrated that most sediment inputs came from logging and road building; and

Prairie Creek has had less human disturbance than the rest of Redwood Creek (Wilzback and Ozaki 2017).

Klein et al. (2011) summarized chronic turbidity levels from 2003 to 2005 for nine stations in the Prairie Creek basin. Using NMFS (2014) recovery criteria for this metric, measured as number of hours per year when turbidity exceeds 25 formazin nephelometric units (FNU), Prairie Creek above Godwood Creek would rank as "Very Good." Little Lost Man Creek would rank as "Good" and Lost Man Creek stations would rank as "Good" to "Fair."

### 3.12.2 Proposed Action Impacts

Would the project:		Less Than Significant Impact	No Impact
a.	Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b.	Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c.	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would:		
	i. Result in substantial erosion or siltation on site or off site?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	ii. Substantially increase the rate or amount of surface runoff in a manner that would result in flooding on site or off site?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	iii. Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	iv. Impede or redirect flood flows?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d.	In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e.	Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**A.** The Proposed Action is required to comply with all applicable water quality standards and waste discharge requirements. NPS and CDPR would comply with all permits and approvals noted in Appendix E, which would specify monitoring and compliance criteria for managing water quality throughout implementation of the Proposed Action.

The Proposed Action is also designed to provide long-term benefits to instream habitats and water quality. For forest thinning activities, the Proposed Action includes streamside protection zones in which no heavy equipment would be permitted and traditional ground-based heavy equipment would be prohibited from operating on slopes greater than 40% (PSR-GEO-3), except for cable-assisted equipment (e.g., tethered harvesters and forwarders), which would be allowed on slopes up to 85% as long as the equipment stays on designated trails covered with a minimum of 6 inches of slash and operations within the riparian management zone are restricted as detailed in Table 6 (PSR-GEO-4). Long-term benefits to water quality would occur by reestablishing the natural drainage networks and reducing sediment delivery along the road system that would be subject to

restoration. In addition, short-term sediment discharge is managed by the inclusion of streamside and wetland buffers and prescriptions (PSR-HYDRO-1), timing restrictions on road reconstruction and/or removal (PSR-HYDRO-5), and avoidance of trees contributing to streambank stability (PSR-HYDRO-12) as part of the Proposed Action. Impacts on water quality related to the discharge of sediment would be less than significant.

The Proposed Action would thin trees within riparian areas to promote the development of late successional conditions (e.g., taller trees with greater canopy complexity) at a more rapid rate than is currently occurring. This would improve the ability of the riparian area to provide cool microclimates to area streams at a more rapid rate than if treatments were not conducted. The potential for short-term increases in water temperature is minor because the Proposed Action includes retention of a minimum of 60% of canopy cover adjacent to streams. The potential for temperature-related impacts on water quality would be less than significant.

**B.** The Proposed Action does not include activities that require direct (i.e., well) use of groundwater; therefore, it would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge. Reducing stand densities may slightly decrease water uptake, allowing an increase in water available for groundwater recharge, but the effect would be short term and negligible (CDPR 2011). The expected impact on groundwater supplies or the ability to sustainably manage groundwater would be less than significant.

**C.i.** The Proposed Action does not include the installation of impervious surfaces. The project area contains approximately 52 miles of haul roads and associated skid roads with 446 stream crossings, 250 on haul roads and the remainder on associated skid roads. Most of these crossings were constructed with earthen fill, dirt, or wood that interfere with streamflow and fish passage. These crossings have been eroding since their construction in the 1950s and 1960s, leading to severely degraded aquatic habitat conditions. These roads also contain inboard ditches and cross drains, which alter the natural drainage patterns of the project area. The Proposed Action would remove roads, crossings, cross drains, and other impediments to drainage patterns, which would help restore a natural drainage pattern and reduce the potential for chronic and catastrophic erosion and sediment delivery to streams. There is the potential for the newly completed treatment sites to experience minimal erosion and sediment delivery during the recovery phase. The Proposed Action includes timing restrictions for road reconstruction and/or removal (PSR-HYDRO-5), in-water work area isolation requirements (PSR-HYDRO-6), drainage structure and stream crossing maintenance requirements (PSR-HYDRO-7), erosion control adjacent to stream channels (PSR-HYDRO-8), not placing recontoured road fill on wet sections of road (SPR-HYDRO-9), and the use of monitoring to ensure proper stream crossing removal techniques (PSR-HYDRO-10) to manage erosion and sediment delivery. Impacts on existing drainage patterns, erosion, and siltation would be less than significant.

**C.ii.** Road surfaces, stream crossings, numerous inboard ditches, and cross drains have altered surface runoff patterns in the project area. The hydrologic connections created by the road system have effectively increased peak flows in the affected area by allowing for a more rapid runoff pattern than under the natural condition. Any upgraded roads needed to access thinning areas would be upgraded to current standards, which would reduce hydrologic connectivity through the use of rolling dips and appropriate cross drain locations, reducing accumulation and concentration of surface runoff (PSR-GEO-5). In addition, upgraded culverts would be appropriately sized to convey flood flow and associated debris. The Proposed Action would conduct road and crossing removal

upon completion of thinning operations to return drainage patterns back to a natural condition. The forest thinning portion of the Proposed Action would require the construction of skid trails on slopes less than 40% to remove logs. Cable-assisted equipment (e.g., tethered harvesters and forwarders) may be allowed on slopes up to 85%. However, equipment would stay on designated trails covered with a minimum of 6 inches of slash. As part of the Proposed Action, cut vegetation would be spread and left on site across skid trails, and erosion control measures would be implemented on skid trails (PSR-GEO-11). Impacts of runoff-induced flooding would be less than significant.

**C.iii.** The Proposed Action would not create or contribute runoff water in amounts that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. No stormwater systems are downslope from the project location, and none are planned. There would be no impact on stormwater drainage systems.

**C.iv.** The Proposed Action would conduct road and stream crossing removal upon completion of thinning operations to return drainage patterns back to a natural condition. Any reoccupied roads needed to access thinning areas would implement current crossing standards. These activities would improve the ability of the project area to handle flood flows. The Proposed Action also includes the potential to install temporary bridges to access treatment areas. Temporary bridges would fully span the channel (i.e., not restrict the channel) and would not impede or redirect flood flows. There would be no negative impact on flood flows.

**D.** The instream aquatic habitat restoration and stream crossing removal activities would use heavy equipment in a flood hazard area, but project implementation would mainly occur during the dry season so that no equipment would occur in flood hazard areas when flooding might occur. The Proposed Action is not located in tsunami or seiche zones. All fueling and servicing of vehicles and equipment associated with the Proposed Action would occur at least 150 feet from any stream channel and 50 feet outside of riparian areas and away from unstable slopes (PSR-HAZ-1). The risk of release of pollutants due to inundation would be less than significant.

**E.** The Proposed Action involves restoration of forest land and aquatic resources. Prairie Creek is currently included on the CWA Section 303(d) list of impaired water bodies for sediment. The TMDL for Redwood Creek acknowledged differences in the severity of sediment impairment between Prairie Creek and the rest of the Redwood Creek basin (Wilzback and Ozaki 2017). The Proposed Action complies with the water quality standards and would continue to implement measures to reduce sediment delivery and other pollutants into GPC streams. Implementation of the Proposed Action would have a long-term beneficial effect on water quality. The project area does not currently have a sustainable groundwater management plan. There would be no impact.

**Cumulative Impacts.** The cumulative adverse effects on hydrology, water quality, floodplains, and wetlands in and around the project area are related to past logging and road building practices, both within what is now RNSP land and upstream of current RNSP boundaries. The Proposed Action is designed to provide benefits to instream water quality and hydrology by repairing some of the damage caused by past projects and practices. Combined with other present and future forest restoration and maintenance activities, the Proposed Action would have a cumulative benefit to hydrology and water quality.

### 3.12.3 No Action Alternative Impacts

Under the No Action Alternative, CDPR and NPS could continue to treat forest stands, road systems, and riparian areas on a project-by-project basis as funding allowed. However, this approach would occur at a slower pace and would be fragmented as compared to the Proposed Action. Compared to the Proposed Action, the No Action Alternative would result in fewer short-term operations-related impacts on water quality, but also maintain the current level of chronic legacy effects of pre-Park timber and road management actions on drainage patterns and hydrology in the project area. In addition, the risk of road system sediment delivery to streams and associated impacts on water quality would likely increase under the No Action Alternative as old culverts and substandard crossings fail at an increasing rate.

## 3.13 Land Use and Planning

### 3.13.1 Existing Conditions

The project area is located in the lower portions of the Prairie Creek watershed within RNSP in a mostly non-populated area of Humboldt County, approximately 2 miles north of the community of Orick. The project area is set mostly away from any public roads and consists only of unmaintained logging roads, skid trails, and vegetation. The area is mainly accessible for maintenance and limited to the public.

The project area is zoned "Public Lands" (P) and "Public Recreation" (PR) under the Humboldt County General Plan (Humboldt County 2017, 2018).

The RNSP GMP/GP (NPS/CDPR 1999) focuses on park establishment, cooperative management of park resources, and the visitor experience. Per the GMP/GP, the Park's goals are to "preserve and protect the Parks' resources... provide for the public enjoyment and visitor appreciation of the parks... [and] maintain collaborative relationships with gateway communities and local American Indian tribes." Although the project area is generally not accessible to the public, current uses of adjacent park lands within the general vicinity of the project area include primarily passive recreational activities, such as hiking, picnicking, and observing nature.

### 3.13.2 Proposed Action Impacts

Would the project:		Less Than Significant Impact	No Impact
a.	Physically divide an established community?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b.	Cause a significant environmental impact due to conflict with any applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**A.** Implementation of the Proposed Action would not divide an established community because none exists within the boundaries of the project area. There would be no impact.

**B.** The Proposed Action would not conflict with any land use project, policy, or regulation of any agency adopted for the purpose of avoiding or mitigating an environmental effect. In general, the Proposed Action has been designed to meet a critical resource protection need and is in agreement with the GMP/GP (NPS/CDPR 1999), *Humboldt County General Plan* (Humboldt County 2017), the

*Humboldt County Coastal Trail Implementation Strategy* (CCC 2011), and the Humboldt County Local Coastal Plans (Humboldt County 2017, Appendix E), as well as all applicable state policies and regulations. There would be no impact.

**Cumulative Impacts.** Historic timber management practices (clearcut tractor logging, road building, and minimal road maintenance) have had significant direct adverse effects on forested area which has led to the development and implementation of zoning and habitat conservation plans. The Proposed Action is consistent with such land use and planning which seeks to protect forests and their resources. The Proposed Action would not result in cumulative effects when combined with other known present and future projects in the area.

### *3.13.3 No Action Alternative Impacts*

There would be no potential impact to land use and planning under the No Action Alternative because this alternative would maintain existing land use and planning as they currently are. There would be no change as compared to the Proposed Action because the Proposed Action would also not result in impacts to land use and planning.

## **3.14 Noise**

### *3.14.1 Existing Conditions*

The Proposed Action is located within a remote forested area in Humboldt County surrounded by mountains and the Pacific Ocean. The closest residential sensitive receptors to the project area are located along U.S. Highway 101, with homes located nearly adjacent to the project area, and in the Orick community, with homes located within 0.5 mile of the project area. Sensitive receptors could also include park visitors using educational centers; campgrounds; or hiking, biking, and equestrian trails in the project area. Ambient natural noise is made up of bird songs, especially during the early morning hours, known as the dawn chorus. Human-generated noise associated with the project area results from RNSP vehicles on roads; cars on U.S. Highway 101 and the Newton B. Drury scenic parkway; occasional air traffic, including small private planes, Coast Guard helicopters, and Cal Fire firefighting aircraft; and limited timber felling activities. Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans identify general principles intended to guide and influence development plans, while local noise ordinances establish standards and procedures for addressing specific noise sources and activities. Humboldt County does not have established noise ordinances.

### 3.14.2 Proposed Action Impacts

Would the project:		Less Than Significant Impact	No Impact
a.	Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b.	Generation of excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c.	Be located within the vicinity of a private airstrip or an airport land use plan area, or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport and expose people residing or working in the Project area to excessive noise levels?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**A.** Noise is a concern if it affects sensitive receptors. Proposed Action-related noise would only occur during implementation activities, which would temporarily increase ambient noise levels on an intermittent basis. Once implementation is completed, all noise-generating equipment would be removed from the project area. There would be no substantial permanent increase in ambient noise levels as a result of the Proposed Action. Implementation-related noise levels would fluctuate depending on the level of work and the proximity of a receptor to the implementation area. While most of the activities would be located in parts of the project area which are not in the vicinity of any noise-sensitive human land uses, there may be limited activities that occur adjacent to residential areas. As noted above, the closest sensitive residential receptors are located along U.S. Highway 101 and in the Orick community. Sensitive receptors could also include park visitors to the project area.

While there are no established County noise ordinance or standards for human receptors, noise standards in state and federal parks are guided by several laws, regulations, and policies, including NPS Director's Order No. 47 and the Noise Control Act of 1972, which all aim to reduce noise to the extent possible. Areas of active implementation would be closed to the public and a closure order specifying closure dates would be posted on all sections of public trail where implementation activities would be conducted. The closure would also be noticed in a news release and update on both the NPS and CDPR websites. The Proposed Action also includes notification requirements to off-site noise-sensitive receptors (PSR-NOISE-1) and power equipment use and maintenance requirements (SPR-NOISE-2) to reduce noise levels from equipment and ensure sensitive receptors are notified of intermittent implementation activities. Impacts would be less than significant.

**B.** Unless heavy equipment activities are conducted extremely close (within a few feet) to neighboring structures, vibrations from implementation activities rarely reach levels that damage structures. For example, heavy equipment (e.g., a large bulldozer) generates vibration levels of 0.089 inch per second peak particle velocity at a distance of 25 feet. There are no buildings in the project area, and there would be no impact.

**C.** The Proposed Action is not within an airport land use plan and is not within 2 miles of an airport or private airstrip. There would be no impact.

**Cumulative Impacts.** Noise levels generated by the Proposed Action would be from on-site project activities, which would be temporary and therefore would not combine with past projects. In addition, such noise would be within the conditionally acceptable range for residential uses and the Proposed Action would include controls to address potential impacts on wildlife. Future regional

projects considered as part of the cumulative analysis would also be subject to regulations and permitting processes that would avoid, minimize, or mitigate noise impacts on sensitive receptors and wildlife. Therefore, the Proposed Action, when combined with future actions in the region, would not result in cumulatively considerable impacts.

### 3.14.3 No Action Alternative Impacts

As the No Action Alternative would not involve any restoration activity, there would be no impacts related to noise or vibration as compared to the Proposed Action.

## 3.15 Recreation

### 3.15.1 Existing Conditions

RNSP recorded 536,000 visitors in 2016 (Cejnar 2017), up 100,000 from 2014 (Kemp 2016). Larger recreational areas observed in the vicinity of the project area include the Lady Bird Johnson Trailhead and Picnic Area; Redwood Creek Day Use, Trailhead, and Picnic Area; Gold Bluffs Beach Campground and Picnic Area; Elk Meadow and Trillium Trailhead Parking; Davison Ranch; Wolf Creek Operations Center; Skunk Cabbage Trailhead; and Gold Bluffs Environmental Campground (Figure 8). These areas include toilets, cabins, housing storage, showers, picnic shelters, activity centers, campgrounds, and over 40 facility signs.

There are some trailheads in the project area, but most of the project area is relatively inaccessible and rarely used by visitors. Some abandoned haul roads are currently being used as hiking and biking trails in the project area, but accessibility to the public is limited. These trails include the off-highway Road/Berry Glen Trail, the Streelow Creek hike/bike trail, the 205 section of 200 Road (Trillium Falls), and the 200 Road/Truck Shop Road trail.

### 3.15.2 Proposed Action Impacts

Would the project:		Less Than Significant Impact	No Impact
a.	Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b.	Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**A.** In the short term, public access to some bike trails within the project area would be prohibited due to Proposed Action implementation activities, but these restrictions would be temporary (seasonally over 2 to 4 years). Other bike and hike trails would still be accessible to the public during these temporary closures. In the long term, ecosystem restoration activities, including forest thinning, would increase the aesthetic value of the park, thereby encouraging its recreational use, but not to a significant degree, because most of the project area is and would remain relatively inaccessible to and rarely used by visitors. The Proposed Action is expected to have less-than-significant impacts.

**B.** The Proposed Action neither involves the construction or expansion of any facility nor is the type of development that results in the need for development of additional recreational facilities. There would be no impact to recreational facilities.

**Cumulative Impacts.** Historic timber management practices (clearcut tractor logging, road building, and minimal road maintenance) have limited some recreational activities because land that could potentially be used for recreation was off limits to the public. However, recreational opportunities in forested areas have increased with park ownership. The Proposed Action would maintain the availability of recreational activities. Therefore, the Proposed Action would not result in cumulative effects when combined with other known present and future projects in the area.

### *3.15.3 No Action Alternative Impacts*

As discussed, recreational opportunities are limited in the project area. While there would be no short-term impacts to bike trails under the No Action Alternative, there would also be no improvement to recreational resources through park enhancements as compared to the Proposed Action, although the recreational resource improvements of the Proposed Action would be limited. As recreational activities are limited, there would be no impact on recreation.

## **3.16 Socioeconomics**

### *3.16.1 Existing Conditions*

Within the greater region, local communities and economies have historically been reliant on the logging industry, which was established in Humboldt County in 1850 (NPS 2014). In 1860, Humboldt County was the second largest lumber-producing county in California. Intensive logging occurred from 1860 to the end of the 1960s, when the Park was established. The creation and expansion of the Park in 1968 and 1978, the removal of most of the old-growth trees, and the enactment of laws protecting water quality and endangered species contributed to the decline of the logging industry as the principal source of income for Humboldt County and more specifically Orick.

Today, Humboldt County ranks lower than the state average on indicators of socioeconomic status, including unemployment rate, education, poverty levels, and household and per capita incomes. The percentage of persons living below the poverty threshold in Humboldt County is particularly high (20.8% in 2017 against a California average of 15.1%; USCB 2018a). According to the U.S. Census Bureau's 2012 Economic Census, health care and social assistance and retail trade are the sectors that employ most of the population of Humboldt County (USCB 2018b). Finally, Humboldt County's total population has been slowly increasing over the past 7 years and is now approximately 135,000 people based on population estimates (USCB 2018c).

Orick specifically also ranks low on many socioeconomic indicators. It qualifies as a disadvantaged community, based upon median household incomes (USCB 2018d), and is transitioning from a resource-based to a service-based economy (RCWG 2006). According to the U.S. Census Bureau's 2013-2017 American Community Survey 5-Year Estimates and the 2010 Demographic Census, Orick's population is declining: in 2010, the population was 357 (USCB 2018e), whereas in 2017, it was 295 (USCB 2018f).

### *3.16.2 Proposed Action Impacts*

Under the Proposed Action, there would be negligible, short-term impacts related to implementation activities and potentially a positive impact to socioeconomics related to increased tourism in the region. There could be an economic benefit to the local economy from contracted services, such as temporary local worker employment to implement the Proposed Action's implementation activities, and from the purchase of materials and plantings, such as seeds and trees. There could be positive

long-term impacts on socioeconomics, based on improving the condition of the forest and aesthetic value, which could lead to more tourism and visitors passing through Orick.

**Cumulative Impacts.** As discussed above, the historic timber industry was once a large and important part of the regional economy. In 1860, Humboldt County was the second largest lumber-producing county in California. The creation and expansion of the Park in 1968 and 1978, the removal of most of the old-growth trees, and the enactment of laws protecting water quality and endangered species contributed to the decline of the logging industry as the principal source of income for the larger project area. However, even if logging was not limited by laws and regulation, the industry may have decreased due to declining resources. The Proposed Action, in combination with other known present and future projects, as listed in Section 3.1.3, may contribute to an economic benefit to the local economy from contracted services, such as temporary local worker employment to carry out the implementation activities.

### *3.16.3 No Action Alternative Impacts*

There would be no change to the local economy under the No Action Alternative because no implementation activities would be conducted, and there therefore would be no economic benefit to the local economy from contracted services, such as temporary local worker employment, and from the purchase of materials and plantings, such as seeds and trees. However, impacts would be negligible because these services would not substantially affect the economy in the project area.

## **3.17 Transportation**

### *3.17.1 Existing Conditions*

The project area is located along U.S. Highway 101 in Humboldt County, which serves as the main north/south highway in the project area. U.S. Highway 101 is a two-lane highway at the main park entrance that is a designated truck highway and also serves as the Pacific Coast Bike Route (Caltrans 2017). Traffic along U.S. Highway 101 is also addressed in *Caltrans District 1: US Route 101 Transportation Concept Report* (Caltrans 2017), which requires roads to operate at a level of service (LOS) of D or better (the segment of U.S. Highway 101 near the project area currently operates at LOS B).

The project area can be accessed by public vehicles traveling along U.S. Highway 101 and Bald Hills Road. Newton B. Drury Scenic Parkway spans the project area, and the visitor center and Elk Prairie Campground can be accessed by Prairie Creek Road, which is located off of Newton B. Drury Scenic Parkway. Gold Bluffs Beach Campground and Fern Canyon are accessed by Davison Road, which is located 3 miles north of Orick off U.S. Highway 101. Davison Road has vehicle limitations of 8 feet wide and 24 feet long. Numerous old dirt roads overgrown with vegetation historically connected U.S. Highway 101 with the project area.

The project area currently contains over 52 miles of logging roads and associated skid trails that were built to facilitate timber extraction prior to the area's inclusion in the state and federal park systems. Most of these roads have been unmaintained and have eroded. There is also a system of publicly accessible trails for hiking, biking, and equestrian use, as well as connections to adjacent hiking trails.

### 3.17.2 Proposed Action Impacts

Would the project:		Less Than Significant Impact	No Impact
a.	Conflict with a program, plan, ordinance, or policy addressing the circulation system including transit, roadway, bicycle and pedestrian facilities?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b.	Conflict with or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c.	Substantially increase hazards because of a geometric feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d.	Result in inadequate emergency access?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**A.** The Proposed Action would not affect public roadways in the long term because it would not affect park usage. During Proposed Action implementation, there would be periodic movement of equipment and logs using U.S. Highway 101. These activities could result in up to approximately 30 trucks per day (based on similar projects in the area) spread throughout the day or an average of three trucks per hour. The trucks would enter and exit the park at several roadways along U.S. Highway 101 and Newton B. Drury Scenic Parkway, including Berry Glen Off-Highway Road, Geneva Road, Davison Road, and May Creek Road. As these trips would be intermittent (a maximum of eight trucks per hour), the Proposed Action would neither substantially increase the traffic on any public street system nor affect any intersections in the vicinity of the project area. In addition, the removal of exiting roadways in the project area would not affect local or regional access because all roads slated for removal do not currently support any public access. The project area also includes hiking, bike and equestrian trails. While there may be short-term periodic closures of sections of trails, there would be no long-term changes to these trail systems. The Proposed Action would not conflict with program, plan, ordinance, or policy addressing the circulation system, and impacts would be less than significant.

**B.** The Proposed Action would not cause additional long-term vehicle trips or change circulation patterns, and thereby would not increase vehicle miles traveled levels, consistent with CEQA Guidelines Section 15064.3(b). There would be no impact.

**C.** The Proposed Action does not contain a design feature or incompatible use that would substantially increase traffic hazards because it does not alter the public roadways systems. There would be no impact.

**D.** While the Proposed Action includes the removal of roadways that could potentially be used to access areas in the park in the case of an emergency such as a fire, all roads that would be removed as part of the Proposed Action have areas that already impede access, such as sections of washouts or blocks from landslides. The Proposed Action would not result in inadequate emergency access because it would not impact any roads that are currently open to public vehicle use or used for emergency access by park or other emergency vehicles. There would be no impact.

**Cumulative Impacts.** The Proposed Action would not affect roadways or transportation resources outside RNSP. No other projects in the past, present, or future are known or expected to have a negative or positive impact on transportation resources within RNSP.

### *3.17.3 No Action Alternative Impacts*

The No Action Alternative would have no impact on transportation or traffic because it would not involve any implementation activities or change in existing conditions. Impacts would be similar to the Proposed Action because the project area includes limited public roadways and does not support public transit.

## **3.18 Wildfire**

### *3.18.1 Existing Conditions*

As described in Section 3.11, the project area is included in the Humboldt County Community Wildfire Protection Plan (Humboldt County 2019) as part of the Orick-Redwood Park Planning Unit Action Plan. An emergency response and evacuation plan has been developed for the Orick-Redwood Park Planning Unit. Evacuation routes in the Orick-Redwood Park Planning Unit would depend on the location of the community at risk and law enforcement recommendations based on fire behavior, wind patterns, traffic, and ingress of emergency vehicles. More specifics are provided in Section 3.11.

In 2007, Cal Fire's Fire and Resource Assessment Program developed fire hazard maps for each county in California (Cal Fire 2007). The maps include areas that fall under the responsibility of local, state, and federal governments. The Humboldt County fire hazard map (Figure 9) includes the project area and associated state and federal responsibility areas. Within the project area, 3,484 acres were rated as having a moderate fire hazard; 6,808 acres had a high fire hazard; and 0 acres had a very high fire hazard rating.

Fuels are classified into four categories based on how they respond to changes in atmospheric moisture (NRI 2004). This response time is referred to as time lag. The four categories are as follows:

- 1-hour fuels: up to 1/4 inch in diameter
- 10-hour fuels: 1/4 inch to 1 inch in diameter
- 100-hour fuels: 1 inch to 3 inches in diameter
- 1000-hour fuels: 3 inches to 8 inches in diameter

In general, higher temperatures increase fire danger, but relative humidity and wind speed are the most important factors among the weather variables. As relative humidity drops, fuel moistures also decrease. One-hour fuels are the most critical regarding fire starts, followed by 10-hour fuels due to their relatively short drying times. One-hundred-hour and larger fuels sustain fires once they start burning and provide most of the heat and flame intensity of fires. Older forest stands with wider spacing between trees are likely less susceptible to stand-replacement fires than younger, densely-spaced stands. In addition, forests within the coastal fog belt have a higher moisture level and generally experience longer fire return intervals than interior areas.

In 2015 and 2016, RNP collected standing forest and fuels loading inventory data in the Prairie Creek watershed from which an assessment of forest conditions could be derived (NPS 2016). Data collected for fuels included the categories above on variable-length transects depending on the fuel category; shorter sampling planes were used for 1-hour and 10-hour fuels and long sampling planes for 1,000-hour fuels. Duff and litter depths were observed at 15, 30, and 45 feet from transect origin.

Trees per acre in the Prairie Creek watershed ranged from 166 (Skunk Cabbage Creek old-growth) to 1,140 (May Creek mixed conifer). The average trees per acre across the sample area was 537 (NPS 2016). The largest mean fuel loading was 386.7 tons per acre in a small conifer stand in the Davison/Wolf creeks area. The high loading was driven mostly by the 1,000-hour fuels, which ranged from 4.3 tons per acre to 369.1 tons per acre, with most values less than 60 tons per acre. The smallest mean fuel loading was 8.5 tons per acre (Skunk Cabbage Creek alder). Mean 1-hour fuels ranged from 0.5 tons per acre to 1.5 tons per acre; mean 10-hour fuels ranged from 1.3 tons per acre to 4.4 tons per acre (which was an outlier as most of the high-end values were less than 3 tons per acre); and mean 100-hour fuels ranged from 1.5 tons per acre to 12.0 tons per acre (which was an outlier; most of the high-end values were less than 4 tons per acre).

### 3.18.2 Proposed Action Impacts

Would the project:		Less Than Significant Impact	No Impact
a.	Substantially impair an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b.	Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c.	Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d.	Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**A.** Activities associated with the Proposed Action would not restrict access to or block any public road. The Proposed Action would not conflict with the Community Wildfire Response Plan or restrict travel on evacuation routes. There would be no impact.

**B.** The conifer stands in the former commercial timberlands in the project area are generally composed of densely spaced small- and medium-size classes of trees. Vertical fuels have become more continuous, contributing to higher risk of canopy fires. The denser forests have intertwined canopies (high canopy bulk density), allowing fire to spread easily from one tree to the next. The Proposed Action would, through forest treatments, reduce the potential for high-intensity crown fires that are difficult to control, and reduce exposure of the public to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.

One aspect of the Proposed Action, lop and scatter, would increase short-term fuels on the forest floor after operations. These surface fuels would have the potential for ignition and sustainable fire prior to full decomposition. One study found an increased fire risk for about 1 year following operations (Jacobson and Dicus 2006), while another found elevated fine fuels for 7 years (Glebocki 2015). Depending on ambient moisture conditions, lop and scatter fuels increase fire risk for about 1 year following operations (Jacobson and Dicus 2006). Another study within the project area has shown slash depth to be reduced by 50% to 66% in 4 years after treatment (O'Hara et al. 2010) with the fine fuels (those that most affect rates of spread) decaying first. Glebocki (2015) reported that 1-

hour and 10-hour surface fuel loads more than doubled in the thinned stand when compared to unthinned stands. This can be expected since unthinned stands have vertical standing fuels (i.e., unthinned small trees), which do not contribute to the ground surface fuel loads until they are cut. One-hour and 10-hour fuels, which are the most critical for fire starts, would generally return to pre-harvest levels within 1 to 7 years, while the 100-hour fuels would continue to decline (Jacobson and Dicus 2006; Glebocki 2015). However, thinning conducted using lop and scatter or other methods removes mid-level fuel ladders and the vertical continuity of fuels that can result in ground fires reaching the forest crown layer. Therefore, thinning can minimize the potential for crown fires. Fire hazard reduction requirements (PSR-HAZ-7) would be implemented to increase the rate of decay of logging slash and low fuels to reduce the time the 1-hour and 10-hour fuels are available for ignition. In addition, the closure of roads associated with the Proposed Action would reduce public use of restored areas and the risk of anthropogenic fire starts. Impacts would be less than significant.

**C.** The Proposed Action would not require the installation of additional infrastructure. Certain roads would be removed upon completion of the forest thinning and aquatic restoration activities. Existing access roads required for maintenance of power lines or other utilities would be retained; no new access roads would be required. There would be no impact.

**D.** The project area does not contain residential development but does contain scattered facilities used to serve park staff and the public visiting the project area. The Proposed Action would, through forest treatments, reduce the potential risk of high-intensity crown fires. In addition, the removal of roads and reestablishment of the natural hydrological patterns in the watershed would reduce risks associated with runoff, post-fire slope instability, or drainage changes. There would be no impact.

**Cumulative Impacts.** Through thinning the forest stands in the project area, the Proposed Action would reduce the potential for high-intensity crown fires that are difficult to control, and reduce exposure of the public to pollutant concentrations or the uncontrolled spread of wildfires. Previous forest thinning projects and additional forest thinning projects that could occur as part of the Redwoods Rising partnership would also reduce the potential risk of wildfire within RNSP. Therefore, the Proposed Action, when combined with future actions in the region, would result in a cumulative net benefit in terms of wildfire risk.

### *3.18.3 No Action Alternative Impacts*

The No Action Alternative would result in no short-term operations-related impacts on wildlife resources that could increase wildfire potential (i.e., lop and scatter operations would not occur). However, the No Action Alternative would also maintain, and thus not reduce, the current level of wildfire risk in the project area.

### 3.19 Mandatory Findings of Significance

This section pertains to CDPR’s CEQA review and anticipated issuance of a ND. It does not apply to or prevent the anticipated NPS NEPA decision to issue a FONSI for the Proposed Action.

Would the project:		Less Than Significant Impact	No Impact
a.	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b.	Does the project have impacts that are individually limited but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c.	Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**A.** Based on the analysis presented in the preceding sections, the Proposed Action would have either less-than-significant or no impacts on the environment. The Proposed Action does not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory. Impacts would be less than significant.

**B.** The Proposed Action is designed to result in improved habitat quality, rehabilitate the GPC watershed, and restore ecosystem processes that have been degraded by historical land use. For these reasons, the Proposed Action, when combined with past actions in the region, would not result in cumulative impacts. Combined with other present and future forest restoration and maintenance activities, the Proposed Action would have a cumulative benefit. Impacts would be considered less than significant.

**C.** The Proposed Action would occur in remote areas where the public has limited access and would therefore have no substantial adverse impacts on humans. Impacts would be less than significant.

#### 3.19.1 No Action Alternative Impacts

The No Action Alternative would not include actions to improve habitat quality, rehabilitate the GPC watershed, and restore ecosystem processes that have been degraded by historical land use. NPS and CDPR could continue to treat forest stands on a project-by-project basis as funding allows but such an approach would be fragmented and occur over smaller areas as compared to the Proposed Action. Therefore, as compared to the Proposed Action, the No Action Alternative would have a long-term negative impact on biological and forestry resources, as well as hydrology and water quality. In addition, the No Action Alternative would have reduced impacts on aesthetics, air quality, GHG, and geology and soils as compared to the Proposed Action.

Appendix A  
Abbreviations

---

## Appendix A: Abbreviations

--	not applicable
AB	Assembly Bill
BACT	best available control technologies
Basin	North Coast Air Basin
BMP	best management practice
BO	Biological Opinion
CAA	Clean Air Act
CAAQS	California ambient air quality standards
Cal Fire	California Department of Forestry and Fire Protection
CalEPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCC	California Coastal Commission
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CDPR	California Department of Parks and Recreation
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CH <sub>4</sub>	methane
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO <sub>2</sub>	carbon dioxide
CRHR	California Register of Historical Resources
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DBH	diameter at breast height
DPS	distinct population segment
EA	Environmental Assessment
EEZ	Equipment Exclusion Zone
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FCAT	Forest Climate Action Team
FNU	formazin nephelometric units

FONSI	Finding of No Significant Impact
Formation	Prairie Creek Formation
GHG	greenhouse gas
GMP	general management plan
GP	general plan
GPC	Greater Prairie Creek
IS	Initial Study
LOS	level of service
MAMU	marbled murrelet
mbf	thousand board feet
MLD	Most Likely Descendant
MOU	Memorandum of Understanding
N <sub>2</sub> O	nitrous oxide
NAAQS	national ambient air quality standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission
NCRD	North Coast Redwoods District
NCRWQCB	North Coast Regional Water Quality Control Board
NCUAQMD	North Coast Unified Air Quality Management District
ND	Negative Declaration
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO <sub>x</sub>	nitrogen oxides
NPS	National Park Service
NRHP	National Register of Historic Places
NSO	northern spotted owl ( <i>Strix occidentalis caurina</i> )
O <sub>3</sub>	ozone
PA	Programmatic Agreement
PM	Particulate matter
PM <sub>10</sub>	particulate matter less than 10 microns in diameter
PM <sub>2.5</sub>	particulate matter less than 2.5 microns in diameter
PRC	Public Resources Code
PSR	Project-Specific Requirement
QMD	quadratic mean diameter
RNSP	Redwood National and State Parks
ROG	reactive organic gases

SHPO	State Historic Preservation Officer
SPR	Standard Project Requirement
TAC	toxic air contaminant
TCP	Traditional Cultural Property
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
VDT	variable density thinning

# Appendix B

## Glossary

---

## Appendix B: Glossary of Terms

<b>Abandoned road</b>	Road lacks obvious maintenance. Ditches may lack cleaning and vegetation may be encroaching the road and road surface. Culverts may be partially or completely plugged, badly rusted, or crushed. The road is typically not drivable without improvements (Merrill et al. 2011).
<b>Alignment</b>	The area affected by a road or trail, including the fill slopes, road bench, and cut bank. Also, a linear representation of features on a map such as a stream channel (Merrill et al. 2011).
<b>Basal area</b>	Cross-sectional area of a stem at breast height (see "Diameter at breast height"), often expressed in square feet or meters. "Stand basal area" refers to the cross-sectional area of all stems in a stand measured at breast height and expressed in a unit of land area (i.e., square feet of basal area per acre or square meters of basal area per hectare).
<b>Berm</b>	General term used to describe a constructed mound of earth typically long and narrow in shape. Berms can form a barrier along the edges of roads, can confine runoff along a road, and may also be present along stream channels and floodplains (Merrill et al. 2011).
<b>Bridge</b>	Structure, including supports, erected over a depression or stream, and which has a deck for carrying traffic and may have railings (Merrill et al. 2011).
<b>Clearcut</b>	Logging practice in which most or all trees in an area are uniformly cut down.
<b>Complete fill recovery</b>	Road removal process which recovers all displaced road, crossing and landing fill. Recovered fill is typically placed along the road cutbench, compacted, shaped to provide sheet drainage, and mulched. Excess fill that cannot be accommodated in the cutbench is relocated to nearby stable locations such as skid trails or quarry pits etc. Complete fill recovery is the preferred method of road removal. (Merrill et al. 2011).
<b>Crane mat</b>	Mats placed to support heavy equipment and protect vegetation and soils from disturbance.
<b>Cross drain culvert</b>	A culvert installed just below road grade that intercepts and conveys water from the inboard ditch to the outside embankment edge of the road. These structures are intended to trap runoff from the roadbed, the hillslope, and shallow groundwater and deliver it to the slope below (Merrill et al. 2011).
<b>Crown class</b>	Category of tree based on its crown position relative to those of adjacent trees. Types of crown classes are as follows: <ul style="list-style-type: none"><li>• Codominant- A tree whose crown helps to form the general level of the main canopy.</li><li>• Dominant- A tree whose crown extends above the general level of the main canopy.</li><li>• Intermediate- A tree whose crown extends into the lower portion of the main canopy.</li></ul>

- Suppressed- A tree whose crown is completely overtopped by one or more neighboring trees (NPS 2014).

<b>Culvert</b>	Metal, plastic or concrete pipe set below the road surface. Used to pass stream-flow from upslope of the road to downslope of the road. Culverts can also be placed to drain springs and inboard ditch flow from the inside to the outside of the road, beyond the outer edge of the road fill, or fillslope (Merrill et al. 2011).
<b>Cutbank</b>	Portion of the hillslope along the upslope side of the roadbed that has been cut into bedrock or native soil (Merrill et al. 2011).
<b>Cutbench</b>	Portion of a roadbed that has been cut into bedrock or native soil. Compare with embankment (Merrill et al. 2011).
<b>Delivery</b>	Amount, expressed as a percentage or ratio of material (sediment), that is delivered to a stream from a site. Also referred to as Sediment Delivery Ratio (SDR). The percentage is an objective estimation based on site conditions, including, but not limited to, slope steepness, groundwater emergence, road drainage, fill materials, adjacent instability, and vegetative cover (Merrill et al. 2011).
<b>Diameter at breast height (dbh)</b>	Diameter of a tree at breast height (4.5 feet above the ground), most often expressed in inches or centimeters. Average dbh of a stand is expressed as the diameter of the tree with the average basal area (quadratic mean diameter) rather than the average of all diameters in a stand (arithmetic mean diameter) (NPS 2014).
<b>Embankment</b>	Fill excavated from the cutbench and used to construct the outboard road bench, often referred to as the fill slope, outboard fill material, or sidecast material. (Merrill et al. 2011). Embankments may also be constructed as bridge supports or approaches or causeways through low-lying areas. Embankments should be constructed with clean, well-graded fill and compacted in lifts by mechanical means.
<b>Even-aged</b>	Stand having trees of approximately the same age, usually within a range of 10 or 20 years, and normally a simple vertical structure (NPS 2014).
<b>Feller-buncher</b>	Harvesting machine that cuts a tree with a shear or saw and carries one or more cut trees in its hydraulically operated arms as it moves to cut the next tree. It deposits small piles of cut trees on the ground to be transported by a skidder (NPS 2014).
<b>Fill</b>	Material used to construct roads and related structures. Fill can include soil, rock, large organic debris, and man-made objects (e.g., cars) (Merrill et al. 2011).
<b>Fillslope</b>	Area of excavated material cast on the downslope side of road cut (also called embankment) (Merrill et al. 2011).
<b>Geomorphology</b>	Study of the earth's surface and the processes that shape it. Geomorphology is closely related to geology (Merrill et al. 2011).
<b>Grade</b>	Proposed or planned ground surface. Grade is usually set to match the surrounding topography or stream gradient. Grade also refers to the

longitudinal slope of a roadway. Typically expressed as a percent (Merrill et al. 2011).

<b>Gradient</b>	The measurement of the angle along a natural slope or a stream. This term is often confused with grade (see "grade") (Merrill et al. 2011).
<b>Ground-based operations</b>	Operational logging method ground-based mechanized equipment (e.g., feller-buncher, skidder, harvester/processor) to fell trees and/or skid logs or whole trees from the stump area to the landing or roadside area (NPS 2014).
<b>Gully</b>	Steeply sided channel caused by erosion from surface runoff or a diverted stream channel. Gullies can usually be identified by their location away from natural stream valleys. Gullies are at least 1 square foot in cross-sectional area. Compare with rill (Merrill et al. 2011).
<b>Harvester</b>	Machine that falls trees and performs processing functions at the stump (see "processor") (NPS 2014).
<b>Humboldt crossing</b>	Stream crossing constructed with logs set parallel to the stream channel and covered with fill (Merrill et al. 2011)
<b>Hydrology</b>	Science of water found on the surface of the earth and in the atmosphere. This term is often confused with hydrogeology, which is the science of groundwater (Merrill et al. 2011).
<b>Inboard ditch</b>	Drainage ditch cut along the inboard edge of the road that collects and conveys road surface runoff, slope runoff, small streams and spring discharge. Inboard ditches convey runoff to the next cross drain culvert or stream crossing down the road (Merrill et al. 2011).
<b>Inventory</b>	Set of objective sampling methods designed to quantify the spatial distribution, composition, and rates of change of resource parameters within specified levels of precision for the purposes of management (NPS 2014).
<b>Landing</b>	Location where logs are collected and loaded onto trucks for transport. Landings are typically located along haul roads and are observed as a "wide spot" in the road. Landings are most often constructed with typical cut/fill techniques but have a large embankment fill volume due to their size, and typically contain a higher concentration of large woody debris (than regular road embankment fill because tree limbs and discarded pieces from logging operations were typically pushed over the outboard edge for removal from the work area (Merrill et al. 2011).
<b>Large wood placement</b>	Placement of large wood in stream channels to create conditions that improve stream habitat. When wood is placed by heavy equipment, the acronym is LW-HEP. When wood is placed by field crews walking channels without heavy equipment, but using chainsaws and other equipment, the acronym is LW-WHEP (Ozaki 2018).
<b>Loader</b>	Self-propelled machine with a grapple or tongs and a supporting structure designed to pick up and discharge trees or logs for the purpose of piling or loading (NPS 2014).

<b>Lop-and-scatter</b>	Hand method of removing the upward-extending branches from tops of felled trees and bucking to keep slash low to the ground, to increase rate of decomposition, lower fire hazard, or as a pretreatment prior to burning (NPS 2014).
<b>Mass wasting</b>	General term that includes many types of mass earth movements. These include rockslides, debris slides, debris flows, and earthflows, etc. (Merrill et al. 2011).
<b>Open road</b>	Road passable to a standard four-wheel-drive vehicle during dry weather without clearing brush or making other improvements. Road typically shows evidence of recent maintenance, including clearing culvert inlets and inboard ditches, grading, rolling dip or waterbar reconstruction, and brushing (Merrill et al. 2011).
<b>Outsloped</b>	Road surface shaped to slant toward the outboard edge of a road. The slanted surface naturally disperses surface runoff. A road that is outsloped may or may not be drivable depending on the intent of treatment. An outsloped road may or may not have an inboard ditch. Pitch is expressed as a negative number (Merrill et al. 2011).
<b>Outsloping</b>	Act of changing a flat or insloped road to an outsloped road. For erosion control treatments, substantial fill is removed from the outer edge of the road prism, and spread and shaped along the inside edge of the road, typically against the cutbank. For surface drainage on active roads, the road surface has a mild outslope that is drivable by logging trucks and forms a relatively maintenance-free road surface that disperses road surface runoff (Merrill et al. 2011).
<b>Processor</b>	Machine that that performs two or more functions on a felled tree, including delimiting, debarking, bucking, measuring, or chipping (see "harvester") (NPS 2014).
<b>Rills</b>	Small erosional feature similar to a gully in morphology but less than 1 square foot in cross-sectional area. Rills often form on soft bare soil or road surfaces. Compare with "gully" (Merrill et al. 2011).
<b>Removed road</b>	Road that has been physically removed from the landscape and is no longer accessible to vehicles (see "road removal"). (Merrill et al. 2011).
<b>Roadway</b>	Corridor of the road within the limits of excavation and embankment, including the cutbank, the inboard ditch, the roadbed, and the outboard fill. (Merrill et al. 2011).
<b>Road outsloping</b>	Treatment of a road to eliminate collection or diversion of water along the roadbed and provide uniform sheet drainage. Outsloping can be prescribed for roads still in use or roads that are no longer used (see "outsloping") (Merrill et al. 2011).
<b>Road removal</b>	Treatment of a road that completely recovers unstable side-cast fill and stabilizes the fill within the original cut-bench. Stream crossing fill is excavated, and all excavated materials are placed in stable locations along

the cutbank. This type of treatment is also referred to as road recontouring or road obliteration. May include associated landings (Merrill et al. 2011).

<b>Road surface</b>	Material, native or placed, that comprises the top layer of the roadbed (see "surfacing") (Merrill et al. 2011).
<b>Rolling dip</b>	Broad, shallow, gentle dip (low point) in the road surface that collects road surface runoff and conveys it to the outer edge of the road. It can also drain an inboard ditch. Rolling dips are drivable at slow speeds without abrupt bumps in the road surface (Merrill et al. 2011).
<b>Runoff</b>	Rainwater flowing on the surface of the ground. Runoff can be generated by rain falling on saturated ground or from heavy rain that cannot soak in fast enough (Merrill et al. 2011).
<b>Sediment</b>	Silt, sand, clay, and gravel that is moved by water or air and deposited at some location (Merrill et al. 2011).
<b>Sediment yield</b>	Amount of sediment that reaches a stream channel after eroding from a site. Expressed in cubic meters and calculated by multiplying the erosion volume and delivery ratio (Merrill et al. 2011).
<b>Silviculture</b>	Art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society (NPS 2014).
<b>Skid</b>	Method of transporting cut logs from the point of felling, limbing, and topping, to a landing for bucking into logs and loading onto a truck for removal from the forest. This is done along narrow, temporary trails by heavy equipment (e.g., skidders and bulldozers) (NPS 2014).
<b>Skid trail</b>	Small single-lane tracks that develop as ground-based equipment moved logs across harvest units. Skid trails are not constructed like haul roads; they lack a constructed roadbed and typically follow, rather than cut through the surrounding topography (Merrill et al. 2011).
<b>Skidder</b>	Self-propelled machine with, often articulated (hinged) in the center, for dragging trees or logs (NPS 2014).
<b>Skyline operation</b>	Operational logging method that uses a cable yarding machine, an overhead system of winch-driven cables, to pull logs or whole trees from the stump area to the landing or roadside area.
<b>Slash</b>	Waste from logging, including the tops and other unusable parts of trees (NPS 2014).
<b>Soil</b>	Uppermost layer of decayed organic matter, clay, silt, sand, air, water, and weathered rock mixed in various proportions. Soil consists of horizons or layers that display different amounts of weathering and fertility (Merrill et al. 2011).
<b>Snag</b>	Standing dead tree.

<b>Stand</b>	Section of forest having relatively uniform composition regarding species, size structure, and density; distinguishable from other stands by attributes such as these. The stand is the basic unit of silviculture, since it is by stands that nearly all cultural treatments are prescribed. A stand type is the designation given one kind of stand within a particular classification system, and it normally consists of symbols referring to principal species, heights, and densities (NPS 2014).
<b>Stand density</b>	Quantitative measure that describes the degree of stem crowding within a stocked area. Absolute measures of stand density are often reported in terms of number of trees, basal area, or volume per unit area or relative to a standardized condition.
<b>Stream crossing</b>	Constructed road section across a natural stream. There are many types of crossings, such as bridges, culverts, Humboldt (see "Humboldt crossing"), and fill crossings. A stream crossing includes all locations where a road crosses a channel, whether water is flowing, and whether a drainage structure has been provided (Merrill et al. 2011).
<b>Thinning</b>	Silvicultural treatment made to reduce stand density primarily to redistribute growing space and available resources, enhance forest health, or recover potential mortality (NPS 2014).
<b>Through-cut</b>	Portion of a road that has cutbanks on both sides with drainage flowing down the road or inside ditch (Merrill et al. 2011).
<b>Topography</b>	Natural shape of the land's surface. (Merrill et al. 2011).
<b>Winterization</b>	Winterization includes: 1) grading exposed road and landing surfaces to allow water to freely drain across them without concentrating, ponding or rilling, 2) installing rolling dips/drains to drain steeper sections of road, 3) clearing clogged drainage ditches or culverts, and 4) installing silt fences and other erosion control devices where necessary to convey concentrated water across exposed road and landing surfaces, 5) removing temporary road-stream crossings that do not meet 100- year flood discharge standard for flow, sediment, and debris, and 6) mulching all exposed soil surfaces beyond road driving surface.
<b>Yarder</b>	System of power-operated winches and a tower used to haul logs or trees from the stump area to a landing or roadside area (NPS 2014).
<b>Yoader</b>	Loader that is converted into a small yarder (see "yarder") (NPS 2014).

# Appendix C

## Tables

---

## Appendix C: Tables

**Table 1**  
**Existing and Post-Treatment Stand Characteristics**

Forest Inventory Unit	Existing Conditions				Post-Treatment Conditions			
	Basal Area per Acre (square feet)	Number of Trees per Acre	Quadratic Mean Diameter	Volume per Acre (thousand board feet)	Basal Area per Acre (square feet)	Number of Trees per Acre	Quadratic Mean Diameter	Volume per Acre (thousand board feet)
Davison A	483	364	15.6	76.0	353	150	20.7	60.6
Davison B	467	175	22.1	83.5	399	106	26.2	73.6
Davison C	535	184	23.1	108.6	480	136	25.4	101.5
Streelow Headwaters North A	494	392	15.2	62.0	294	108	22.4	44.7
Streelow Headwaters South B	499	354	16.1	70.0	298	97	23.8	45.8
Major Creek	426	101	27.8	95.3	390	90	28.2	88.2
North Fork Streelow Creek D	435	363	14.8	87.9	273	153	18.1	56.8
North Fork Streelow Creek C	490	327	16.6	71.8	295	154	18.7	44.0
North Fork Streelow Creek A	489	221	20.1	63.4	400	150	22.1	55.0
North Fork Streelow Creek B	446	184	21.1	84.1	367	102	25.7	74.7
Gold Bluffs Beach A	372	204	18.3	45.6	247	76	24.5	35.3
Gold Bluffs Beach B	356	142	21.4	89.0	298	74	27.2	83.5
Gold Bluffs Beach C*	345	156	20.2	--	270	107	21.5	--
Berry Glen B	365	367	13.5	45.4	215	210	13.7	29.7

Forest Inventory Unit	Existing Conditions				Post-Treatment Conditions			
	Basal Area per Acre (square feet)	Number of Trees per Acre	Quadratic Mean Diameter	Volume per Acre (thousand board feet)	Basal Area per Acre (square feet)	Number of Trees per Acre	Quadratic Mean Diameter	Volume per Acre (thousand board feet)
Berry Glen A	399	304	15.5	72.9	239	151	17.0	36.5
Harding Mill*	335	249	15.7	--	316	217	16.3	--
May Creek F	360	306	14.7	39.3	268	137	19.0	37.3
May Creek B	409	341	14.8	67.0	246	115	19.8	42.7
May Creek A	436	393	14.3	66.2	258	165	17.0	42.0
May Creek C	468	512	13.0	46.5	280	228	15.0	31.5
May Creek D	431	327	15.5	60.3	324	166	18.9	50.7
May Creek E	536	316	17.6	95.8	345	124	22.6	69.1
Prairie Creek North*	428	187	20.5	--	341	112	23.6	--
Skunk Cabbage C	280	223	15.2	--	241	150	17.2	--
Skunk Cabbage D*	312	120	21.9	--	296	106	22.6	--
Skunk Cabbage A*	370	656	10.2	--	220	368	10.5	--
Skunk Cabbage B	439	612	11.5	35.2	260	186	16.0	25.5

Note:

\* Unit would have a lop-and-scatter operational method where no biomass volume is removed.

--: No volume removal.

**Table 2**  
**Proposed Operational Methods**

<b>Forest Inventory Unit</b>	<b>Size (acres)</b>	<b>Ground-Based Operations (acres)</b>	<b>Skyline Operations (acres)</b>	<b>Lop-and-Scatter Operations (acres)</b>
Davison A	283	169	113	-
Davison B	286	135	151	-
Davison C	250	106	145	-
Streelow Headwaters North A	313	204	109	-
Streelow Headwaters South B	470	290	180	-
Major Creek	302	181	121	-
North Fork Streelow Creek D	310	150	161	-
North Fork Streelow Creek C	303	249	54	-
North Fork Streelow Creek A	450	200	250	-
North Fork Streelow Creek B	385	259	126	-
Gold Bluffs Beach A	510	206	304	-
Gold Bluffs Beach B	172	56	116	-
Gold Bluffs Beach C	108	-	-	108
Berry Glen B	209	90	119	-
Berry Glen A	354	215	139	-
Harding Mill	289	-	-	289
May Creek F	155	139	16	-
May Creek B	318	131	187	-
May Creek A	621	262	358	-
May Creek C	383	150	233	-
May Creek D	293	180	113	-
May Creek E	321	121	200	-
Prairie Creek North	433	-	-	433
Skunk Cabbage C	234	170	64	-
Skunk Cabbage D	498	301	197	-
Skunk Cabbage A	248	155	93	-
Skunk Cabbage B	310	277	33	-
<b>Total Acres</b>	<b>8,808</b>	<b>4,396</b>	<b>3,582</b>	<b>830</b>

**Table 3**  
**Inventoried Stream Crossing Sites**

Watershed	Inventoried Roads			Road Not Inventoried (miles**)	Total Miles**
	Number of Sites *	Total Excavation Volume (cubic yards*)	Inventoried Road (miles**)		
May Creek	50	36,529	2.8	6.1	8.9
Berry Glen	52	77,411	2.3	1.9	4.2
North Fork Streeelow	181	173,539	10.6	6.4	17
Davison	34	23,887	2.2	0.5	2.7
Streeelow Headwaters	69	81,520	4.3	4.0	8.3
Skunk Cabbage	60	55,577	5.3	0.8	6.1
Gold Bluffs Beach	0	--	0	4.8	4.8
<b>Total</b>	<b>446</b>	<b>448,463</b>	<b>27.5</b>	<b>24.5</b>	<b>52.0</b>

Note:

\* Includes inventoried haul roads and associated skid roads.

\*\* Road mileage is for haul roads only. Associated skid roads are not included in mileage totals.

**Table 4**  
**Order of Restoration Activities**

Order	Activity	Description
1	Site Access and Preparation	Maintain roads leading to the unit
		Maintain stream crossings to ensure roads leading to the unit are stable
2	Forest and Aquatic Restoration	Complete forest thinning treatment
		Place large wood in tributaries
		Maintain and winterize access roads as needed between field seasons
3	Road Removal or Maintenance Activities	Complete road removal activities
		Maintain roads to be retained

**Table 5**  
**Standard Project Requirements and Project-Specific Requirements**

Element/Title	Requirement
SPR-AIR-1	<b>Equipment maintenance.</b> All diesel- and gasoline-powered equipment engines would be maintained in good condition, in proper tune (according to manufacturer’s specifications), and in compliance with all state and federal requirements.
PSR-AIR-2	<b>Watering to minimize fugitive dust.</b> Prior to use of roads and/or landings for hauling and yarding activities, sufficient water must be applied to the area to be disturbed to minimize fugitive dust emissions. Exposed areas would not be overwatered such that watering results in runoff. Water would not be sprayed on bridge running surfaces. Water sources and drafting specifications would be identified per permit requirements. Alternatively, unpaved areas subject to hauling and yarding activities could be stabilized through the effective application of gravel or treated with biodegradable dust suppressant. Any dust suppressant product used must be environmentally benign (i.e., non-toxic to plants and shall not negatively impact water quality) and its use shall not be prohibited by CARB, USEPA, or the State Water Resources Control Board.
SPR-AIR-3	<b>Idling restrictions.</b> All motorized heavy equipment would be shut down when not in use. Idling of equipment and haul trucks would be limited to 5 minutes.
PSR-AIR-4	<b>Fugitive dust-related excavation/grading restrictions.</b> Excavation and grading activities on road removal sites would be suspended when fugitive dust from project activities might obscure driver visibility on public roads.
SPR-BIO-1	<b>Pre-implementation special-status plant surveys.</b> Prior to the start of project activities, and when the plants are in a phenological stage conducive to positive identification, a qualified botanist would conduct surveys for special-status plant species and sensitive communities throughout the project area if deemed necessary by a Park plant ecologist. Surveys would be conducted in conformance with the <i>California Department of Fish and Wildlife Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities</i> (CDFW 2018a).
PSR-BIO-2	<b>Special-status plant buffers and avoidance.</b> Individuals or populations of rare, threatened, endangered plants, or those listed as CNPS Ranks 1 and 2, would be avoided where feasible with an appropriate buffer delineated by high-visibility flagging. Personnel would be instructed to keep project activities out of the flagged areas. The buffer size would be 25 feet unless agreed otherwise with regulatory agencies. If avoidance of special-status plants is not possible, then CDFW would be consulted to determine a mutually agreeable strategy to minimize project impacts.
SPR-BIO-3	<b>Invasive plant and pathogen control.</b> All project activities that could spread invasive non-native plants and pathogens are subject to the Draft NCRD Invasive Species BMPs (within the Draft Mill Creek Vegetation Management Plan [CDPR 2019]) or the <i>Invasive Plant Management Plan for Redwood National Park</i> (NPS 2017), and the Aquatic Invasive Species Management Plan (CDFG 2008).
PSR-BIO-4	<b>Suppressed and intermediate tree management.</b> In all forest restoration units, a minimum of three suppressed trees, intermediate trees, or snags (unless they pose a risk to worker safety), in any combination, would be left per acre.
PSR-BIO-5	<b>Tree retention.</b> Thinning projects would retain all trees that are 30 inches DBH or larger.

Element/Title	Requirement
PSR-BIO-6	<p><b>Timing restrictions and surveys for nesting migratory birds.</b> In general, project activities that modify or disturb vegetation would not occur during the peak nesting season (May 1 to June 30) to avoid nesting migratory birds. If modification or disturbance to vegetation is deemed necessary at any time during the typical bird breeding period (May 1 to July 31), an RNSP biologist would conduct weekly breeding bird surveys within the area of potential disturbance. If occupied nests are detected, work would either be suspended until the birds have fledged, or a spatial buffer would be applied to protect the nest. The size of the spatial buffer would be determined by the RNSP biologist based on the species found and the nest site specifics.</p>
PSR-BIO-7	<p><b>Special-status bird surveys and restrictions.</b> All special-status bird survey requirements, habitat modification, and normal operating season restrictions for all project activities would be implemented in conformance with all minimization measures and requirements identified in the Biological Opinion issued by USFWS in compliance with ESA Section 7 requirements or CESA documents issued by CDFW. Special-status birds includes those that are state and federally listed as threatened or endangered and state-listed species of special concern.</p>
PSR-BIO-8	<p><b>Raptor breeding temporal and spatial buffers.</b> Prior to the start of project-related work occurring from May 1 through July 31, the on-site inspector/monitor would be responsible for implementing raptor temporal and spatial buffers around observed nests. No project activities would occur within temporal and spatial buffer zones. Temporal buffers are temporary buffers established around nest sites that restrict operations during the species critical nesting period. Spatial buffers are permanent habitat retention buffers established around a species nest site. Until the nest site is determined to be no longer active (normally after 3 years of no use), habitat modification is not allowed within the spatial buffer.</p>
PSR-BIO-9	<p><b>Large wood placement restrictions.</b> Cable and rebar would not be used to anchor large wood in streams. Large wood is expected to be dynamic in the channel and may break loose and deposit naturally at downstream sites. However, no large wood would be placed within 300 feet upstream of bridges without being reviewed and approved by a California-licensed professional engineer. If mobile large wood accumulates within 300 feet upstream of a bridge and is deemed a potential threat to the bridge, a California-licensed professional engineer would evaluate the debris and make recommendations for stabilization or removal.</p>
PSR-BIO-10	<p><b>Large wood retention requirements.</b> Any large wood encountered during excavation of stream crossing would be retained primarily on site as mulch or used in channel to provide habitat. Large wood encountered during excavation of stream crossings would be retained for on-site bank stabilization, in channel to provide habitat, or stockpiled for large wood restoration.</p>
SPR-BIO-11	<p><b>Tree protection.</b> Equipment operators conducting work would be required to avoid striking residual old growth trees or trees identified by park staff.</p>
PSR-BIO-12	<p><b>Fish and amphibian management.</b> All fish and amphibian survey requirements, habitat modification, and operational restrictions for all project activities would be implemented in conformance with all minimization measures and requirements identified in the Biological Opinion issued by NMFS in compliance with ESA Section 7 requirements and CDFW CESA requirements.</p>
PSR-BIO-13	<p><b>Mulching exposed soils.</b> All areas of exposed soils resulting from instream large wood placement shall be mulched with native fuel cover, or in pasture or grass-dominated areas, seeded with native seed mixes to minimize the delivery of sediment into the adjacent stream.</p>

Element/Title	Requirement
PSR-BIO-14	<p><b>Foothill yellow-legged frog surveys.</b> Surveys for foothill yellow legged frogs shall be conducted within 5 days of any operations being conducted in streams that exhibit surface flow. The surveys shall extend a distance of 100 feet upstream and downstream of the project site. CDFW would be notified if any frogs are observed within the survey reach. Appropriate actions shall be taken to avoid or minimize take of these species under the direction of CDFW. These actions include, but shall not be limited to, installation of exclusion fencing, removal and relocation, and daily pre-implementation surveys to ensure frogs have not reoccupied the project site during periods of inactivity.</p>
PSR-BIO-15	<p><b>Wildlife tree retention.</b> All designated wildlife trees would be retained that are associated with forest thinning. A wildlife tree would have one or more of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. Large lateral branches: greater than 5 inches in diameter</li> <li>2. Cavities: wood voids with (estimated) small-to-medium interior dimensions and an entrance opening of at least 1.5 inches suitable for use by a variety of small mammal and bird species</li> <li>3. Hollow: Wood voids with (estimated) large interior dimension and a large (6 inches or larger) entrance opening suitable for use by a variety of small mammal and bird species</li> <li>4. Decay: Extensive decayed wood as evidence by large and/or extensive fungal fruiting bodies (conk), lichen, cavity entrances, and sloughing wood and/or bark</li> <li>5. Broken top: Trees with a minimum diameter at the ordinal break of 12 inches or larger</li> <li>6. Multiple tops: Trees with two or more leaders near the top of the tree that provide opportunities for resting, denning, or nesting</li> <li>7. Snag top: Trees where the top the tree is dead with the lowest portion of the dead top is at least 12 inches in diameter</li> </ol>
PSR-BIO-16	<p><b>Protection of equipment access routes through wetlands.</b> If access is necessary during implementation, crane mats or other appropriate cover material would be placed along the heavy equipment access routes that cross wetland or herbaceous-dominated (pasture/grasslands) areas.</p>
PSR-CULT-1	<p><b>Historical and archaeological resource inventories.</b> Proposed project areas would be inventoried for the presence or absence of historical and archaeological resources prior to operations within the project area and reports would be submitted to and reviewed by the NCRD Archaeologist. PRC 5024 compliance documentation would be completed. A report would be prepared by a qualified archaeological consultant with direct oversight by the NCRD Archaeologist prior to any project activities. Any cultural resources identified during the inventory would be recorded and flagged with a 30-foot buffer (or as needed based on topography and access points to protect the find). CDPR reserves the right to alter this measure through the PRC 5024 process.</p> <p>This requirement would only apply to projects with no NPS involvement. Projects with NPS involvement, where compliance with Section 106 is required, would follow the process described in the Section 106 Programmatic Agreement.</p>

Element/Title	Requirement
SPR-CULT-2	<p><b>Suspend work for the inadvertent discovery of an archaeological resource.</b> In the unlikely event that previously undocumented archaeological resources, including but not limited to flaked stone artifacts (arrowheads or flakes), shellfish, bone, deposits of old bottles and cans, and wooden or rock structural debris, are encountered during project implementation, work in that location would be immediately suspended until an archaeologist meeting the Secretary of the Interior’s standards has evaluated the find in consultation with the SHPO, Yurok Tribe, Tolowa Dee-ni’ Nation, and Elk Valley Rancheria, as appropriate.</p> <p>This requirement would only apply to projects with no NPS involvement. Projects with NPS involvement, where compliance with Section 106 is required, would follow the process described in the Section 106 Programmatic Agreement.</p>
SPR-CULT-3	<p><b>Stop work for inadvertent discovery of human remains.</b> For ground-disturbing activities, in the event that human remains or suspected human remains are discovered, work would cease immediately within 100 feet of the find (or as needed based on topography and access points to protect the find) and the project manager/site supervisor would notify the Cultural Resources Program Manager of the NCRD and the District Superintendent. The human remains and/or funerary objects would not be disturbed and would be protected by covering with soil or other appropriate methods. The District Superintendent (or authorized representative) would notify the County Coroner (in accordance with Section 7050.5 of the California Health and Safety Code) and NAHC. The District Superintendent (or authorized representative) would also notify the local tribal representative. The County Coroner would determine whether the human bone is of Native American origin.</p> <p>If the Coroner determines the remains represent Native American interment, the NAHC would be consulted to identify the MLD and appropriate disposition of the remains. Work would not resume in the area of the find until proper disposition is complete (PRC Section 5097.98). No human remains or funerary objects would be cleaned, photographed, analyzed, or removed from the place of discovery prior to determination and consultation with the MLD. If it is determined that the find indicates a sacred or religious site, the site would be avoided to the maximum extent practicable. Formal consultation with the SHPO and review by the NAHC, as well as appropriate tribal representatives, would occur as necessary to define additional site mitigation or future restrictions.</p> <p>This requirement would only apply to projects with no NPS involvement. Projects with NPS involvement, where compliance with Section 106 is required, would follow the process described in the Section 106 Programmatic Agreement. Additional procedures may also apply to projects on NPS-owned lands under the Native American Graves Protection and Repatriation Act.</p>

Element/Title	Requirement
SPR-CULT-4	<p><b>Aerial suspension removal requirements within a culturally sensitive area.</b> If forest thinning activities are proposed within a culturally sensitive area (an archaeological site, tribal cultural resource, or historical site described in PSR-CULT-1), downed and other forest debris would be removed by aerial suspension; no portion of logs, slash, or debris would be dragged across the surface.</p> <p>This requirement would only apply to projects with no NPS involvement. Projects with NPS involvement, where compliance with Section 106 is required, would follow the process described in the Section 106 Programmatic Agreement.</p>
PSR-GEO-1	<p><b>Unstable area buffer.</b> Within a 50-foot-wide buffer around unstable areas (areas that appear to have recent soil movement, as evidenced by characteristics such as conifers with excessive sweep, tilted stumps, scarps, cracks, hummocky or benched terrain, or slide debris) regardless of percent slope, no trees would be cut. Unstable areas would be marked by park staff with training and expertise in geologic and watershed processes.</p> <p>Landslides within a project area would be mapped by park staff; this would trigger evaluation and approval for use by an earth sciences/physical sciences professional if the feature is related to travel routes or operations. Heavy equipment and/or vehicles or one-end cable yarding would not be allowed to cross areas of instability (as defined above) without approval from an earth sciences/physical sciences professional.</p>
PSR-GEO-2	<p><b>Consultation with earth sciences/physical sciences professional.</b> Any ground shaking over magnitude 6.0 in the project vicinity would require park staff to consult with staff of the USGS Earthquake Information Center to understand the source, distance, intensity, and depth of the ground shaking. An earth sciences/physical sciences professional would then determine the need for project area review of roads.</p>
PSR-GEO-3	<p><b>Slope limitations for traditional ground-based equipment.</b> Traditional ground-based equipment would be limited to slopes less than 40%. Operations within the riparian management zone would be restricted as described in Table 6.</p>
PSR-GEO-4	<p><b>Slope limitations for cable-assisted thinning operations.</b> Cable-assisted equipment (e.g., tethered harvesters and forwarders) may be allowed on slopes up to 85%. Equipment would stay on designated trails covered with a minimum of 6 inches of slash. Operations within the riparian management zone would be restricted as described in Table 6.</p>

Element/Title	Requirement
PSR-GEO-5	<p><b>Winterization requirements and timing restrictions on activities causing soil erosion.</b> Project work would typically be completed during the normal operating season between June 15 and October 15. If more than 0.5 inch of rain is forecast during the normal operating season, project operations would temporarily cease and sites would be winterized. Within riparian management zones, areas with disturbed soils must be stabilized prior to the beginning of the winter period subject to extensions provided by dry weather, and/or prior to the sunset if the National Weather Service forecast is a “chance” (30% or more) of rain within the next 24 hours, or at the conclusion of operations, whichever is sooner. Implementation activities may continue past the end of the normal operating season if the work can be completed within a window of dry weather as predicted by NOAA’s Fall Transition Season Precipitation and Hydrology Decision Support Service notifications.</p> <p>Work sites, including roads and landings, would be winterized before the end of the normal operating season. Winterization includes: 1) grading exposed road and landing surfaces to allow water to freely drain across them without concentrating, ponding or rilling; 2) installing rolling dips/drains to drain steeper sections of road; 3) clearing clogged drainage ditches or culverts; 4) installing silt fences and other erosion control devices where necessary to convey concentrated water across exposed road and landing surfaces; 5) removing road-stream crossings that do not meet 100-year flood discharge standard for flow, sediment, and debris; and 6) mulching all exposed soil surfaces beyond road driving surface. Operations may be started prior to the normal operating season when the soil is dry throughout the entire top 8 inches of the profile, as evidenced by the field guide for soil moisture described in the <i>Wet Weather Operations Standards for Heavy Equipment Use and Log Hauling for Redwoods Rising</i> (RNP 2019a) guidelines.</p> <p>Roads and landings used outside of the normal operating season or after significant rain events would be winterized. Prevention measures would occur before damage occurs, or the area would be avoided until it is sufficiently dry for use. All road use would comply with the Park Seasonal Road Use Policy (March 11, 2011, version or later), and <i>Wet Weather Operations Standards for Heavy Equipment Use and Log Hauling for Redwoods Rising</i> guidelines, which prohibit any road use that would cause rutting or other road deformation. Roads not currently listed as all season may be brought up to that standard if winter travel is necessary.</p>
PSR-GEO-6	<p><b>Requirements for existing and new landings.</b> Existing landings that were constructed for commercial logging operations prior to park establishment would be used when practicable. Reopening old landings would include shrub and small tree removal, minimal grading, and stump removal. New landings (fewer than two per 50 acres) may need to be constructed for yarding equipment. New landings would be located outside of geologically unstable areas, and the grade would not exceed 15%. Individual landings would not be larger than 0.25 acre. New landings or equipment pull outs would not be placed within 100 feet of streams except where existing roads occur within this threshold distance and there is no other place to land logs. The total number of landings created within 100 feet of a stream would not cumulatively make up more than 35% of the total number of new landings needed in the project area. Existing roads and skid trails would be used to access the break-in-slope where cable yarders can set up. Landings would be kept to the minimum size needed to accomplish the job and existing road and skid trail surfaces would be used as much as practicable.</p>

Element/Title	Requirement
PSR-GEO-7	<p><b>Road removal and erosion control.</b> Brush, trees, rootwads, and other organic debris removed during excavation and clearing of project areas would be collected, stockpiled, and placed on slopes adjacent to live streams or other locations where fine sediment may be mobilized and has potential to enter the stream system. If there is not enough vegetative debris at a particular work site to achieve the amount of ground cover specified, vegetative debris may be moved from nearby, less erosionally sensitive work sites. In the event that imported material (such as straw or shredded redwood bark) is needed, RNSP would purchase and deliver it as close as possible by truck to the area needed. Materials would be selected to comply with RNSP guidelines to minimize introduction of exotic plant species and interference with re-establishment of native forest species.</p>
PSR-GEO-8	<p><b>Cable and ground-based yarding one-end log suspension minimum.</b> Cable and ground-based yarding would be restricted to the use of equipment capable of maintaining a minimum of one-end log suspension to reduce surface disturbance.</p>
PSR-GEO-9	<p><b>Evaluation of existing roads/landings for reuse.</b> Existing roads and landings proposed for reuse would be evaluated. Any cracks or other signs of instability or erosion potential would be evaluated by an earth sciences/physical sciences professional who would provide reconstruction or maintenance prescriptions necessary for the intended purpose of reuse.</p>
PSR-GEO-10	<p><b>Monitor equipment operations at road construction and/or removal sites.</b> At road reconstruction and/or removal sites, a qualified inspector trained in road rehabilitation or removal would monitor equipment operation. Heavy equipment operators would be cautioned to minimize their exposure to unstable slopes that may occur naturally or result from the earthmoving process.</p>
PSR-GEO-11	<p><b>Skid trail erosion control measures.</b> On skid trails with no measurable fill cross section, tire tracks, skidding ruts, and other depressions and surface irregularities would be removed and restored to a non-sediment delivery status. Erosion control measures such as outsloping (preferred) or water bars in conjunction with slash placement on skid trails and disturbed soils would be implemented where the potential exists for erosion and delivery of sediment to waterbodies, floodplains, and wetlands. Slash generated from forest restoration would be spread uniformly as mulch.</p>
PSR-HAZ-1	<p><b>Equipment storage, servicing, and fueling limitations.</b> All equipment would be stored, serviced, and fueled at least 150 feet from any stream channel and 50 feet outside of riparian areas and away from unstable slopes. All primary fuel storage containers (fuel tankers) will be required to have secondary containment and would be stored outside of riparian areas. When long stretches of road are entirely within riparian areas, smaller, portable refueling devices (under 200 gallons) may be used to refuel large equipment. In such cases, drip pads/pans or other protective devices will be placed under the fueling area.</p>
PSR-HAZ-2	<p><b>Spill prevention, monitoring, and response requirements.</b> All equipment, including hand tools, heavy equipment, and cable yarding equipment, would be checked daily for leaks and equipment with leaks would not be used until leaks are repaired. RNSP staff would ensure a spill kit is maintained on site at all times. Additionally, contractors would equip each piece of heavy equipment with a spill response kit. Should leaks develop in the field, they would be repaired immediately, or work with that equipment would be suspended until repairs are made. In the event of any spill or release of any chemical in any physical form on or immediately adjacent to the project sites or within the project area during operations, the contractor would immediately notify the appropriate RNSP staff (e.g., the project inspector). All contaminated water, sludge, spill residue, or other hazardous compounds would be contained and disposed of outside the boundaries of the project area at a lawfully permitted or authorized destination.</p>

Element/Title	Requirement
PSR-HAZ-3	<b>Equipment requirements for spark arrestors and fire extinguishers.</b> All equipment would be required to include spark arrestors or turbo chargers that eliminate sparks in exhaust and to have fire extinguishers on site. One shovel or one serviceable fire extinguisher would be in the immediate vicinity of all persons operating chain saws during the dry season. All heavy equipment would be required to carry a 10-pound fire extinguisher with a valid inspection tag.
SPR-HAZ-4	<b>Vehicle parking restrictions.</b> Crews would park vehicles a minimum of 10 feet from flammable material such as dry grass or brush.
SPR-HAZ-5	<b>Radio dispatch requirements in case of fire.</b> RNSP personnel would have a RNSP radio at the park unit which allows direct contact with a centralized dispatch center to facilitate the rapid dispatch of control crews and equipment in case of a fire.
PSR-HAZ-6	<b>Road access requirements.</b> All project roads with active operations must be made passable as soon as reasonable and practicable for emergency vehicles and Park staff.
PSR-HAZ-7	<b>Fire hazard reduction requirements.</b> All felled trees would be brought to the ground and would not be left suspended or hanging in crowns of other trees. Slash would be lopped and scattered to within 3 feet of ground when determined necessary by the project manager or their designee for short-term fire hazard reduction.
SPR-HAZ-8	<b>Inadvertent discovery of unknown material spillage.</b> If there is discovery of unknown spillage from, or free product discovered on or adjacent to the project sites, work would be halted or diverted from the immediate vicinity of the find, and the RNSP hazardous materials coordinator would be contacted. Hazardous materials, if present, would be contained and removed from the site prior to resumption of work.  Removal of all contaminants, including sludge, spill residue, or containers, would be conducted following established procedures and in compliance with all local, state, and federal regulations and guidelines regarding the handling and disposal of hazardous materials.
PSR-HYDRO-1	<b>Riparian buffers.</b> Equipment exclusion zones around riparian corridors would be established as defined in Table 6.
PSR-HYDRO-2	<b>Use of dropped trees as instream structures.</b> Trees that are dropped into or across stream channels would not be removed, but their position may be adjusted for use as instream structures.
SPR-HYDRO-3	<b>Equipment decontamination.</b> Decontamination of heavy equipment would occur prior to delivery onto park lands. Heavy equipment would be thoroughly power washed prior to delivery to the park. Equipment would be free of woody and organic debris, soil, grease, and other foreign matter. The engine compartment, cab, and other enclosed spaces would also be free of the aforementioned debris. Equipment would be thoroughly inspected by an agency representative upon delivery and may be rejected if, in the opinion of the representative, the equipment does not meet decontamination standards. If a piece of equipment is removed from the park for unrelated work or work not identified as part of implementation, it would be re-inspected upon re-entry to the park. Decontamination would take place off site upon demobilization.
PSR-HYDRO-4	<b>Cable yarding across perennial streams.</b> When cable yarding across perennial streams, trees must be fully suspended in the air when traveling near streams, as defined in Table 6.

Element/Title	Requirement
PSR-HYDRO-5	<p><b>Timing restrictions for road reconstruction and/or removal.</b> Road reconstruction and/or removal work would generally occur outside of the rainy season (June 15 through October 15). On roads where potential sediment delivery to streams exists, restoration activities after October 15 would only proceed according to permit conditions established in consultation with regulatory agencies. If periods of dry weather are predicted after October 15, small additional work items may be done with regulatory agency approval, if they can be completed within the window of dry weather. RNSP would have materials to sufficiently mulch bare work areas on site. Work would be conducted so that no more than 1 half-day would be required to finish all earth moving and mulching work. All access roads would be winterized prior to any additional earth moving tasks.</p>
PSR-HYDRO-6	<p><b>In-water work area isolation requirements.</b> Stream crossing excavations and/or culvert replacements would take place in dry channels or in channels where stream flow is diverted around the excavation sites to reduce turbidity. In crossings where flow is sufficient to be intercepted, a small diversion dam or collection point would be built upstream and stream flow piped around the worksite and discharged into the stream below the worksite. In crossings where the stream flow is too low to be captured and diverted, filter structures would be installed downstream to filter turbid discharge from the worksite. The project inspector would monitor the structures to prevent failures. All temporary berms, ponds, and piping would be completely removed at the completion of excavations or culvert replacement.</p>
PSR-HYDRO-7	<p><b>Drainage structure and stream crossing maintenance requirements.</b> On roads where vehicle or heavy equipment access is required for forest restoration, culverts, water bars, and other damaged or non-functional drainage structures would be repaired or replaced. All stream crossings proposed for reconstruction and left over winter would be designed to convey the 100-year flood discharge including wood debris and sediment loads. Crossings through fish bearing streams would allow for fish passage throughout their lifecycle if they are to remain in place over winter. Bridges and supporting structures would be designed by a California-licensed professional engineer.</p>
PSR-HYDRO-8	<p><b>Erosion control adjacent to stream channels.</b> At road reconstruction and/or removal sites, disturbed soil adjacent to stream channels would receive mulch coverage with brush and trees (generated during the clearing phase of rehabilitation work) to reduce sheet erosion. Coverage would be heaviest adjacent to the stream or where no native mulch buffer exists downslope between disturbed soil and a stream channel. If needed, hand crews would cut and lop upright branches to further increase ground contact and/or spread finer mulch over small bare areas. Similarly, duff laden with seed, nutrients, and fungi may be collected and scattered. Care would be taken not to impact source areas.</p>
SPR-HYDRO-9	<p><b>Removal requirements for wet roads.</b> At road removal sites, cutbanks exposing seeps or springs would not be recontoured. Instead, the entire embankment fill adjacent to the wet area would be exported to dry sections. An outsloped cutbench would extend along all wet road sections.</p>
PSR-HYDRO-10	<p><b>Stream crossing monitoring.</b> Selected stream crossing sites would be photo-documented following treatment to enable rough-estimate quantitative assessment of post-treatment adjustments according to monitoring protocols. Stream crossing sites would be reviewed in the field during the first winter following treatment to identify any deficiencies in treatment or treatment techniques.</p>

Element/Title	Requirement
PSR-HYDRO-11	<p><b>Water drafting requirements.</b> If water drafting becomes a necessary component of the proposed project, drafting would be conducted as described in the NMFS <i>Water Drafting Specifications</i> (NMFS 2001). Screening devices would be used for water drafting pumps to minimize removal of aquatic species, including juvenile fish, amphibian egg masses, and tadpoles, from aquatic habitats. Drafting sites would be planned to avoid adverse effects to special-status aquatic species and associated habitat, in-stream flows, and depletion of pool habitat.</p> <p>If water drafting becomes a necessary component of the proposed project, drafting would be conducted as described in the NMFS <i>Water Drafting Specifications</i> (NMFS 2001).</p> <p>These specifications include the following:</p> <ul style="list-style-type: none"> <li>• Screening devices no greater than 3/32 inch would be used for water drafting pumps to avoid removal of aquatic species, including juvenile fish, amphibian egg masses, and tadpoles, from aquatic habitats.</li> <li>• Drafting sites would be planned to avoid adverse effects to special-status aquatic species and associated habitat, in-stream flows, and depletion of pool habitat.</li> <li>• All drafting sites would occur outside of occupied coho habitat.</li> <li>• Seek streams and pools where water is deep and flowing, as opposed to streams with low flow and small isolated pools.</li> <li>• Pumping rate shall not exceed 350 gallons per minute (gpm).</li> <li>• The pumping rate shall not exceed 10% of the stream flow as measured by a visual observation of water level in relation to a moss line or rock to determine if stream level is dropping due to pumping.</li> <li>• Operators shall keep a log on the truck containing the following information: Operator’s Name, Date, Time, Pump Rate, Filling Time, Screen Cleaned (Y or N), Screen Condition, and Comments.</li> </ul>
PSR-HYDRO-12	<p><b>Avoid trees contributing to stream bank stability.</b> No trees that contribute to stream bank stability or are within an inner gorge (as determined by an earth sciences/physical sciences professional) would be felled.</p>
PSR-HYDRO-13	<p><b>Cable yarding requirements.</b> Cable yarding corridors would not be larger than 20 feet in width. Stumps or trees (second-growth only) would be used as tail holds. Guylines for the yarder would be anchored to old-growth stumps (not trees) or second-growth stumps or trees surrounding the landing. Skyline operations pull logs fully or partially suspended from the ground, resulting in minimal ground disturbance. Skyline cable operations reduce the need for mid-slope roads.</p>
PSR-NOISE-1	<p><b>Notification requirements to off-site noise-sensitive receptors.</b> Written notification of project activities would be provided to all off-site noise-sensitive receptors (e.g., residential land uses) located within 1,500 feet of work locations. Notification would include anticipated dates and hours during which activities are anticipated to occur and contact information of the project representative, including a daytime telephone number.</p>
SPR-NOISE-2	<p><b>Power equipment use and maintenance requirements.</b> All powered heavy equipment and power tools would be used and maintained according to manufacturer specifications. All diesel- and gasoline-powered equipment would be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers’ recommendations.</p>
PSR-UTIL-01	<p><b>Utility Right of Way notification requirements.</b> The utility company would be notified 5 days before material is hauled that limited road access will be available within portions of their Right of Way.</p>

**Table 6**  
**Greater Prairie Creek Riparian Management Zones**

<b>Stream Type</b>	<b>Open Channel Perennial</b>	<b>Open Channel Intermittent</b>	<b>Buried Channel Perennial</b>	<b>Buried Channel Intermittent</b>	<b>Ephemeral</b>
Equipment Exclusion Zone (EEZ) Size <sup>1</sup>	150 feet from bank full width or 50 feet from break in slope, <sup>2</sup> whichever is greater	50 feet from bank full width or top of break in slope, <sup>2</sup> whichever is greater	50 feet from bank full width or top of break in slope, <sup>2</sup> whichever is greater	50 feet from edge of buried channel	25 feet from channel or top of break in slope, <sup>2</sup> whichever is greater
Other restrictions	Fallen trees may not be removed by heavy equipment if they lie within the break in slope	Fallen trees may not be removed by heavy equipment if they lie within the break in slope	Ground-based equipment may remove trees within the break in slope via endlines, unless yarding causes significant gouging of soil. <sup>3</sup>	Ground-based equipment may remove trees within the break in slope via endlines, unless yarding causes significant gouging of soil. <sup>3</sup>	

Notes:

1. No heavy equipment would be used within the EEZ buffer, except for when an existing road lies within the EEZ. Heavy equipment would only be used on road prisms within the EEZ.
2. The break in slope would be identified and physically marked by park staff trained by a qualified park forester or geologist.
3. Significant gouging of soil is defined as a dragged tree bole causing exposure of soil, not other woody debris, over a horizontal distance greater than 3 feet.

**Table 7  
National and California Ambient Air Quality Standards**

<b>Pollutant</b>	<b>Averaging Period</b>	<b>California Standards</b>	<b>National Standards</b>	<b>Health Effects</b>
O <sub>3</sub>	1-hour	0.09 ppm	--	Breathing difficulties, lung tissue damage
	8-hour <sup>b</sup>	0.070 ppm	0.075 ppm	
PM <sub>10</sub>	24-hour	50 µg/m <sup>3</sup>	150 µg/m <sup>3</sup>	Increased respiratory disease, lung damage, cancer, premature death
	Annual	20 µg/m <sup>3</sup>	--	
PM <sub>2.5</sub>	24-hour <sup>c</sup>	--	35 µg/m <sup>3</sup>	Increased respiratory disease, lung damage, cancer, premature death
	Annual	12 µg/m <sup>3</sup>	12 µg/m <sup>3</sup>	
CO	1-hour	20 ppm	35 ppm	Chest pain in heart patients, headaches, reduced mental alertness
	8-hour	9.0 ppm	9 ppm	
NO <sub>2</sub>	1-hour	0.18 ppm	0.100 ppm <sup>a</sup>	Lung irritation and damage
	Annual	0.030 ppm	0.053 ppm	
SO <sub>2</sub>	1-hour	0.25 ppm	0.075 ppm <sup>a</sup>	Increases lung disease and breathing problems for asthmatics
	3-hour	--	0.5 ppm	
	24-hour	0.04 ppm	--	
Lead	30-day	1.5 µg/m <sup>3</sup>	--	Increased body burden and impairment of blood formation and nerve conduction
	Quarter	--	1.5 µg/m <sup>3</sup>	
	3-month	--	0.15 µg/m <sup>3</sup>	
Sulfates	24-hour	25 µg/m <sup>3</sup>	--	Decrease in ventilator function, aggravation of asthmatic symptoms, aggravation of cardio-pulmonary disease
Visibility-reducing particles	8-hour	In sufficient amount to give an extinction coefficient of >0.23 inverse kilometers (visual range to less than 10 miles with relative humidity less than 70%)	--	--
Hydrogen sulfide	1-hour	0.03 ppm	--	Odor
Vinyl chloride	24-hour	0.01 ppm	--	Short-term exposure: central nervous system effects – dizziness, drowsiness, and headaches Long-term exposure: liver damage, cancer

**Table 8**  
**Timing of Special-status Amphibian Life Stages that Occur within Aquatic Habitats**

Species	Months											
	J	F	M	A	M	J	J	A	S	O	N	D
Southern torrent salamander												
Oviposition <sup>1</sup>								x	x			
Hatching <sup>1</sup>			x	x	x							
Metamorphosis <sup>2</sup>	x	x	x	x	x	x	x	x	x	x	x	x
Pacific tailed frog												
Oviposition <sup>3</sup>							x	x	x			
Metamorphosis <sup>4</sup>	x	x	x	x	x	x	x	x	x	x	x	x
Northern red-legged frog												
Oviposition <sup>5</sup>	x	x	x	x								x
Hatching <sup>6</sup>	x	x	x	x	x	x						
Metamorphosis <sup>7</sup>			x	x	x	x	x	x	x	x		
Foothill yellow-legged frog												
Oviposition <sup>8</sup>				x	x							
Hatching <sup>9</sup>				x	x	x						
Metamorphosis <sup>10</sup>								x	x			

Notes:

1. Southern torrent salamander peak oviposition is in August and September in California, with peak hatching occurring in the spring (Tait and Diller 2006).
2. Southern torrent salamander larval development from hatching to metamorphosis takes 2.5 years (Tait and Diller 2006).
3. Pacific tailed frog oviposition occurs between July and September in California (Sever et al. 2001; Karraker et al. 2006).
4. Pacific tailed frog metamorphosis in lowland coastal California populations takes 1 to 2 years (Wallace and Diller 1998, Bury and Adams 1999).
5. Northern red-legged frog breeding occurs for a few weeks between December and April (Calef 1973).
6. Following northern red-legged breeding (see above), hatching occurs within 39 to 45 days (Calef 1973).
7. Following northern red-legged hatching (see above), metamorphosis may take 3 to 5 months (California Herps 2019).
8. Foothill yellow-legged frog breeding in Del Norte County in 2002 to 2007 was initiated in early April and lasted 19 to 52 days, with earlier breeding occurring in low-flow years (Wheller and Welsh 2008).
9. Foothill yellow-legged frog eggs take 2 to 3 weeks to hatch (Kupferbuerg 1996).
10. Foothill yellow-legged frogs metamorphose in late summer through early autumn (Wheeler and Welsh 2008).

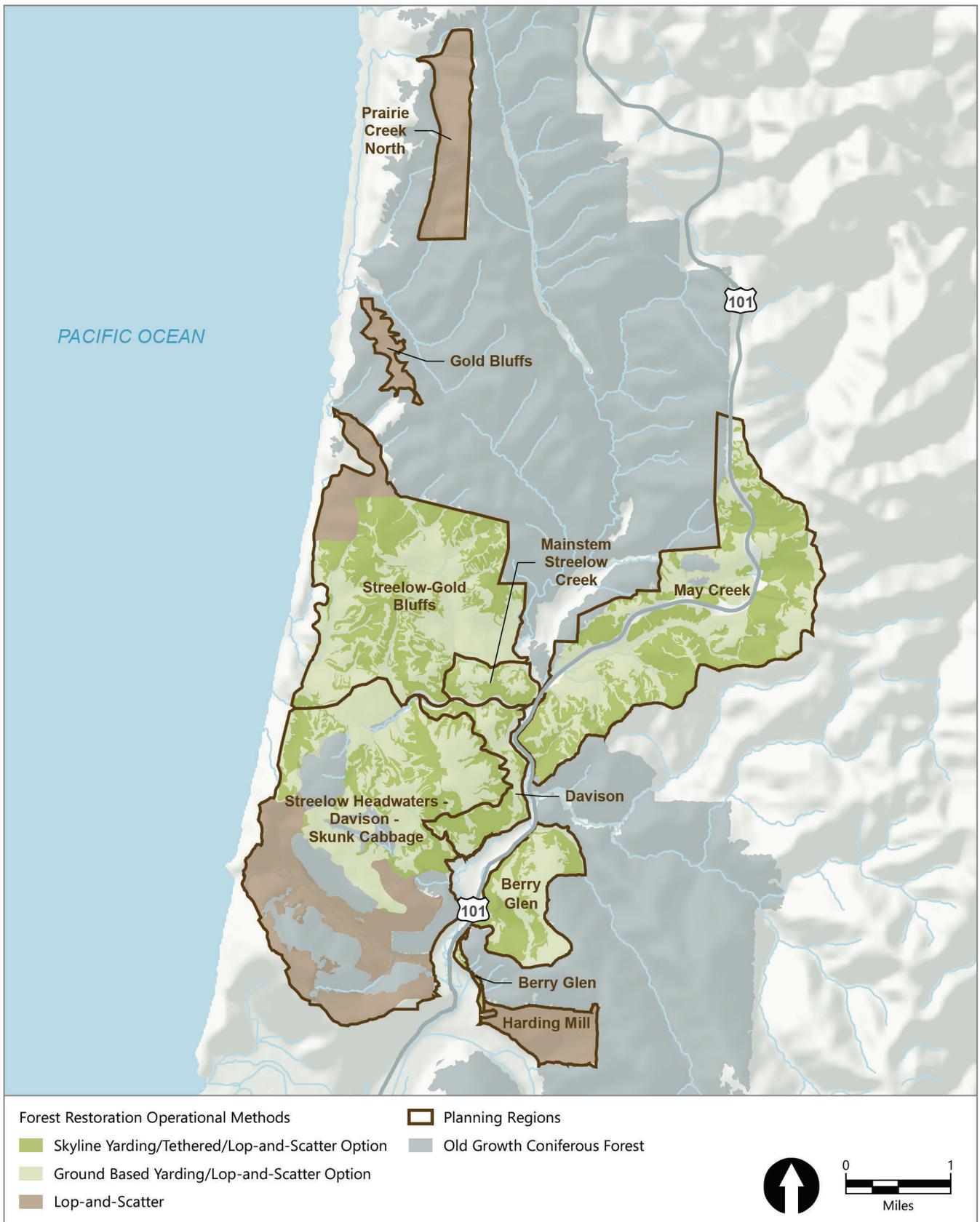
# Appendix D

## Figures

---

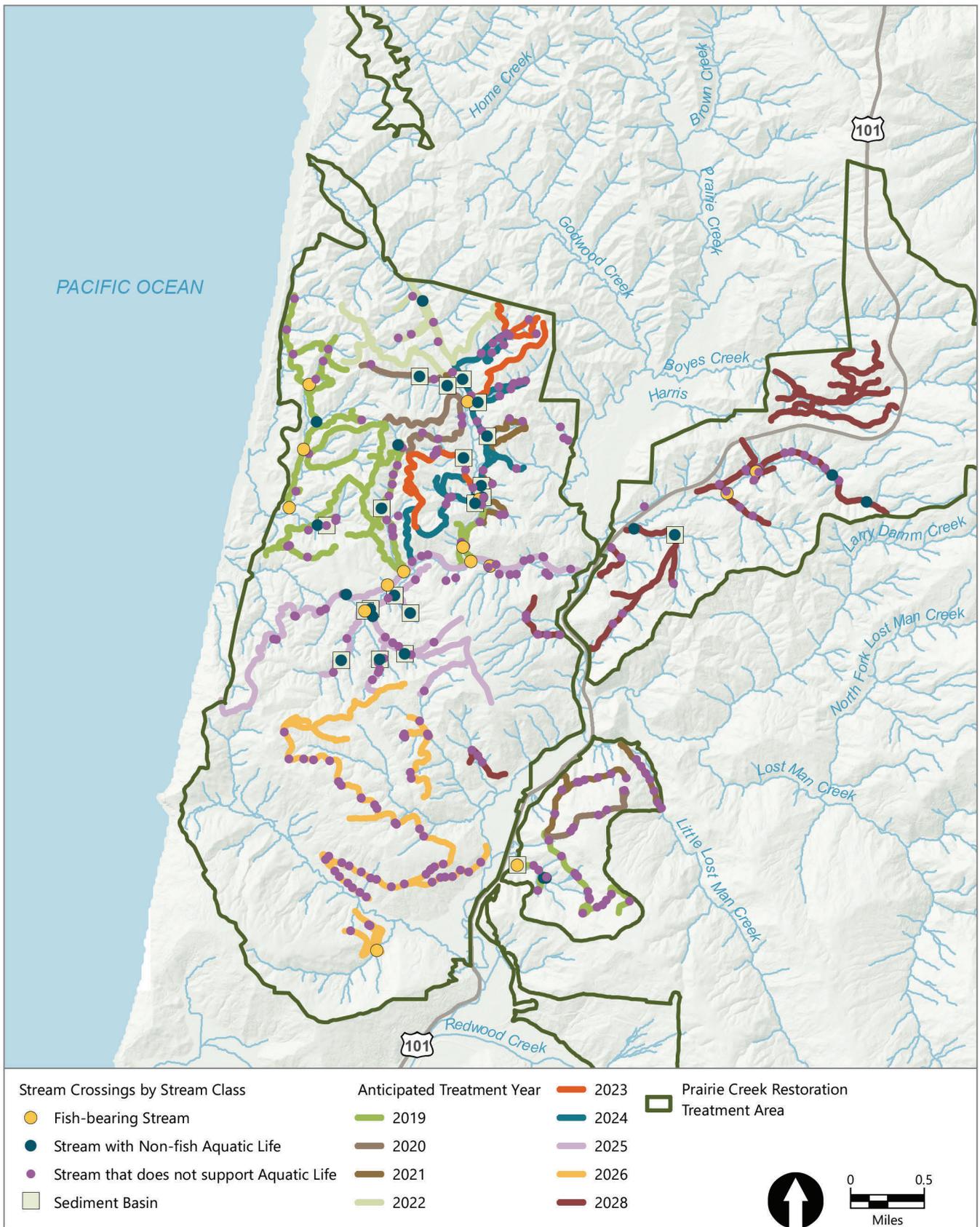


Publish Date: 2019/03/29, 3:24 PM | User: jsfox  
 Filepath: \\orcas\GIS\Jobs\SaveTheRedwoodsLeague\_1808\Maps\IS-EA\Fig1\_Overview.mxd



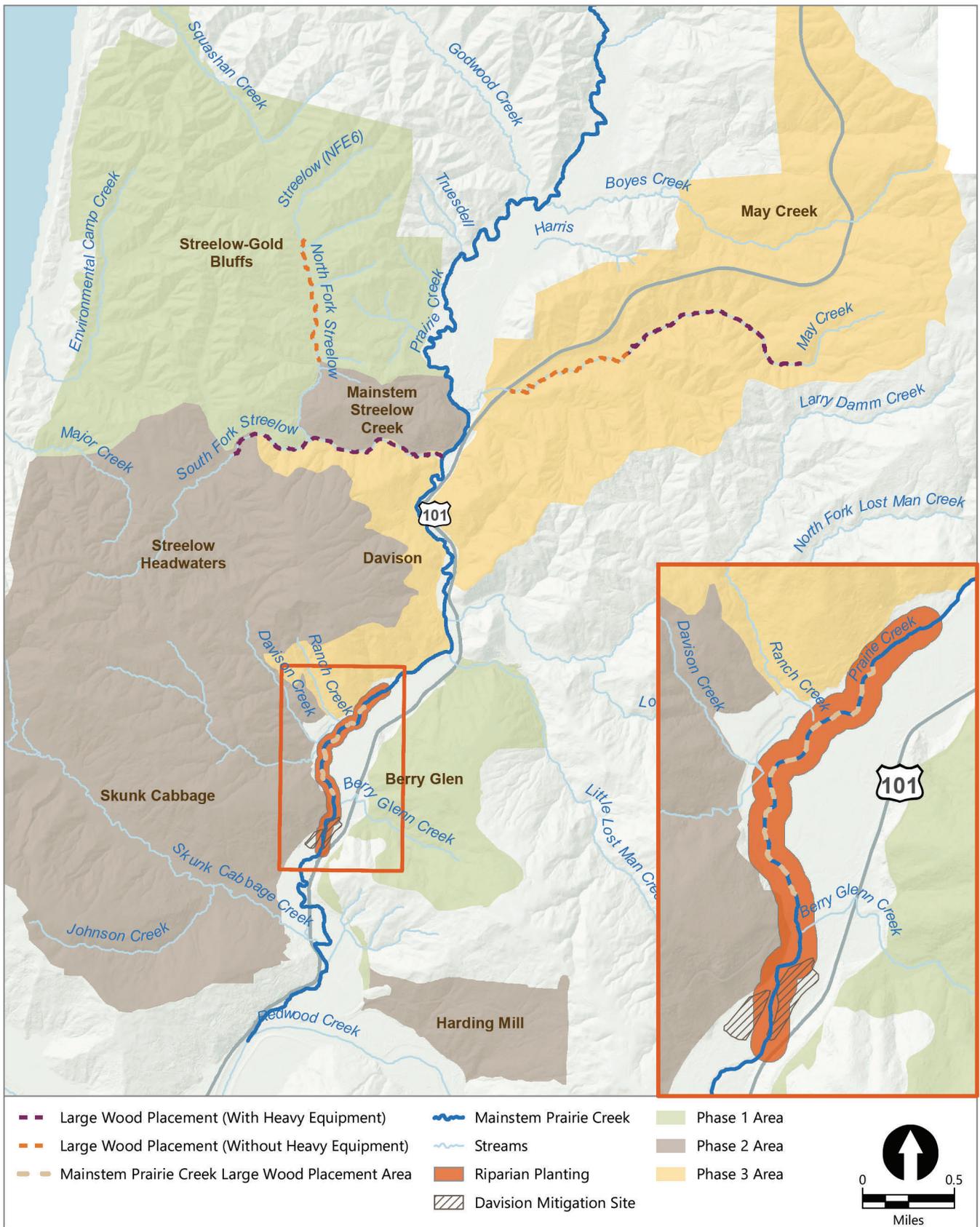
Publish Date: 2019/04/01, 8:20 AM | User: jsfox  
 Filepath: \\orcas\GIS\Jobs\SaveTheRedwoodsLeague\_1808\Maps\15-EA\Fig2\_ForestRestoration.mxd

**Figure 2**  
**Forest Restoration Operational Methods**  
 Greater Prairie Creek Ecosystem Restoration Project



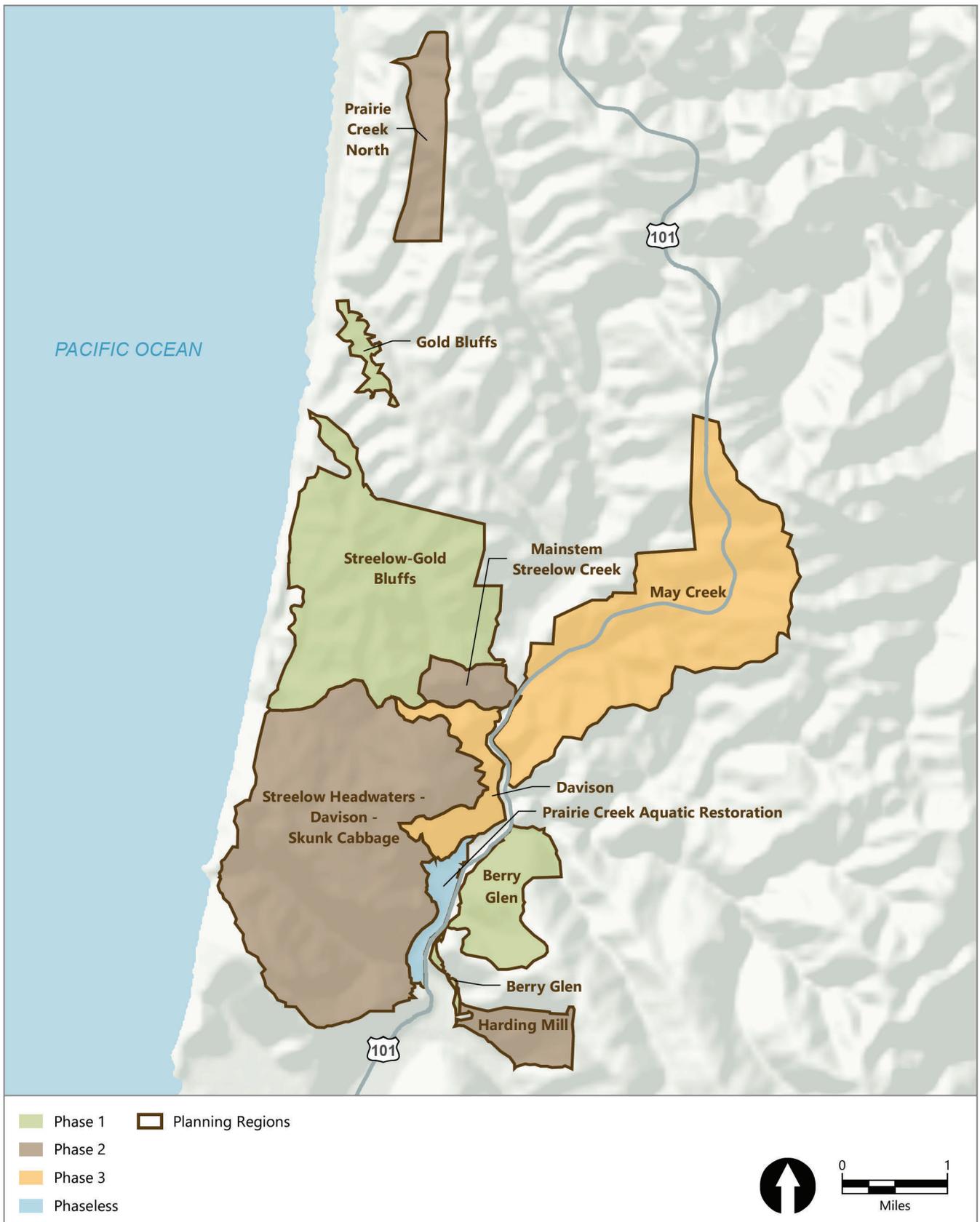
Publish Date: 2019/03/29, 4:33 PM | User: jsfox  
 Filepath: \\orcas\GIS\Jobs\SaveTheRedwoodsLeague\_1808\Maps\15-EA\Fig3\_PrairieCreekRoads.mxd

**Figure 3**  
**Existing Roads and Stream Crossings**  
 Greater Prairie Creek Ecosystem Restoration Project



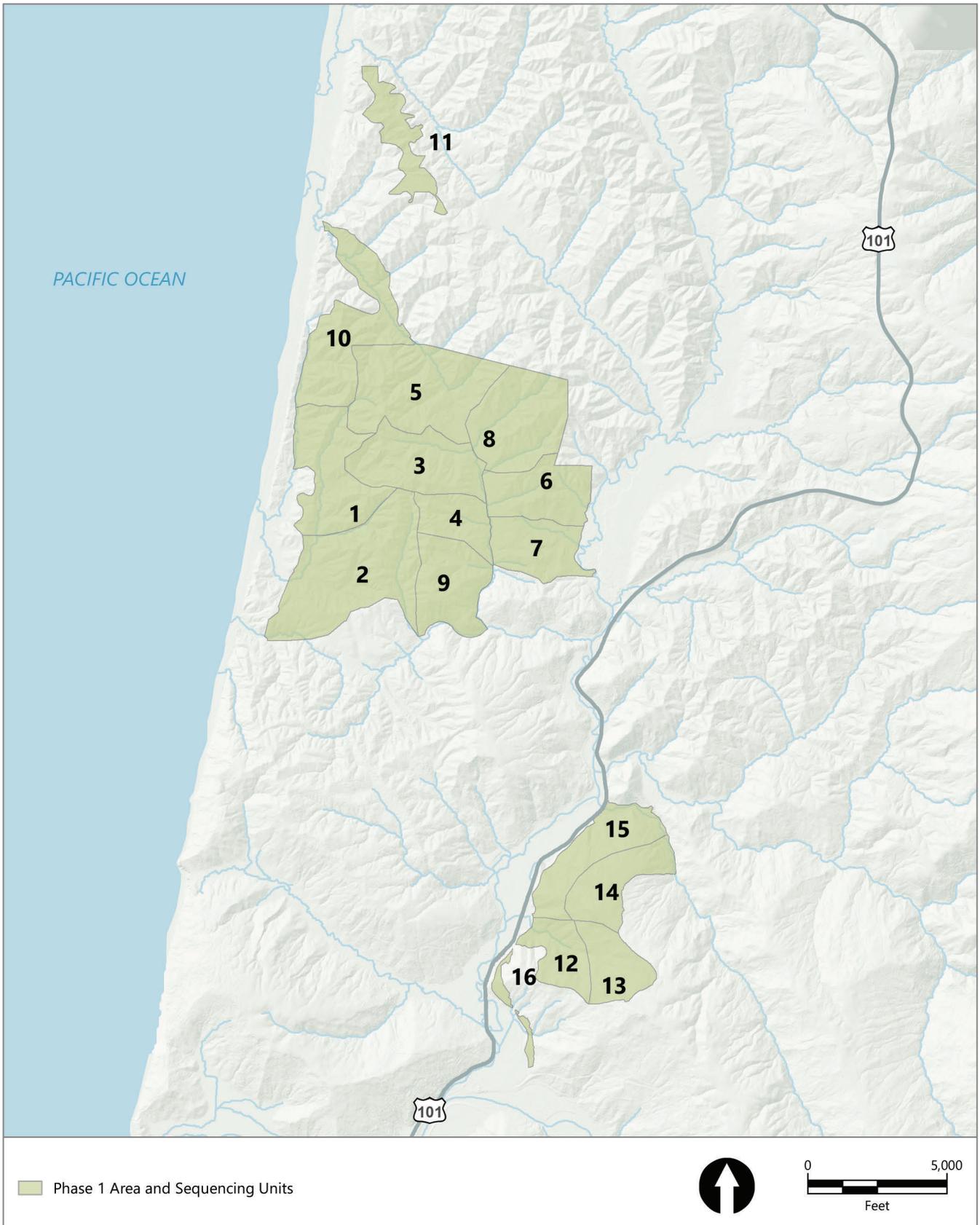
Publish Date: 2019/03/29, 3:33 PM | User: jsfox  
 Filepath: \\orcas\GIS\Jobs\SaveTheRedwoodsLeague\_1808\Maps\15-EA\Fig4\_MainstemPrairieCreek.mxd

**Figure 4**  
**Aquatic Restoration Activities**  
 Greater Prairie Creek Ecosystem Restoration Project



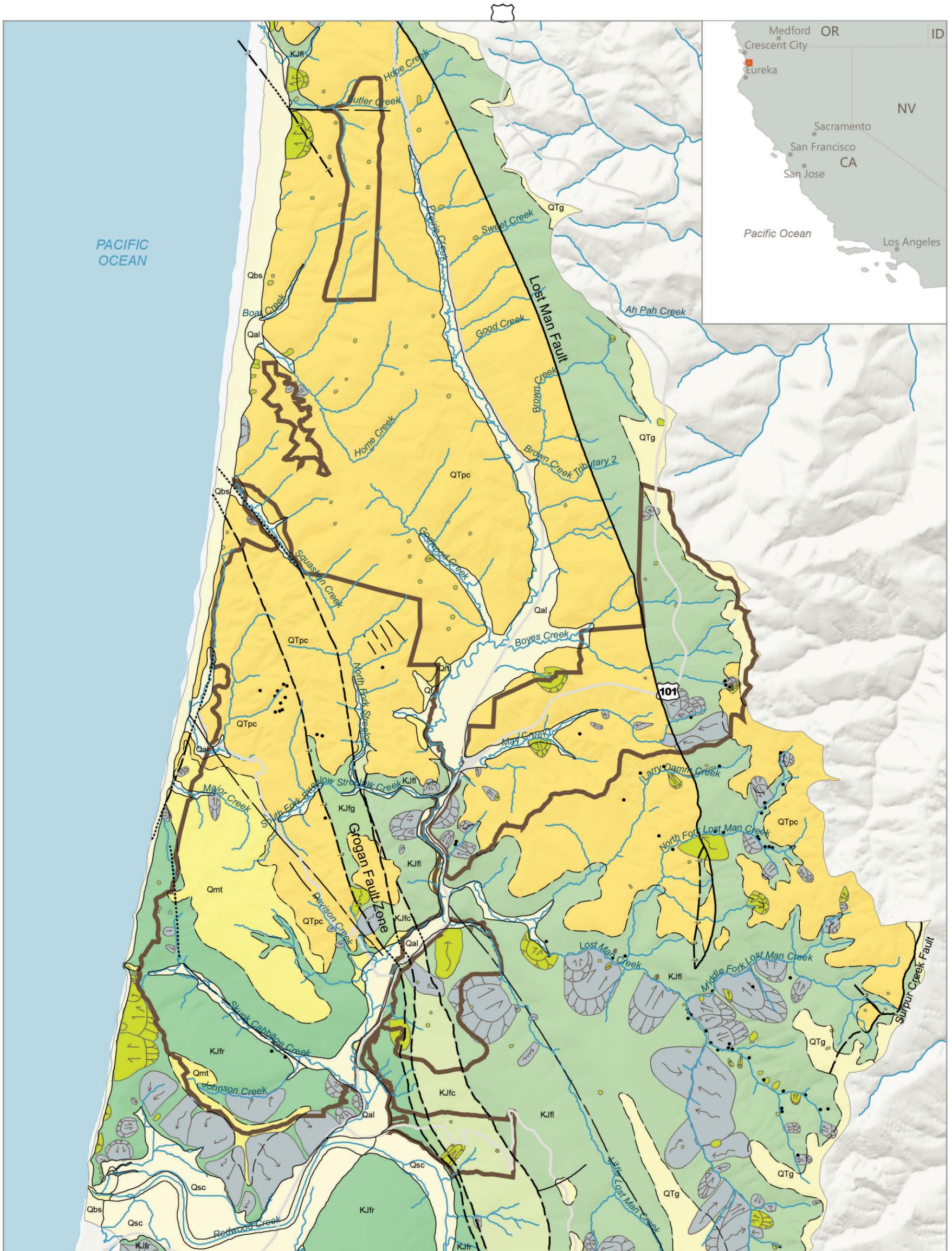
Publish Date: 2019/03/29, 3:39 PM | User: jsfox  
 Filepath: \\orcas\GIS\Jobs\SaveTheRedwoodsLeague\_1808\Maps\IS-EA\Fig5\_Units\_Phases.mxd

**Figure 5**  
**Implementation Planning Phases and Areas**  
 Greater Prairie Creek Ecosystem Restoration Project



Publish Date: 2019/03/29, 3:40 PM | User: jsfox  
 Filepath: \\orcas\GIS\Jobs\SaveTheRedwoodsLeague\_1808\Maps\15-EA\Fig6\_Phase1\_Units.mxd

**Figure 6**  
**Phase 1 Implementation Planning Sequence**  
 Greater Prairie Creek Ecosystem Restoration Project



**LEGEND:**

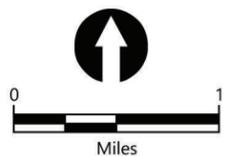
- Highway or Major Public Road
- ~ Streams
- ▭ GPC Restoration Areas
- Small Landslide
- ☄ Active Landslide
- ☄ Dormant Landslide
- Overlap Deposits**
- ☐ Qbs: Beach sand
- ☐ Qsc: Stream channel deposits
- ☐ Qf: Alluvial fans

- ☐ Qal: Recent alluvium
- ☐ Qe: Estuarine deposits
- ☐ Qrt: Undifferentiated river terrace deposits
- ☐ Qmt: Marine terrace deposits
- ☐ QTpc: Prairie Creek Formation
- ☐ QTg: Undifferentiated continental and marine deposits
- Franciscan Complex**
- ☐ KJfg: Transitional Rocks of the Grogan Fault Zone
- ☐ KJfl: Coherent Unit of Lacks Creek
- ☐ KJfc: Incoherent Unit of Coyote Creek
- ☐ KJfr: Redwood Creek Schist

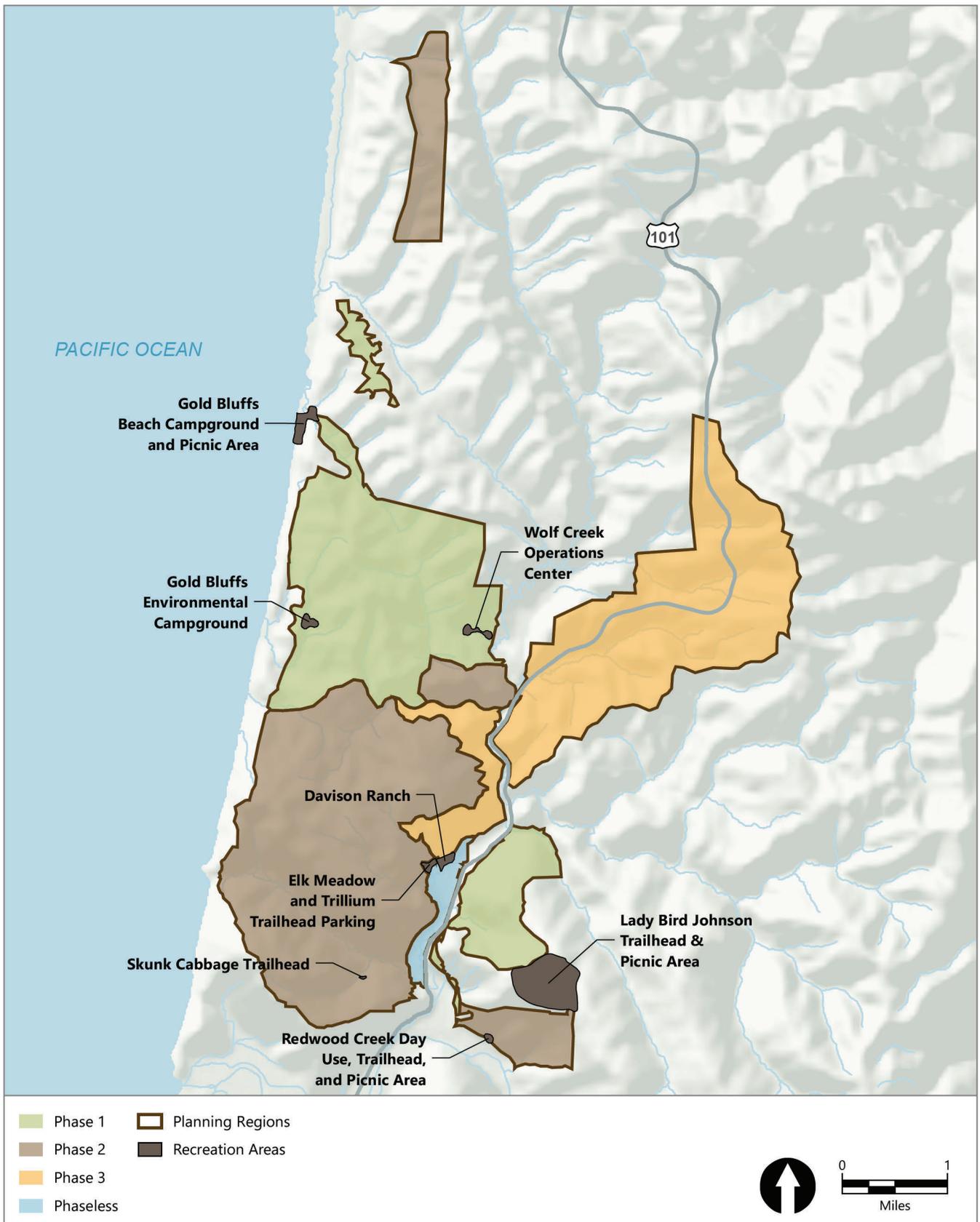
- Contact, approximate
- Contact, certain
- ⋯ Contact, concealed
- - - Fault, approximate
- Fault, certain
- ⋯ Fault, concealed
- - - ? Fault, inferred

**NOTES:**

Map created using digital data from the Geologic and Geomorphic Features Related to Landsliding Redwood Creek Watershed, Humboldt County, California Plate 1, Sheet 1 of 3 (Northern Portion) published by California Geological Survey in 2002.

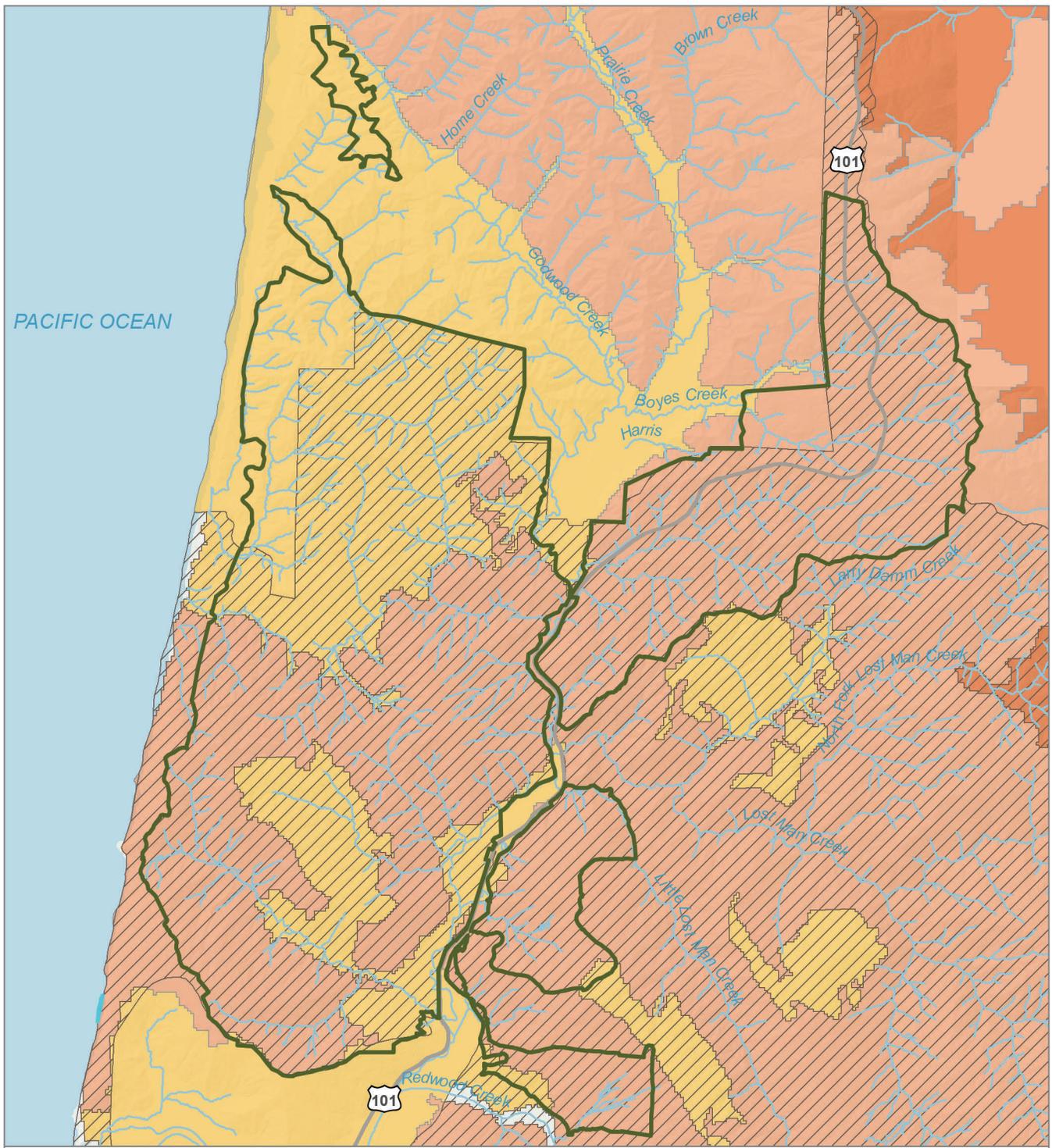


**Figure 7**  
**Geologic Map of the Project Area**  
 Greater Prairie Creek Ecosystem Restoration Project



Publish Date: 2019/03/29, 4:35 PM | User: jsfox  
 Filepath: \\orcas\GIS\Jobs\SaveTheRedwoodsLeague\_1808\Maps\15-EA\Fig8\_Recreation\_PC.mxd

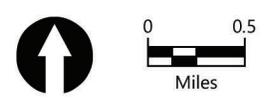
**Figure 8**  
**Recreational Areas in the Project Area**  
 Greater Prairie Creek Ecosystem Restoration Project



- Moderate Fire Hazard
- High Fire Hazard
- Very High Fire Hazard
- Federal Responsibility Area (FRA)

Prairie Creek Restoration Treatment Area

**NOTE:**  
All lands not designated as FRA are State responsibility areas.



Publish Date: 2019/03/29, 4:36 PM | User: jsfox  
 Filepath: \\orcas\GIS\Jobs\SaveTheRedwoodsLeague\_1808\Maps\15-EA\Fig9\_PC\_FireHazards.mxd

**Figure 9**  
**Fire Hazards in the Project Area**  
 Greater Prairie Creek Ecosystem Restoration Project

# Appendix E

## Agency Consultations and Required Approvals

---

## Appendix E: Agency Consultations and Required Approvals

CDPR and NPS will perform all necessary reviews and obtain all required permits prior to implementing any component of the Proposed Action. CDPR and NPS retain approval authority for the Proposed Action within the RNSP, and the Proposed Action meets the goals presented in the GMP/GP. NPS and CDPR will sign separate decision documents for the Proposed Action's NEPA and CEQA reviews, respectively, and CDPR approval is a prerequisite for NPS's approval.

The Proposed Action requires approval or permits from the following federal and state agencies:

- U.S. Army Corps of Engineers (USACE): USACE will issue a Clean Water Act (CWA) Section 404 Regional General Permit for the Proposed Action's impacts to waters of the United States.
- U.S. Fish and Wildlife Service (USFWS): NPS will initiate consultation under Section 7 of the Endangered Species Act (ESA) with USFWS for marbled murrelet and northern spotted owl, and USFWS will prepare a Biological Opinion (BO) for the Proposed Action.
- National Marine Fisheries Service (NMFS): NPS will initiate consultation under Section 7 of the ESA with NMFS for potential effects on coho salmon, Chinook salmon, and steelhead trout, and NMFS will prepare a BO for the Proposed Action.
- California Coastal Commission (CCC): CCC will approve a Coastal Zone Management Act (CZMA) consistency determination prepared by NPS for restoration activities located in the coastal zone that are proposed as part of the Proposed Action. A separate Coastal Development Permit for activities on state lands is not required.
- North Coast Regional Water Quality Control Board (NCRWQCB): NCRWQCB will issue a CWA Section 401 Water Quality Certification for the Proposed Action's impacts to waters of the state and coverage under Category B of the Waiver of Waste Discharge Requirements for Nonpoint Source Discharges Related to Certain Federal Land Management Activities on National Forest System Lands in the North Coast Region (NCRWQCB 2015) for the Proposed Action's potential water quality impacts from forest restoration and road removal, and coverage under the Discharges of Storm Water Associated with Construction Activity Construction General Permit Order 2009-0009-DWQ for clearing or grading activities occurring outside of the scope of other NCRWQCB approvals.
- California Department of Fish and Wildlife (CDFW): CDFW will issue a Streambed Alteration Agreement for the Proposed Action's work in streams and riparian areas and a Memorandum of Understanding (MOU) for the Proposed Action's potential effects on state endangered and threatened species, including Humboldt marten, marbled murrelet, northern spotted owl, and willow flycatcher. A consistency determination with the federal BO is anticipated to be prepared for coho salmon; therefore, that species is not anticipated to be included in the MOU.
- State Historic Preservation Officer (SHPO): Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies consider the effects of their proposed actions on historic properties, including prehistoric or historic sites, buildings, districts, or objects eligible for listing in the National Register of Historic Places. Agencies are required to consult with the SHPO, Native American tribes, and other parties; identify historic properties; assess the action's potential effects; and avoid, minimize, or mitigate adverse effects to historic properties.

- Native American tribes: Section 106 of the NHPA also requires NPS to engage in government-to-government consultation with federally recognized tribes regarding the identification and evaluation of historic properties, and the assessment of project effects. Traditional cultural properties and cultural landscapes are potential historic properties.

## Appendix F

### Alternatives Considered but Eliminated

---

## Appendix F: Alternatives Considered but Eliminated

CDPR and NPS considered alternatives to restore ecosystems in the project area, but determined that these alternatives either do not meet the purpose and need for the project, are inconsistent with the 1999 GMP/GP (NPS/CDPR 1999) or other approved plans, or that the agencies do not currently have the authority to pursue these alternatives.

### *Lop-and-Scatter Only*

A lop-and-scatter only alternative would involve lop-and-scatter operations throughout the entire project area, with no biomass removal. This alternative was dismissed because it would not meet the stated purpose and need for the project and was not carried forward for full analysis.

### *Low-intensity Thinning from Below*

A basal area reduction of 25 to 30% (low-intensity thin from below) was considered. Results from past thinning efforts in the park show that thinning from below would not release the dominant and co-dominant trees because this method concentrates on cutting trees in the intermediate and suppressed crown classes. Low-intensity thinning from below would not generate the growth response desired to accelerate the development of old-growth characteristics in as short a time as the Proposed Action. Therefore, this alternative would not meet the project purpose and need and was not carried forward for full analysis.

### *Helicopter Logging*

Helicopter logging is a method of logging that uses helicopters to remove cut trees from forests by lifting them on cables attached to a helicopter. It is often used in inaccessible areas of forests. Helicopters are not permitted to lift trees over U.S. Highway 101, which means that this alternative could not be used throughout much of the project area. Helicopter logging also requires large landings and is typically a high cost method. Therefore, this alternative would not meet the project purpose and need and was not carried forward for full analysis.

### *Prescribed Fire*

Use of prescribed fire as a technique to thin second-growth forests was considered. Little experimentation has taken place on using prescribed fire as a second-growth forest restoration tool on a relatively large scale. It is difficult to predict the level of mortality caused by a prescribed burn and the overall forest characteristics created after a burn. It is unknown whether prescribed fire could directly restore redwood as the dominant species at the stand level or what intensity of prescribed fire would be needed to restore or accelerate development of ecological processes and characteristics found in mature forests. Further study is needed to test fire effects in high-density second-growth stands dominated by Douglas-fir and spruce. Experimental use of prescribed burning in second-growth was addressed in the 2010 *Redwood National Park Fire Management Plan* (NPS 2010). Given the high degree of uncertainty associated with prescribed fire in dense young second-growth forests in the park, this alternative was not carried forward for full analysis.

### *Removal of Crossings and Retention of Roads*

This alternative would involve removing blocked stream crossings but retaining all roadways in the project area. It would reduce the amount of fill removed as part of partial road removal activities; however, it would leave in roadways that would continue to erode and cause sedimentation issues in the watershed. Therefore, this alternative would not meet the project purpose and need and was not carried forward for full analysis.

### *Maintain All Roads*

This alternative would involve treating and maintaining all roadways in the project area. Sedimentation threats would be reduced. However, this alternative would conflict with park management direction included in the GMP/GP; therefore, it was not carried forward for full analysis.

### *Reduced Project Area*

CDPR and NPS considered an alternative consisting of a smaller project area, including only Phase 1 or Phases 1 and 2. A smaller project area would not accomplish the stated ecosystem restoration objectives; therefore, this alternative was not carried forward for full analysis.

Appendix G  
Photographs

---

## Appendix G: Photographs

### Photograph 1

As part of ground-based operations, a skidder pulls cut trees to a small landing, where they are processed and loaded onto a haul truck



### Photograph 2

This series of photos shows a forest from a previous restoration project at the South Fork Lost Man Creek. The photo-point depicts forest conditions before treatment (right), immediately after treatment (center), and 5 years after treatment (left). By opening up the canopy, plants and trees can reestablish in the understory and help promote the recovery of diversity in a relatively short time



**Photograph 3**

**Cable yarding equipment pulls up cut trees on steep slopes to a haul road where they will be removed from the site**



**Photograph 4**

**A feller buncher cuts smaller diameter trees as part of a low thin prescription in an ongoing forest restoration project in the upper Lost Man Creek watershed**



**Photograph 5**

**These two photos show the contrast between undisturbed channels and channels overwhelmed from failing road sediment. The photo on the top shows Godwood Creek, just north of the Prairie Creek Visitor Center. The photo on the bottom shows Lower May Creek, less than 1 mile away from Godwood Creek**



**Photograph 6**

**Larry Dam Road Removal Project: crossing excavation in 2003 and regrowth in 2007**



**Photograph 7**

**Previously logged second growth forest (bottom) compared to neighboring old-growth (top) in the Prairie Creek Redwoods State Park**



**Photograph 8**  
**Fragmented old growth rises above the surrounding second growth in Redwood National and State Parks**



## Appendix H

### Special-Status Species Tables

---

## Appendix H: Special-Status Species Tables

**Table H-1**  
**Database Query Results of Special-Status Fish and Wildlife in the Project Region**

Common Name <i>Scientific Name</i>	Query Sources	Status Federal/ State/CRPR	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
<b>Mollusk</b>					
Western pearlshell mussel <i>Margaritifera falcata</i>	CNDDDB	-/- <sup>1</sup>	Widely distributed throughout coastal streams and large rivers; primarily north of Big Sur	Clear, nutrient-poor, cool, highly oxygenated, low-mineralized, and moderate-to-fast flowing water; found in gravel, lodged between cobbles, boulders, bedrock, or areas of coarse sand	Low: known to occur in Redwood Creek between river kilometers 11.3 and 27.5 (Bensen 2014). However, not present in Prairie Creek, and calcium carbonate concentration and hardness of water in Prairie Creek is unsuitable for mollusk shell development (Wilzback and Ozaki 2017).
<b>Fish</b>					
Pacific lamprey <i>Entosphenus tridentatus</i>	CNDDDB	-/SSC	Widely distributed throughout coastal streams and large rivers; primarily north of Big Sur	Spawning occurs in gravel and cobble substrates located in pool tail-outs or low-gradient riffles; larval rearing generally occurs in low-velocity, silty backwater areas	High: known to occur in project area

<sup>1</sup> The western pearlshell mussel is not a special-status species; however, it is on the CDFW Special Animals List (CDFW 2018d), has a state ranking of critically imperiled, and was incorporated into this document at the request of CDFW during the agency scoping process held by Redwoods Rising.

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Distribution in California</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Green sturgeon: southern DPS <i>Acipenser medirostris</i>	CNDDDB, NMFS	FT/SSC	San Francisco, San Pablo, Suisun, and Humboldt Bays; Sacramento–San Joaquin Delta, Sacramento and Klamath rivers	Spawns in pools of large freshwater river mainstems with cool water and cobble, clean sand, or bedrock; in San Francisco Bay, adults tend to use water depths less than 33 feet to swim near the surface or forage along the sea floor	None: habitat not present within project area
Longfin smelt <i>Spirnichus thaleichthys</i>	CNDDDB	FPT/ST	San Francisco estuary from Rio Vista or Medford Island in the Delta as far downstream as South Bay; concentrated in Suisun, San Pablo, and North San Francisco Bays; historical populations in Humboldt Bay, Eel River estuary, and Klamath River estuary	Adults in large bays, estuaries, and nearshore coastal areas; migrate into freshwater rivers to spawn; salinities of 15 to 30 ppt	Low: no record in Redwood and Prairie creeks
Eulachon southern DPS <i>Thaleichthys pacificus</i>	CNDDDB	FT/–	Skeena River in British Columbia (inclusive) south to the Mad River in Northern California (inclusive)	An anadromous fish that historically used the Klamath River estuary and lowest portions of the river to spawn; few to no individuals currently use the estuary; most of their life is spent in the ocean	High: known to infrequently occur in Prairie Creek in low numbers

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Distribution in California</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Coho salmon, southern Oregon/northern California ESU <i>Oncorhynchus kisutch</i>	CNDDDB, NMFS	FT/ST	Punta Gorda north to the Oregon border	Streams; spawns in gravel riffles	High: known to occur in project area
Chinook salmon, California coastal ESU <i>Oncorhynchus tshawytscha</i>	NMFS	FT/-	Russian River (Sonoma County) north to Redwood Creek (Humboldt County)	Coastal streams; spawns in gravel riffles	High: known to occur in project area
Steelhead, Northern California Coast DPS <i>Oncorhynchus mykiss irideus</i>	CNDDDB, NMFS	FT/-	Russian River north to Redwood Creek (Humboldt County)	Streams; spawns in gravel riffles	High: known to occur in project area
Coastal cutthroat trout <i>Oncorhynchus clarkii</i>	CNDDDB	-/SSC	Small, low-gradient coastal streams and estuaries from northern Oregon to the Eel River, California	Spawns in shaded streams with water temperatures below 18°C and small gravel	High: known to occur in project area
Tidewater goby <i>Eucyclogobius newberryi</i>	CNDDDB, USFWS	FE/SSC	San Diego County north to the mouth of the Smith River in Del Norte County	Coastal lagoons and the uppermost zone of large brackish estuaries; prefer sandy substrate for spawning, but can be found on silt, mud, or rocky substrates; can occur in water up to 15 feet in lagoons and within a wide range of salinity (0 to 42 ppt)	None: extirpated in the 1980s

Common Name Scientific Name	Query Sources	Status Federal/ State/CRPR	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
<b>Amphibians</b>					
Southern torrent salamander <i>Rhyacotriton variegatus</i>	CNDDDB	-/SSC	Coastal drainages from near Point Arena in Mendocino County to the Oregon border	In and adjacent to cold, permanent, well-shaded mountain springs, waterfalls, and seeps with rock substrate	High: known to occur in project area
Pacific tailed frog <i>Ascaphus truei</i>	CNDDDB	-/SSC	Coastal Mendocino County north to the Oregon border, with an isolated population in Shasta region	In and adjacent to cold, clear, moderate- to fast-flowing perennial mountain streams in conifer forest	High: known to occur in project area
Northern red-legged frog <i>Rana aurora</i>	CNDDDB	-/SSC	Ranges from Mills Creek in Mendocino County to Oregon border	Breeds in still or slow-moving water with emergent and overhanging vegetation, including wetlands, wet meadows, ponds, lakes, and low-gradient, slow-moving stream reaches with permanent pools; uses adjacent uplands for dispersal and summer retreat	High: known to occur in project area
Foothill yellow-legged frog <i>Rana boylei</i>	CNDDDB	-/SCT, SSC	From the Oregon border along the coast to the Transverse Ranges, and south along the western side of the Sierra Nevada mountains to Kern County; a possible isolated population in Baja, California	Shallow tributaries and mainstems of perennial streams and rivers, typically associated with cobble or boulder substrate	High: known to occur in project area

Common Name Scientific Name	Query Sources	Status Federal/ State/CRPR	Distribution in California	Habitat Association	Likelihood to Occur in Project Area
<b>Reptiles</b>					
Western pond turtle <i>Emys marmorata</i>	CNDDDB	-/SSC	From the Oregon border along the coast ranges to the Mexican border, and west of the crest of the Cascades and Sierras	Permanent, slow-moving fresh or brackish water with available basking sites and adjacent open habitats or forest for nesting	Low: habitat is limited in project area due to low water temperatures
<b>Birds</b>					
White-tailed kite <i>Elanus leucurus</i>	eBird	-/SFP	Year-round resident; found in nearly all lowlands of California west of the Sierra Nevada mountains and the southeast deserts	Lowland grasslands and wetlands with open areas; nests in trees near open foraging area	High: suitable nesting and foraging habitat present, frequent sightings throughout project area
Bald eagle <i>Haliaeetus leucocephalus</i>	CNDDDB	FD, BGEPA/SE, SFP	Permanent resident and uncommon winter migrant; found nesting primarily in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity Counties	Large bodies of water or rivers with abundant fish; uses snags or other perches; nests in advanced-successional conifer forest near open water	Moderate: foraging habitat and marginal nesting habitat in project area; observations of flyovers are relatively common (eBird 2018)
Northern harrier <i>Circus cyaneus</i>	eBird	-/SSC	Year-round resident; scattered throughout California; in the northwest, nests largely within coastal lowlands from Del Norte County south to Bodega Head in Sonoma County, inland to Napa County	Nests, forages, and roosts in wetlands or along rivers or lakes, but also in grasslands, meadows, or grain fields	High: commonly observed in project area, and suitable nesting and foraging habitat present

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Distribution in California</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Golden eagle <i>Aquila chrysaetos</i>	eBird	BGEPA/SFP	Uncommon permanent resident and migrant throughout California, except center of Central Valley	Open woodlands and oak savannas, grasslands, chaparral, sagebrush flats; nests on steep cliffs or medium to tall trees	Low: infrequently observed; may fly over or forage in project area, but no suitable nesting habitat
American peregrine falcon <i>Falco peregrinus anatum</i>	eBird	FD/SD, SFP	Most of California during migrations and in winter; nests primarily in the Coast Ranges, northern Sierra Nevada mountains, and other mountainous areas of northern California	Wetlands, woodlands, cities, agricultural lands, and coastal area with cliffs (and rarely broken-top, predominant trees) for nesting; often forages near water	High: foraging only
Western snowy plover <i>Charadrius alexandrinus nivosus</i>	CNDDDB, USFWS	FT (Pacific coastal population)/SSC (coastal and interior populations)	Nests in locations along the California coast, including the Eel River in Humboldt County; nests in the interior of the state in the Central Valley, Klamath Basin, Modoc Plateau, and Great Basin, Mojave, and Colorado deserts; winters primarily along coast	Barren to sparsely vegetated beaches, barrier beaches, salt-evaporation pond levees, and shores of alkali lakes; also nests on gravel bars in rivers with wide flood plains; needs sandy, gravelly, or friable soils for nesting	Low: present along ocean beaches; no suitable habitat in the active project area

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Distribution in California</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Marbled murrelet <i>Brachyramphus marmoratus</i>	CNDDDB, USFWS	FT/SE	Nesting murrelets in California mostly concentrated on coastal waters near Del Norte and Humboldt counties, and in lesser numbers near San Mateo and Santa Cruz counties; winter throughout nesting range, and in small numbers in southern California	Most time spent on the ocean; nests inland in old-growth conifers with suitable platforms, especially redwood or Douglas fir forests near coastal areas	High: known to occur in project area
Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	CNDDDB, USFWS	FT/SE	Breeds in limited portions of the Sacramento River and the South Fork Kern River; small populations may nest in Butte, Yuba, Sutter, San Bernardino, Riverside, Inyo, Los Angeles, and Imperial Counties	Summer resident of valley foothill and desert riparian habitats; nests in open woodland with clearings and low, dense, scrubby vegetation	Low: nearest sighting was 25 miles south in Arcata
Northern spotted owl <i>Strix occidentalis caurina</i>	USFWS	FT/ST, SSC	Northwestern California south to Marin County, and southeast to the Pit River area of Shasta County	Typically found in older forested habitats; nests in complex stands dominated by conifers, especially coastal redwood, with hardwood understories; some open areas are important for foraging	High: known to occur in project area

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Distribution in California</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Vaux's swift <i>Chaetura vauxi</i>	eBird	-/SSC	Summer resident of northern California; nests in the Coast Ranges from Sonoma County north and very locally south to Santa Cruz County; also found in the Sierra Nevada and possibly in the Cascade ranges	Redwood and Douglas fir habitats with large snags, especially forest with larger basal hollows and chimney trees	High: known to occur in project area
Olive-sided flycatcher <i>Contopus cooperi</i>	eBird	-/SSC	Uncommon to common summer resident throughout California, except in deserts, the Central Valley, and other lowland areas	Primarily advanced-successional conifer forests with open canopies	High: known to occur in project area
Willow flycatcher <i>Empidonax traillii</i>	eBird	-/SE	In the Sierra Nevada and Cascade ranges; nests as far south as San Diego County; confirmed breeding along the Eel River, and in mesic clear-cuts in northern Humboldt County	Dense brushy thickets within riparian woodland, often dominated by willows or alder, near permanent standing water; uses brushy, early-succession forests (e.g., clear-cuts) in the Pacific Northwest	High: known to occur in project area along Prairie Creek
Bank swallow <i>Riparia riparia</i>	CNDDB	-/ST	Throughout California	Colonial nester; builds nest by tunneling into vertical sandy cliffs; forages for insects over fields, marshes, and ponds	Low: occurs near eroding bluffs along ocean beaches; no suitable habitat in forested project area

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Distribution in California</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Yellow warbler <i>Setophaga petechial</i>	eBird	-/SSC	Summer resident; nests in most of California, except most of the Central Valley, high Sierras, and Mojave and Colorado Deserts	Open-canopy, deciduous riparian woodland close to water, along streams or wet meadows	High: known to occur in project area
<b>Mammals</b>					
Sonoma tree vole <i>Arborimus pomo</i>	CNDDDB	-/SSC	Along North Coast from Sonoma County north to the Oregon border, generally along the fog belt	Humid coastal coniferous forests with Douglas fir, grand fir, western hemlock, bishop pine, or Sitka spruce	High: known to occur in project area
White-footed vole <i>Arborimus albipes</i>	CNDDDB	-/SSC	Between Humboldt and Del Norte Counties	Humid, mature coastal redwood, Douglas fir, and riparian forests, with a preference for areas near small streams with dense alder and shrubs	Moderate: potential habitat in project area
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	CNDDDB	-/SSC	Throughout California, found in all but subalpine and alpine habitats; details of distribution not well known	Most abundant in mesic habitats; also found in oak woodlands, desert, vegetated drainages, and caves or cave-like structures (including basal hollows in large trees, mines, tunnels, and buildings)	Moderate: potential habitat in project area in basal hollows of large trees

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Distribution in California</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Pallid bat <i>Antrozous pallidus</i>	CNDDDB	-/SSC	Throughout California except, for elevations above 9,842 feet in the Sierra Nevada	Roosts in rock crevices, tree hollows, mines, caves, and a variety of vacant and occupied buildings; feeds in a variety of open woodland habitats	Moderate: potential habitat in project area in basal hollows of large trees
Humboldt marten <i>Martes caurina humboldtensis</i>	CNDDDB	-/SE, SSC	Coastal redwood zone from the Oregon border south to Fort Ross, Sonoma County	Mid- to advanced-successional stands of conifers with complex structure near the ground and dense canopy closure	High: suitable habitat in project area

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Distribution in California</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Fisher <i>Pekania pennanti</i> West Coast DPS/Northern California ESU	CNDDDB	-/ SSC	Two widely separated regions: the northern California Coast Range and Klamath Province, and the southern Sierra Nevadas.	Dense advanced-successional conifer forests with complex forest structure; makes dens in hollow trees and snags	High: known to occur in project area

Notes:

BGEPA: federally protected under the Bald and Golden Eagle Protection Act

CDFW: California Department of Fish and Wildlife

CNDDDB: California Natural Diversity Database

CRPR: California Rare Plant Ranks

DPS: distinct population segment

ESU: evolutionarily significant unit

FC: federal candidate species

FD: federally delisted

FE: listed as endangered under the federal Endangered Species Act

FPT: federally proposed as threatened

FT: listed as threatened under the federal Endangered Species Act

GPC: Greater Prairie Creek

NMFS: National Marine Fisheries Service

ppt: parts per thousand

SCE: State Candidate Endangered

SD: state delisted

SE: listed as endangered under the California Endangered Species Act

SFP: CDFW Fully Protected species

SSC: California Species of Special Concern

ST: listed as threatened under the California Endangered Species Act

USFWS: U.S. Fish and Wildlife Service

**Table H-2**  
**Database Query Results of Special-Status Plants in the Project Region**

Common Name Scientific Name	Query Sources	Status Federal/ State/CRPR	Habitat Association	Likelihood to Occur in Project Area
Pink sand-verbena <i>Abronia umbellata</i> var. <i>breviflora</i>	CNPS, CNDDDB	-/-/1B.1	Coastal dunes. 0 to 10 meters (0 to 35 feet). June through October.	None
Sea-watch <i>Angelica lucida</i>	CNPS	-/-/4.2	Coastal bluff scrub, coastal dunes, coastal scrub, and coastal salt marshes and swamps. 0 to 150 meters (0 to 490 feet). May through September.	None
Howell's manzanita <i>Arctostaphylos hispidula</i>	CNPS	-/-/4.2	Serpentinite or sandstone in chaparral. 120 to 1,250 meters (390 to 4,100 feet). March through April.	None
Serpentine arnica <i>Arnica cernua</i>	CNPS	-/-/4.3	Serpentinite in lower montane coniferous forest. 500 to 1,920 meters (1,640 to 6,300 feet). April through July.	None
Bald Mountain milk-vetch <i>Astragalus umbraticus</i>	CNPS, CNDDDB	-/-/2B.3	Sometimes roadside in cismontane woodland and lower montane coniferous forest. 150 to 1,250 meters (490 to 4,100 feet). May through August.	Moderate
False gray horsehair lichen <i>Bryoria pseudocapillaris</i>	CNPS	-/-/3.2	Usually on conifers in coastal dunes in San Luis Obispo County and along the immediate coast in North Coast coniferous forest. 0 to 90 meters (0 to 295 feet).	Moderate

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Bolander's reed grass <i>Calamagrostis bolanderi</i>	CNPS	-/-/4.2	Mesic areas in bogs and fens, broadleaved upland forest, closed-cone coniferous forest, coastal scrub, mesic areas in meadows and seeps, freshwater marshes and swamps, and north coast coniferous forest. 0 to 455 meters (0 to 1,495 feet). May through August.	Moderate
Thurber's reed grass <i>Calamagrostis crassiglumis</i>	CNPS, CNDDDB	-/-/2B.1	Mesic areas in coastal scrub and freshwater marshes and swamps. 10 to 60 meters (30 to 195 feet). May through August.	None
Leafy reed grass <i>Calamagrostis foliosa</i>	CNPS	-/SR/4.2	Rocky areas in coastal bluff scrub and north coast coniferous forest. 0 to 1,220 meters (0 to 4,005 feet). May through September.	Moderate
Seaside bittercress <i>Cardamine angulata</i>	CNPS, CNDDDB	-/-/2B.2	Wet areas and streambanks in lower montane coniferous forest and north coast coniferous forest. 25 to 915 meters (80 to 3,000 feet). (January) March through July.	Moderate
Buxbaum's sedge <i>Carex buxbaumii</i>	CNPS	-/-/4.2	Bogs and fens, mesic areas in meadows and seeps, and marshes and swamps. 3 to 3,300 meters (5 to 10,825 feet). March through August.	None

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Lagoon sedge <i>Carex lenticularis</i> var. <i>limnophila</i>	CNPS, CNDDDB	-/-/2B.2	Shores, beaches; and often in gravelly areas in bogs and fens, marshes and swamps, and north coast coniferous forest. 0 to 6 meters (0 to 20 feet). June through August.	Moderate
Bristle-stalked sedge <i>Carex leptalea</i>	CNPS	-/-/2B.2	Bogs and fens, mesic areas in meadows and seeps, and marshes and swamps. 0 to 700 meters (0 to 2,295 feet). March through July.	None
Northern meadow sedge <i>Carex praticola</i>	CNPS, CNDDDB	-/-/2B.2	Mesic areas in meadows and seeps. 0 to 3,200 meters (0 to 10,500 feet). May through July.	None
Deceiving sedge <i>Carex saliniformis</i>	CNPS, CNDDDB	-/-/1B.2	Coastal prairie, coastal scrub, meadows and seeps, and coastal salt marshes and swamps. 3 to 230 meters (5 to 755 feet). June (July).	Moderate
Siskiyou sedge <i>Carex scabriuscula</i>	CNPS	-/-/4.3	Mesic areas and sometimes serpentinite seeps in lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest. 710 to 2,345 meters (2,325 to 7,695 feet). May through July.	Moderate

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Green yellow sedge <i>Carex viridula</i> ssp. <i>viridula</i>	CNPS, CNDDDB	-/-/2B.3	Bogs and fens, freshwater marshes and swamps, and mesic areas in north coast coniferous forest. 0 to 1,600 meters (0 to 5,250 feet). (June) July through September (November).	Moderate
Humboldt Bay owl's-clover <i>Castilleja ambigua</i> var. <i>humboldtiensis</i>	CNPS, CNDDDB	-/-/1B.2	Coastal salt marshes and swamps. 0 to 3 meters (0 to 10 feet). April through August.	None
Oregon coast paintbrush <i>Castilleja litoralis</i>	CNPS, CNDDDB	-/-/2B.2	Sandy areas in coastal bluff scrub, coastal dunes, and coastal scrub. 15 to 100 meters (45 to 330 feet). June through July.	None
Pacific golden saxifrage <i>Chrysosplenium glechomifolium</i>	CNPS	-/-/4.3	Streambanks, sometimes seeps, sometimes roadsides in north coast coniferous forest, and riparian forest. 10 to 455 meters (30 to 1,495 feet). February through June (July).	Moderate
Oregon goldthread <i>Coptis laciniata</i>	CNPS, CNDDDB	-/-/4.2	Mesic areas in meadows and seeps and streambanks north coast coniferous forest. 0 to 1,000 meters (0 to 3,280 feet). (February) March through May (September through November).	Moderate

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
California lady's-slipper <i>Cypripedium californicum</i>	CNPS	-/-/4.2	Seeps and streambanks and usually serpentinite in bogs and fens and lower montane coniferous forest. 30 to 2,750 meters (95 to 9,020 feet). April through August (September).	Moderate
California pitcherplant <i>Darlingtonia californica</i>	CNPS	-/-/4.2	Mesic areas and generally serpentinite seeps in bogs and fens and meadows and seeps. 0 to 2,585 meters (0 to 8,480 feet). April through August.	None
Oregon bleeding heart <i>Dicentra formosa</i> ssp. <i>oregana</i>	CNPS	-/-/4.2	Serpentinite in lower montane coniferous forest. 425 to 1485 meters (1,390 to 4,870 feet). April through May.	None
Naked flag moss <i>Discelium nudum</i>	CNPS, CNDDDB	-/-/2B.2	Soil, on clay banks in coastal bluff scrub. 10 to 50 meters (30 to 165 feet).	None
Del Norte buckwheat <i>Eriogonum nudum</i> var. <i>paralinum</i>	CNPS, CNDDDB	-/-/2B.2	Coastal bluff scrub and coastal prairie. 5 to 80 meters (15 to 260 feet). (June) August through September.	Moderate
Coast fawn lily <i>Erythronium revolutum</i>	CNPS, CNDDDB	-/-/2B.2	Mesic areas and streambanks in bogs and fens, broadleafed upland forest, and north coast coniferous forest. 0 to 1,600 meters (0 to 5,250 feet). March through July (August),	Moderate

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Minute pocket moss <i>Fissidens pauperculus</i>	CNPS, CNDDDB	-/-/1B.2	Damp coastal soil in north coast coniferous forest. 10 to 1,024 meters (30 to 3,360 feet).	Moderate
American glehnia <i>Glehnia littoralis</i> ssp. <i>leiocarpa</i>	CNPS	-/-/4.2	Coastal dunes. 0 to 20 meters (0 to 65 feet). May through August.	None
Howell's horkelia <i>Horkelia sericata</i>	CNPS	-/-/4.3	Serpentinite and clay in chaparral and lower montane coniferous forest. 60 to 1,280 meters (195 to 4,200 feet). May through July.	None
California globe mallow <i>Iliamna latibracteata</i>	CNPS, CNDDDB	-/-/1B.2	Often in burned areas in montane chaparral, lower montane coniferous forest, mesic areas in north coast coniferous forest, and streambanks in riparian scrub. 60 to 2,000 meters (195 to 6,560 feet). June through August.	Moderate
Del Norte County iris <i>Iris innominata</i>	CNPS	-/-/4.3	Serpentinite lower montane coniferous forest. 300 to 2,000 meters (980 to 6,560 feet). May through June.	None

Common Name Scientific Name	Query Sources	Status Federal/ State/CRPR	Habitat Association	Likelihood to Occur in Project Area
Thompson's iris <i>Iris thompsonii</i>	CNPS	-/-/4.3	Openings, usually mesic areas, often serpentinite, often edges, and sometimes roadsides and streambanks in lower montane coniferous forest, north coast coniferous forest. 90 to 600 meters (295 to 1,970 feet). (March through April) May through June (July through August).	Moderate
Small groundcone <i>Kopsiopsis hookeri</i>	CNPS, CNDDDB	-/-/2B.3	North coast coniferous forest. 90 to 885 meters (295 to 2,905 feet). April through August.	Moderate
Seaside pea <i>Lathyrus japonicus</i>	CNPS, CNDDDB	-/-/2B.1	Coastal dunes. 1 to 30 meters (0 to 100 feet). May through August.	None
Marsh pea <i>Lathyrus palustris</i>	CNPS	-/-/2B.2	Mesic areas in bogs and fens, coastal prairie, coastal scrub, lower montane coniferous forest, marshes and swamps, north coast coniferous forest. 1 to 100 meters (0 to 330 feet). March through August.	Moderate
Beach layia <i>Layia carnosa</i>	CNPS, CNDDDB	FE/SE/1B.1	Coastal dunes, sandy areas in coastal scrub. 0 to 60 meters (0 to 195 feet). March through July.	None
Bolander's lily <i>Lilium bolanderi</i>	CNPS	-/-/4.2	Serpentinite in chaparral and lower montane coniferous forest. 30 to 1,600 meters (95 to 5,250 feet). June through July.	None

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Heart-leaved twayblade <i>Listera cordata</i>	CNPS	-/-/4.2	Bogs and fens, lower montane coniferous forest, and north coast coniferous forest. 5 to 1,370 meters (15 to 4,495 feet). February through July.	Moderate
Inundated bog club-moss <i>Lycopodiella inundata</i>	CNPS	-/-/2B.2	Coastal bogs and fens, mesic lower montane coniferous forest, and lake margins marshes and swamps. 5 to 1,000 meters (15 to 3,280 feet). June through September.	Moderate
Running-pine <i>Lycopodium clavatum</i>	CNPS, CNDDDB	-/-/4.1	Often edges, openings, and roadsides and mesic areas in lower montane coniferous forest, marshes and swamps, mesic areas in north coast coniferous forest. 45 to 1,225 meters (145 to 4,020 feet). June through August (September).	Moderate
Marshall's saxifrage <i>Micranthes marshallii</i>	CNPS	-/-/4.3	Rocky streambanks in riparian forest. 90 to 2,130 meters (295 to 6,990 feet). March through August.	Moderate

Common Name Scientific Name	Query Sources	Status Federal/ State/CRPR	Habitat Association	Likelihood to Occur in Project Area
Leafy-stemmed miterwort <i>Mitellastra caulescens</i>	CNPS	-/-/4.2	Mesic areas and, sometimes roadsides in broadleaved upland forest, lower montane coniferous forest, meadows and seeps, north coast coniferous forest. 5 to 1,700 meters (15 to 5,575 feet). (March) April through October.	Moderate
Woodnymph <i>Moneses uniflora</i>	CNPS, CNDDDB	-/-/2B.2	Broadleaved upland forest, north coast coniferous forest. 100 to 1,100 meters (325 to 3,610 feet). May through August.	Moderate
Ghost-pipe <i>Monotropa uniflora</i>	CNPS, CNDDDB	-/-/2B.2	Broadleaved upland forest, north coast coniferous forest. 10 to 550 meters (30 to 1,805 feet). June through August (September).	Moderate
Howell's montia <i>Montia howellii</i>	CNPS, CNDDDB	-/-/2B.2	Vernally mesic areas and sometimes roadsides in meadows and seeps, north coast coniferous forest, and vernal pools. 0 to 835 meters (0 to 2,740 feet). (January through February) March through May.	Moderate
Wolf's evening-primrose <i>Oenothera wolfii</i>	CNPS, CNDDDB	-/-/1B.1	Sandy and usually mesic areas in coastal bluff scrub, coastal dunes, coastal prairie, and lower montane coniferous forest. 3 to 800 meters (5 to 2,625 feet). May through October.	None

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Siskiyou Mountains ragwort <i>Packera macounii</i>	CNPS	-/-/4.3	Sometimes serpentinite and often in disturbed areas in chaparral, and lower montane coniferous forest. 400 to 915 meters (1,310 to 3,000 feet). June through July.	None
White-flowered rein orchid <i>Piperia candida</i>	CNPS, CNDDDB	-/-/1B.2	Sometimes on serpentinite in broadleafed upland forest, lower montane coniferous forest, and north coast coniferous forest. 30 to 1,310 meters (95 to 4,300 feet). (March) May through September.	Moderate
California pinefoot <i>Pityopus californicus</i>	CNPS	-/-/4.2	Mesic areas in broadleafed upland forest, lower montane coniferous forest, north coast coniferous forest, and upper montane coniferous forest. 15 to 2,225 meters (45 to 7,300 feet). (March through April) May through August.	Moderate
Nodding semaphore grass <i>Pleuropogon refractus</i>	CNPS	-/-/4.2	Mesic in lower montane coniferous forest, meadows and seeps, and north coast coniferous forest, riparian forest. 0 to 1,600 meters (0 to 5,250 feet). (March) April through August.	Moderate

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Oregon polemonium <i>Polemonium carneum</i>	CNPS, CNDDDB	-/-/2B.2	Coastal prairie, coastal scrub, and lower montane coniferous forest. 0 to 1,830 meters (0 to 6,005 feet). April through September.	Moderate
Trailing black currant <i>Ribes laxiflorum</i>	CNPS	-/-/4.3	Sometimes roadsides in north coast coniferous forest. 5 to 1,395 meters (15 to 4,575 feet). March through July (August).	Moderate
Blue Creek stonecrop <i>Sedum citrinum</i>	CNPS, CNDDDB	-/-/1B.2	North coast coniferous forest. 1,050 to 1,280 meters (3,440 to 4,200 feet). June.	None
Maple-leaved checkerbloom <i>Sidalcea malachroides</i>	CNPS, CNDDDB	-/-/4.2	Often in disturbed areas in broadleaved upland forest, coastal prairie, coastal scrub, north coast coniferous forest, and riparian woodland. 0 to 730 meters (0 to 2,395 feet). (March) April through August.	Moderate
Siskiyou checkerbloom <i>Sidalcea malviflora</i> ssp. <i>patula</i>	CNPS, CNDDDB	-/-/1B.2	Often roadcuts in coastal bluff scrub, coastal prairie, and north coast coniferous forest. 15 to 880 meters (45 to 2,885 feet). (April) May through August.	Moderate
Scouler's catchfly <i>Silene scouleri</i> ssp. <i>scouleri</i>	CNPS, CNDDDB	-/-/2B.2	Coastal bluff scrub, coastal prairie, valley and foothill grassland. 0 to 600 meters (0 to 1,970 feet). (March through May) June through August (September).	None

<b>Common Name Scientific Name</b>	<b>Query Sources</b>	<b>Status Federal/ State/CRPR</b>	<b>Habitat Association</b>	<b>Likelihood to Occur in Project Area</b>
Serpentine catchfly <i>Silene serpentinicola</i>	CNPS, CNDDDB	-/-/1B.2	Serpentine openings and gravelly or rocky areas in chaparral and lower montane coniferous forest. 145 to 1,650 meters (475 to 5,415 feet). May through July.	None
Slender false lupine <i>Thermopsis gracilis</i>	CNPS	-/-/4.3	Sometimes roadsides in chaparral, cismontane woodland, lower montane coniferous forest, meadows and seeps, and north coast coniferous forest. 100 to 1,720 meters (325 to 5,645 feet). March through July.	Moderate
Robust false lupine <i>Thermopsis robusta</i>	CNPS, CNDDDB	-/-/1B.2	Broadleafed upland forest, north coast coniferous forest. 150 to 1,500 meters (490 to 4,920 feet). May through July.	Moderate
Trifoliolate laceflower <i>Tiarella trifoliata</i> var. <i>trifoliata</i>	CNPS	-/-/3.2	Edges, moist shady banks, and streambanks in lower montane coniferous forest and north coast coniferous forest. 170 to 1,500 meters (555 to 4,920 feet). (May) June through August.	Moderate
Cylindrical trichodon <i>Trichodon cylindricus</i>	CNPS, CNDDDB	-/-/2B.2	Sandy, exposed soil and roadbanks in broadleafed upland forest, meadows and seeps, and upper montane coniferous forest. 50 to 2,002 meters (160 to 6,570 feet).	Moderate

Common Name Scientific Name	Query Sources	Status Federal/ State/CRPR	Habitat Association	Likelihood to Occur in Project Area
Coastal triquetrella <i>Triquetrella californica</i>	CNPS, CNDDDB	-/-/1B.2	Soil in coastal bluff scrub, and coastal scrub. 10 to 100 meters (30 to 330 feet).	Moderate
Methuselah's beard lichen <i>Usnea longissima</i>	CNPS, CNDDDB	-/-/4.2	On tree branches; usually on old growth hardwoods and conifers in broadleaved upland forest and north coast coniferous forest. 50 to 1,460 meters (160 to 4,790 feet).	Moderate
Siskiyou false-hellebore <i>Veratrum insolitum</i>	CNPS	-/-/4.3	Clay in chaparral and lower montane coniferous forest. 45 to 1,635 meters (145 to 5,365 feet). June through August.	None
Alpine marsh violet <i>Viola palustris</i>	CNPS, CNDDDB	-/-/2B.2	Coastal bogs and fens, and mesic areas in coastal scrub. 0 to 150 meters (0 to 490 feet). March through August.	None
Redwood forest		G3/S3.2		High
Sitka Spruce Forest		G1/S1.1		High
Coastal and Valley Freshwater Marsh		G3/S2.1		Moderate

Notes:

"None" indicates that habitat is not present in the Project Area or is outside of the elevation range.

"Moderate" indicates that habitat is present within the Project Area.

"High" indicates that the species has been documented within the Project Area.

CNPS Threat Rank 0.1: Seriously threatened in California (high degree/immediacy of threat)

CNPS Threat Rank 0.2: Fairly threatened in California (moderate degree/immediacy of threat)

CNPS Threat Rank 0.3: Not very threatened in California (low degree/immediacy of threats or no current threats known)

CRPR List 1B: Plants rare, threatened, or endangered in California and elsewhere

CRPR List 2B: Plants rare, threatened, or endangered in California, but more common elsewhere

CRPR List 3: Plants about which more information is needed, a review list  
CRPR List 4: Plants of limited distribution, a watch list  
CDFW: California Department of Fish and Wildlife  
CNDDDB: California Natural Diversity Database  
CNPS: California Native Plant Society  
CRPR: California Rare Plant Ranks  
FE: Listed as endangered under the federal Endangered Species Act  
FT: Listed as threatened under the federal Endangered Species Act  
FPT: Federally proposed as threatened  
FC: Federal candidate species  
G1: Critically Imperiled — At very high risk of extinction due to extreme rarity (often five or fewer populations)  
G3: Vulnerable — At moderate risk of extinction or elimination due to a restricted range, relatively few populations (often 80 or fewer)  
SE: Listed as Endangered under the California Endangered Species Act  
SR: Listed as Rare under the California Endangered Species Act  
ST: Listed as Threatened under the California Endangered Species Act  
SCE: State Candidate Endangered  
SSC: California Species of Special Concern  
SFP: CDFW Fully Protected species  
S1: Critically imperiled in the state because of extreme rarity (often five or fewer occurrences)  
S2: Imperiled in the state because of rarity due to very restricted range, very few (fewer than 20) populations  
S3: Vulnerable in the state due to a restricted range, relatively few (fewer than 80) populations

# Appendix I

## List of Preparers

---

## **Appendix I: List of Preparers**

### **California Department of Parks and Recreation**

Amber Transou  
Shannon Dempsey  
Brian Merrill  
Lathrop Leonard  
Greg Collins  
Claudia Voigt  
Nick Nuebel

### **National Park Service**

Leonel Arguello  
Karin Grantham  
Aida Parkinson  
Neal Youngblood  
Jason Teraoka  
Vicki Ozaki  
Judy Wartella  
Keith Bensen  
David Anderson  
Stassia Samuels  
Greg Litten  
Dave Best

### **Save the Redwoods League**

Rosalind Litzky  
Laura Lalemand  
Richard Campbell  
Matthew Morassutti

## Consultant Team

### *Anchor QEA*

Katie Chamberlin

Elizabeth Greene

Lena DeSantis

Barbara Bundy

Jordan Theyel

Marine Vié

### *Stillwater Sciences*

Dennis Halligan

Dylan Caldwell

Emily Teraoka

Lauren Dusek

### *Baldwin, Blomstrom, Wilkinson, and Associates*

Mark Andre

Jared Gerstein

### *PAR Environmental*

Mary Maniery

Appendix J  
References

---

## Appendix J: References

- Allen, J., M.L. Maniery, and S. Heffner, 2018. *Research Design and Cultural Resources Inventory Work Plan for the Redwoods Rising Project, Greater Mill Creek and Greater Prairie Creek, Humboldt and Del Norte Counties, California*. On file at the Save the Redwoods League, San Francisco, California.
- Atwater, B.F., A.R. Nelson, J.J. Clague, G.A. Carver, D.K. Yamaguchi, P.T. Bobrowski, J. Bourgeois, M.E. Darienzo, W.C. Grant, E. Hemphill-Haley, H.M. Kelsey, G.C. Jacoby, S.P. Nishenko, S.P. Palmer, C.D. Peterson, and M.A. Reinhart, 1995. "Summary of coastal geologic evidence for past great earthquakes at the Cascadia subduction zone." *Earthquake Spectra* 11(1):1–18.
- Bean, W.T., D. Tange, and S. Osborn, 2016. "A Suitability Model for White-Footed Voles with Insights into Habitat Associations at the Southern Boundary of their Range." *Northwestern Naturalist* 97:105–112.
- Bearss, E.C., 1969. *Redwood National Park History Basic Data*. National Park Service Division of History, Office of Archaeology and Historic Preservation. Available at: [https://www.nps.gov/parkhistory/online\\_books/redw/](https://www.nps.gov/parkhistory/online_books/redw/).
- Bensen, K., 2014. *Status of Western Pearlshell Mussels in Lower Redwood Creek: An Indicator of Watershed Health and Recovery*. Orick, California: Redwood National Park.
- Benson, L., M. Kashgarian, R. Rye, S. Lund, F. Paillet, J. Smoot, C. Kester, S. Mensing, D. Meko, and S. Lindström, 2002. "Holocene multidecadal and multicentennial droughts affecting Northern California and Nevada." *Quaternary Science Reviews* 21:659–682.
- Bury, R.B., and M.J. Adams, 1999. "Variation in age at metamorphosis across a latitudinal gradient for the tailed frog, *Ascaphus truei*." *Herpetologica* 55:283–291.
- Busing, R.T., and T. Fujimori, 2005. "Biomass, production and woody detritus in an old coast redwood (*Sequoia sempervirens*) forest." *Plant Ecology* 177(2):177–188.  
Available at: <https://doi.org/10.1007/s11258-005-2322-8>.
- Calef, G.W., 1973. "Natural mortality of tadpoles in a population of *Rana Aurora*." *Ecology* 54:741–758.
- CalEPA (California Environmental Protection Agency), 2018. "Cortese List Data Resources."  
Accessed November 14, 2018. Available at: <https://calepa.ca.gov/sitecleanup/corteselist/>.
- Cal Fire (California Department of Forestry and Fire Protection), 2006. "Fire Threat Map."  
Available at: <http://frap.fire.ca.gov/>.

- Cal Fire, cartographer, 2007. Humboldt County fire hazard severity zones in state responsibility areas (computer map). Sacramento, California: Cal Fire and Resource Assessment Program. Available at: [http://frap.fire.ca.gov/webdata/maps/humboldt/fhszs\\_map.12.jpg](http://frap.fire.ca.gov/webdata/maps/humboldt/fhszs_map.12.jpg).
- Cal Fire, 2017. *California Forest Practice Rules 2017*. Available at: [https://calfire.ca.gov/resource\\_mgmt/downloads/2017%20Forest%20Practice%20Rules%20and%20Act.pdf](https://calfire.ca.gov/resource_mgmt/downloads/2017%20Forest%20Practice%20Rules%20and%20Act.pdf).
- California Herps, 2019. "Northern red-legged frog – *Rana aurora*." Accessed February 21, 2019. Available at: <http://www.californiaherps.com/frogs/pages/r.aurora.html>.
- Caltrans (California Department of Transportation), 2011. *California Scenic Highway Mapping System*. Available at: [http://www.dot.ca.gov/hq/LandArch/16\\_livability/scenic\\_highways/](http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/).
- Caltrans, 2017. *Caltrans District 1: US Route 101 Transportation Concept Report*. October 2017.
- CARB (California Air Resources Board), 2017. *California's 2017 Climate Change Scoping Plan: The Strategy for Achieving California's 2030 Greenhouse Gas Target*. November 2017. Available at: [https://www.arb.ca.gov/cc/scopingplan/scoping\\_plan\\_2017.pdf](https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf).
- CARB, 2018. Sensitive Receptor Assessment. Available at: <https://ww2.arb.ca.gov/capp-resource-center/community-assessment/sensitive-receptor-assessment>.
- Cashman, S.M., H.M. Kelsey, and D.R. Harden, 1995. "Geology of the Redwood Creek basin. Humboldt County, California." *Geomorphic processes and aquatic habitat in the Redwood Creek basin, northwestern California*. Editors, K.M. Nolan, H.M. Kelsey, and D.C. Marron. U.S. Geological Survey Professional Paper 1454; pp. B1–B13.
- CCC (California Coastal Commission), 2011. *Humboldt County Coastal Trail Implementation Strategy*. January 2011. Available at: [http://www.naturalresourceservices.org/sites/default/files/CCT\\_FinalReport\\_20Jan2011\\_0.pdf](http://www.naturalresourceservices.org/sites/default/files/CCT_FinalReport_20Jan2011_0.pdf).
- CCCC (California Climate Change Center), 2012. *Our Changing Climate 2012: Vulnerability & Adaptation to the Increasing Risks from Climate Change in California. A Summary Report on the Third Assessment from the California Climate Change Center*. Available at: <https://www.energy.ca.gov/2012publications/CEC-500-2012-007/CEC-500-2012-007.pdf>
- CDFG (California Department of Fish and Game), 2008. *California Aquatic Invasive Species Management Plan*. January 2008. Available at: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3868&inline=1>.

- CDFW (California Department of Fish and Wildlife), 2018a. *California Department of Fish and Wildlife Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities*. March 20, 2018. Available at: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959>.
- CDFW, 2018b. California Natural Diversity Database search of Proposed Action Area.
- CDFW, 2018c. *California Sensitive Natural Communities List*. Sacramento, California: CDFW Biogeographic Data Branch. Available at: <https://www.wildlife.ca.gov/Data/VegCAMP/Natural-Communities>.
- CDFW, 2018d. Special Animals List. Available at: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline>. November 2018.
- CDPR (California Department of Parks and Recreation), 2011. *Mill Creek Watershed Young Forest Restoration Project Initial Study/Mitigated Negative Declaration*. July 2011.
- CDPR, 2016. *Draft Initial Study/Mitigated Negative Declaration: Del Norte Coast Redwood State Park Redwood Coast-to-Crest Trail Project*. December 2016.
- CDPR, 2019. *Draft Mill Creek Vegetation Management Plan*. March 2019.
- Cejnar, J., 2017. "Redwood parks' visitor count continues to rise." *Del Norte Triplicate* (Crescent City, California). April 28, 2017. Available at: <https://www.currypilot.com/news/5267691-151/redwood-parks-visitor-count-continues-to-rise>.
- CGS (California Geological Survey), 2015. "Geological Gems of California State Parks." Editors, M. Fuller, S. Brown, C. Wills, and W. Short. Special Report 230.
- CNPS (California Native Plant Society), 2018. "Inventory of Rare and Endangered Vascular Plants of California." Available at: <http://www.rareplants.cnps.org/>.
- Coastal Conservancy, 2017. "Orick Mill Site Restoration: Lower Prairie Creek Restoration and Enhancement." Available at: [http://scc.ca.gov/webmaster/ftp/pdf/sccbb/2017/1709/20170928Board05\\_Orick\\_Mill\\_Site.pdf](http://scc.ca.gov/webmaster/ftp/pdf/sccbb/2017/1709/20170928Board05_Orick_Mill_Site.pdf).
- Driver, H.E., 1939. *Culture Element Distributions: X Northwest California*. Volume 1(6). University of California Anthropology Records. Berkeley, California: University of California Press.
- Dell'Osso, D.R., J.N. Falls, and D.J. McGuire, cartographers, 2002. Geologic and Geomorphic Features related to Landsliding, Redwood Creek Watershed, Humboldt County, California (computer map). Watershed Mapping Series, Map Set 6, Plate 1, Sheet 1 of 3 (Northern Portion). California Geological Survey.

- Dunk, J.R., and J.V.G. Hawley, 2009. "Red-tree vole habitat suitability modeling: Implications for conservation and management." *Forest Ecology and Management* 258:626–634.
- eBird, 2019. Bird Observations for the Proposed Action area. Cornell Lab of Ornithology. Accessed February 2019. Available at <https://ebird.org>.
- Ehrlich, P.R., D.S. Dobkin, and D. Wheye, 1998. *The Birder's Handbook: A Field Guide to the Natural History of North American Birds*. New York, NY: Simon and Schuster/Fireside Books.
- Erlandson, J., 1997. "The Middle Holocene along the California Coast." *Archaeology of the California Coast During the Middle Holocene*. Editors, M. Glassow and J. Erlandson. Los Angeles, California: University of California Institute of Archaeology; pp. 1–10.
- Erlandson, J.M., and K. Bartoy, 1995. "Cabrillo, the Chumash, and Old World Diseases." *Journal of California and Great Basin Anthropology* 17(2):153–173.
- Falls, J.N., D.J. McGuire, and D.R. Dell'Osso, 2003. *Report of the Geologic and Fluvial Geomorphic Characteristics of the Redwood Creek Watershed, California*. Prepared in cooperation with the California Resources Agency's North Coast Watershed Assessment Program. Sacramento, California: California Geological Survey.
- FCAT (Forest Climate Action Team), 2018. *California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate*. May 2018. Available at: <http://resources.ca.gov/wp-content/uploads/2018/05/California-Forest-Carbon-Plan-Final-Draft-for-Public-Release-May-2018.pdf>.
- Glebocki, R., 2015. *Fuel Loading and Moisture Dynamics in Thinned Coast Redwood – Douglas-Fir Forests in Headwaters Forest Reserve, California*. Master's Thesis. Arcata, California. Humboldt State University.
- Goldfinger, C., C.H. Nelson, A.E. Morey, J.R. Johnson, J. Patton, E. Karabanov, J. Gutierrez-Pastor, A.T. Eriksson, E. Gracia, G. Dunhill, R.J. Enkin, A. Dallimore, and T. Vallier, 2012. *Turbidite event history—Methods and implications for Holocene paleoseismicity of the Cascadia subduction zone*. U.S. Geological Survey Professional Paper 1661-F. Available at: <http://pubs.usgs.gov/pp/pp1661/f>.
- Haggard, J.A.G., 2000. *A Radio Telemetric Study of the Movement Patterns of Adult Northern Red-Legged Frogs (Rana aurora aurora) at Freshwater Lagoon, Humboldt County, California*. Arcata, California: Humboldt State University.
- Harden, D.R., H.M. Kelsey, S.D. Morrison, and T.A. Stephens, 1982. *Geologic map of the Redwood Creek drainage basin, Humboldt County, California*. U.S. Geological Survey Water Resources Investigations Open-File Report 8.

- Heizer, R., 1993. *The Destruction of California Indians: A Collection of Documents from the Period 1847 to 1865, on Indian and White Relations*. Lincoln, Nebraska: University of Nebraska Press.
- Hildebrandt, W.R., 2007. "Northwest California: Ancient Lifeways among Forested Mountains, Flowing Rivers, and Rocky Ocean Shores." *California Prehistory*. Editors, T. L. Jones and K. A. Klar. Lanham, Maryland: AltaMira Press; pp. 83-98.
- Hilton, R.P., 2003. *Dinosaurs and Other Mesozoic Reptiles of California*. Berkeley, California: University of California Press.
- Humboldt County, 2017. *Humboldt County General Plan*. Adopted October 23, 2017. Available at: <https://humboldt.gov/205/General-Plan>.
- Humboldt County, 2018. Humboldt County WebGIS Portal search for the Proposed Action area. Accessed December 14, 2018. Available at: <http://webgis.co.humboldt.ca.us/HCEGIS2.0/>.
- Humboldt County, 2019. *Humboldt County Community Wildfire Protection Plan 2019 Update*. Available at: <https://humboldt.gov/2431/CWPP-2019>.
- Hunter, J.E., D. Fix, G.A. Schmidt, and J.C. Power, 2005. *Atlas of the Breeding Birds of Humboldt County, California*. Eureka, California: Redwood Region Audubon Society.
- Huntsinger, L., and S. McCaffrey, 1995. "A Forest for the Trees: Forest Management and the Yurok Environment, 1850 to 1994." *American Indian Culture and Research Journal* 19(4):155–192.
- IPCC (Intergovernmental Panel on Climate Change), 1995. *IPCC Second Assessment, Climate Change 1995: A Report of the Intergovernmental Panel on Climate Change*. Available at: <https://www.ipcc.ch/pdf/climate-changes-1995/ipcc-2nd-assessment/2nd-assessment-en.pdf>.
- IPCC, 2000. *Land Use, Land-Use Change, and Forestry*. Editors, R.T. Watson, I.R. Noble, B. Bolin, N.H. Ravindranath, D.J. Verardo, and D.J. Dokken. Cambridge, United Kingdom: Cambridge University Press.
- Jacobson, K.W., and C.A. Dicus, 2006. *Effects of lop and scatter treatment on potential fire behavior and soil erosion following a selection harvest in a coast redwood forest*. U.S. Forest Service Pacific Wildland Fire Sciences Laboratory and California Polytechnic State University. Available at: [http://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1041&context=nrm\\_fac](http://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1041&context=nrm_fac).
- Justice, N.D., 2002. *Stone Age Spear and Arrow Points of California and the Great Basin*. Bloomington, Indiana: Indiana University Press.

- Karraker, N.E., 1999. "Natural history notes: *Rhyacotriton variegatus*. Nest site." *Herpetological Review* 30:160–161.
- Kemp, K., 2016. "Record Number of Visitors in Redwood National Park Last Year and Numbers Appear Higher this Year." *Redheaded Blackbelt*. July 17, 2016. Available at: <https://kymkemp.com/2016/07/17/record-number-of-visitors-in-redwood-national-park-last-year-and-numbers-appear-higher-this-year/>.
- Klein, R.D., J. Lewis, and M.S. Buffleben, 2011. "Logging and turbidity in the coastal watersheds of northern California." *Geomorphology* 139-140:136–144. Available at: <https://dx.doi.org/10.1016/j.geomorph.2011.10.011>.
- Klein, R., and T. Marquette. 2010. *Rainfall, streamflow, turbidity, and suspended sediment yield in the Redwood Creek watershed: Annual Progress Report for 2009*. Arcata, California: Redwood National and State Parks.
- Melillo, J.M., T.C. Richmond, and G. W. Yohe, editors, 2014. *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program. Available at: <https://nca2014.globalchange.gov/downloads>.
- NCRWQCB (North Coast Regional Water Quality Control Board), 2015. *Waiver of Waste Discharge Requirements for Nonpoint Source Discharges Related to Certain Federal Land Management Activities on National Forest System Lands in the North Coast Region*. October 8, 2015. Available at: [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fseprd514070.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd514070.pdf).
- NCUAQMD (North Coast Unified Air Quality Management District), 2018. "Air Quality Information for the North Coast." Accessed December 19, 2018. Available at: <http://www.ncuaqmd.org/index.php?page=air.quality>.
- NMFS (National Marine Fisheries Service), 2001. *Water Drafting Specifications*. Available at: [https://www.westcoast.fisheries.noaa.gov/publications/hydropower/water\\_drafting\\_specifications\\_guidelines.pdf](https://www.westcoast.fisheries.noaa.gov/publications/hydropower/water_drafting_specifications_guidelines.pdf).
- NMFS, 2014. *Final recovery plan for the Southern Oregon/Northern California coast evolutionarily significant unit of Coho Salmon* (*Oncorhynchus kisutch*).
- NMFS, 2018. National Marine Fisheries Service West Coast Region species list of endangered and threatened species and critical habitat. Database search for project site. Available at: [http://www.westcoast.fisheries.noaa.gov/maps\\_data/california\\_species\\_list\\_tools.html](http://www.westcoast.fisheries.noaa.gov/maps_data/california_species_list_tools.html).

- National Park Service (NPS), 2008. *South Fork Lost Man Creek Second Growth Forest Restoration Environmental Assessment*. Available at:  
<https://parkplanning.nps.gov/document.cfm?parkID=336&projectID=12553&documentID=31204>.
- NPS, 2010. *Redwood National and State Parks Fire Management Plan*. Available at:  
[https://www.nps.gov/redw/learn/management/upload/REDW%202010%20FMP%20and%20Appendices%20A\\_L.pdf](https://www.nps.gov/redw/learn/management/upload/REDW%202010%20FMP%20and%20Appendices%20A_L.pdf).
- NPS, 2014. *Redwood National Park Middle Fork Lost Man Creek Second-Growth Forest Restoration Environmental Assessment*. May 2014. Available at:  
<https://parkplanning.nps.gov/document.cfm?parkID=336&projectID=34857&documentID=59510>.
- NPS, 2016. *Forest inventory and prioritization report; lower Prairie Creek final report*. Orick, California: National Park Service.
- NPS, 2017a. *Invasive Plant Management Plan and Environmental Assessment for Redwood National Park and Santa Monica Mountains National Recreation Area*. October 2017. Available at:  
<https://parkplanning.nps.gov/document.cfm?documentID=83505>.
- NPS, 2017b. "Tidewater goby and candlefish."  
Available at: <https://www.nps.gov/redw/learn/nature/tidewater-goby-and-candlefish.htm>.
- NPS/CDPR (National Park Service and California Department of Parks and Recreation), 1999. *General Plan/General Management Plan, Redwood National and State Parks, Humboldt and Del Norte Counties, California*. Available at: [https://www.parks.ca.gov/?page\\_id=24851](https://www.parks.ca.gov/?page_id=24851).
- NRI (Noble Research Institute), 2004. "Fuel Loading, Fuel Moisture Are Important Components of Prescribed Fire." Available at: <https://www.noble.org/news/publications/ag-news-and-views/2004/january/fuel-loading-fuel-moisture-are-important-components-of-prescribed-fire/>.
- O'Hara, K.L., J.C.B. Nesmith, L. Leonard, and D.J. Porter, 2010. "Restoration of old forest features in coast redwood forests using early-stage variable-density thinning."  
*Restoration Ecology* 18:125–135.
- Ozaki, V., and R. Truesdell, 2017. *Lower Prairie Creek Stream Channel Assessment*. Arcata, California: Redwood National and State Parks. Funded by the Save the Redwoods League.

- RCWG (Redwood Creek Watershed Group), 2006. *Redwood Creek Integrated Watershed Strategy*. June 22, 2006. Available at: <https://www.nps.gov/redw/learn/management/upload/RWC%20IWS%20Final.pdf>.
- RNP (Redwood National Park), 1987. *Statement for Management*. Available at: <http://npshistory.com/publications/redw/statement-for-mgt-1987.pdf>.
- RNP, 2019a. *Wet Weather Operations Standards for Heavy Equipment Use and Log Hauling for Redwoods Rising*. Unpublished Report.
- RNP, 2019b. Unpublished Report. Orick, California.
- Rogers, D., 1973. "Eulachon run on Redwood Creek." California Department of Fish and Game Field Note. Eureka, California: California Department of Fish and Game.
- Seney, J., N. Weinberg, G. Davis, M. Gallup, and M. Bueno, 2017. *Assessing Condition of Meadow, Forested and Riverine Wetlands on the Prairie Creek Floodplain*. Redwood National and State Parks.
- Sever, D.M., E.C. Moriarty, L.C. Rania, and W.C. Hamlett, 2011. "Sperm storage in the oviduct of the internal fertilizing frog *Acapus truei*." *Journal of Morphology* 248:1–21.
- Smedley, S.C., 1952. "Notes on pink salmon in Prairie Creek, California." *California Fish and Game* 38:275.
- Tait, C.K., and L.V. Diller, 2006. "Life history of the southern torrent salamander (*Rhyacotriton variegatus*) in coastal northern California." *Journal of Herpetology* 40:43–54.
- Thomson, R.C., A.N. Wright, and H.B. Shaffer, 2016. *California Amphibian and Reptile Species of Special Concern*. California Department of Fish and Wildlife and University of California Press.
- USCB (United States Census Bureau), 2018a. 2013-2017 American Community Survey: Selected Economic Characteristics. American Fact Finder Database entries for "Humboldt County, California" and "California". Accessed December 17, 2018. Available at: <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>.
- USCB, 2018b. 2012 Economic Census, 2012 Economic Census of Island Areas, and 2012 Nonemployer Statistics. American Fact Finder Database entry for "Humboldt County, California." Accessed December 17, 2018. Available at: <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>.

- USCB, 2018c. Annual Estimates of the Resident Population: April 1, 2010, to July 1, 2017, Population Estimates. American Fact Finder Database entry for "Humboldt County, California." Accessed December 17, 2018. Available at: <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>.
- USCB, 2018d. Profile of General Population and Housing Characteristics: 2010 Demographic Profile Data. American Fact Finder Database entry for "Orick, California." Accessed December 17, 2018. Available at: <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>.
- USCB, 2018e. 2010 Census. American Fact Finder Database entry for "Orick, California." Accessed December 17, 2018. Available at: <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>.
- USCB, 2018f. 2013-2017 American Community Survey: Selected Economic Characteristics. American Fact Finder Database entry for "Orick, California." Accessed December 17, 2018. Available at: <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>.
- USDA NRCS (United States Department of Agriculture, Natural Resources Conservation Service), 2008. *Soil Survey of Redwood National and State Parks, California*. Available at: [http://soils.usda.gov/survey/printed\\_surveys/](http://soils.usda.gov/survey/printed_surveys/).
- USEPA (U.S. Environmental Protection Agency), 1999. *A review and synthesis of effects of alternation to the water temperature regime on freshwater life stages of salmonids, with special reference to Chinook salmon*. EPA 910-R-99-010. Seattle, Washington: USEPA Region 10.
- USEPA, 2003. *EPA Region 10 Guidance for Pacific Northwest State and Tribal Water Quality Standards*. EPA 910-B-03-002. Seattle, Washington: USEPA Region 10.
- USFWS (U.S. Fish and Wildlife Service), 2012. *Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls*. February 2, 2011; revised January 9, 2012. Available at: <https://www.fws.gov/oregonfwo/Species/Data/NorthernSpottedOwl/Documents/2012RevisedNSOprotocol.2.15.12.pdf>.
- USFWS, 2018. U.S. Fish and Wildlife Service list of federally listed and proposed endangered, threatened, and candidate species. IPaC (Information for Planning and Consultation) database. Available at: <https://ecos.fws.gov/ipac/>.
- USGS (U.S. Geological Survey), 2018. "California Water Science Center: Wildfires & Climate." Last updated October 16, 2017; accessed December 14, 2018. Available at: <https://ca.water.usgs.gov/wildfires/wildfire-climate.html>.

- Van Pelt, R., S.C. Sillett, W.A. Kruse, J.A. Freund, and R.D. Kramer, 2016. "Emergent crowns and light-use complementarity lead to global maximum biomass and leaf area in *Sequoia sempervirens* forests." *Forest Ecology and Management* 375:279–308. Available at: <https://www.savetheredwoods.org/wp-content/uploads/VanPelt-et-al-2016-Maximum-biomass-and-leaf-area-in-Sequoia-sempervirens-forests.pdf>.
- Van Kirk, S., 1994. *Historical Information on Redwood Creek*. On file with Redwood National and State Parks.
- Wallace, R.L, and L.V. Diller, 1998. "Length of the larval cycle of *Ascaphus truei* in coastal streams of the redwood regions, northern California." *Journal of Herpetology* 32:404–409.
- Wheeler, C.A., and H.H. Welsh, Jr., 2008. "Mating strategy and breeding patterns of foothill yellow-legged frog (*Rana boylei*)." *Herpetological Conservation and Biology* 3:128–142.
- Wilzbach, M.A., M.D. Sparkman, P.Y. Drobny, M.E. Gordon, and C.M.G. Boone, 2016. *Prairie Creek Monitoring Project, 2015 Season: a report to the Fisheries Restoration Grants Program*. Project No. P1210321.
- Wilzbach, M.A., M.D. Sparkman, N.P. Van Vleet, B. Sheppard, and M. Settlemayer, 2017. *Overwinter survival and smolt abundances of Coho Salmon in Prairie Creek, California: 2014-2016*. Final Report to the California Department of Fish and Wildlife Fisheries Restoration Grants Program. Project No. P1210321.
- Wilzbach, M.A., and V. Ozaki, 2017. *Fisheries and Aquatic Resources of Prairie Creek, Redwood National Park*. Natural Resource Report NPS/REDW/NRR—2017/1492. Fort Collins, Colorado: National Park Service. Available at: <https://irma.nps.gov/DataStore/DownloadFile/582002>.
- Yurok Tribe, 2018. "The Yurok Tribe: Culture: History." Accessed June 9, 2018. Available at: <http://www.yuroktribe.org/culture/>.