United States Department of Agriculture

Six Rivers Aquatic Restoration Project

Draft Environmental Assessment

Forest Service | Pacific Southwest Region | Six Rivers National Forest | R5-MB-314 October 2018

Cover photo: Large wood in Monkey Creek, Smith River National Recreation Area / Gasquet Ranger District, Six Rivers National Forest. USDA Forest Service photo.

Six Rivers Aquatic Restoration

Environmental Assessment

Del Norte, Humboldt, Siskiyou and Trinity Counties, California

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Acknowledgements

The *Six Rivers Aquatic Restoration Project* exemplifies a shared vision amongst collaborative partners and stakeholders, dedicated to restoring north coast fisheries and their habitats. Today, as the stakes grow ever higher as fisheries populations dwindle, Six Rivers National Forest leadership would like to acknowledge all those who envisioned and championed this pragmatic, science-based project.

Forest leadership would like to impart special thanks to the California Coastal Conservancy for providing funding and the Mid Klamath Watershed Council for their efforts in spearheading the Coastal Conservancy grant. Our gratitude to those who provided letters of support to the grantor; namely, the Salmon River Restoration Council, Hayfork Watershed and Training Center, Smith River Alliance and the National Marine Fisheries Service. We would also like to acknowledge additional key contributors including the Blue Lake and Elk Valley Rancherias, Hoopa, Karuk, Tolowa Dee-ni′ Nation, Tsnungwe, Wiyot, and Yurok tribes, as well as the California Department of Fish and Wildlife, and local stakeholders.

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Summary

The USDA Forest Service, Six Rivers National Forest (SRNF or forest) has prepared the *Six Rivers Aquatic Restoration Project* (*Aquatic Restoration Project*) *Draft Environmental Assessment* (draft EA), to disclose the environmental analysis of a proposal to accelerate recovery of north coast salmon populations (federally listed threatened coho salmon, steelhead and Chinook salmon), other Forest Service aquatic species and water quality. This assessment was guided by the California Office of Planning and Research 2014 guidance *NEPA and CEQA: Integrating Federal and State Environmental Reviews* which encourages federal, state and local agencies to coordinate the NEPA and CEQA process so that one environmental document is prepared that meets the requirements for both CEQA and NEPA. The draft EA discloses a range of alternatives and predicted effects of No Action (Alternative 1) compared to the modified Proposed Action (Alternative 2), in compliance with the National Environmental Policy Act (NEPA; 42 USC 4321 et seq.) and the California Environmental Quality Act (CEQA; California Public Resources Code (CPRC) §21000 et seq.).

Alternative 2 represents a programmatic, iterative approach to implementing a suite of phased, forest-wide instream and riparian restoration activities as a step toward fulfilling tribal trust responsibilities, and obligations to local communities, recreationists and commercial fishing industries, SRNF and Klamath National Forest (KNF) land and resource management plans (LRMP or forest plans), and state and federal recovery plan goals (NMFS 2014, CDFG 2004). Alternative 2 aims to rectify and compensate for past natural and human-caused disturbances to aquatic and riparian resources, regardless of the disturbance agent (e.g., floods, landslides, recreational uses, and introduction of invasive plants) by implementing a suite of phased, forest-wide instream and riparian restoration activities. The Proposed Action would repair and rehabilitate the site environment by replacing or providing substitute resources or environments to eliminate impacts over time.

The project area encompasses 1,234 miles of stream and riparian habitats and other water bodies with native, non-salmonid aquatic fish and wildlife species, including 1,156 acres of lakes and ponds, providing around 9 percent of California's total freshwater runoff. Alternative 2 involves rehabilitating known, mapped instream and riparian location-specific sites as displayed in Appendix D of this draft EA, while allowing for the identification and development of new restoration project sites within the project area footprint. The development of additional restoration project sites and methodology would occur collaboratively via an interdisciplinary process, informed by pending surveys and integrated field assessments, to optimize restoration outcomes. The proposed design for all sites would avoid significant impacts, and would include a unique combination of mitigations and best management practices (BMP) to minimize unavoidable minor impacts to natural, social and cultural resources, as described in Appendix C of this draft EA.

The social context for restoration is key—as the successful implementation of restoration is dependent upon acceptance by those who live near and care for streams and their floodplains (Wohl et al. 2015). Since 2012, stakeholders have expressed a keen interest in exploring partnerships and

collaborative funding opportunities with the Forest Service, including local tribes, landowners, the California Department of Fish and Wildlife (CDFW), National Marine Fisheries Service (NMFS) and watershed restoration groups.

There are numerous federally recognized tribes and non-federally recognized tribal groups living within the boundaries of the SRNF… many on ancestral lands. Evidence of past use is prevalent throughout the project area; with remnants of tribal villages, gathering areas, ceremonial grounds and trails remains concentrated along riverine and riparian environments. This use pattern indicates easy access to abundant fisheries and rich food gathering plant resources, which sustained healthy diets.

Local communities, such as Mad River, Ruth, Willow Creek, Trinity Village and Gasquet, rely on indirect revenues from visitors fishing, renting hotels, eating at family-owned restaurants, and buying souvenirs from gift shops and gas. This in turn, provides job opportunities and needed income to these disadvantaged communities, reliant on natural resources for economic stability, where there is poverty due to high unemployment. The *Aquatic Restoration Project* would promote funding for the SRNF and its partners, optimizing opportunities to collaborate on more local jobs to plan, monitor and administer contracts and restoration operations, contributing to building economic well-being.

Crescent City and Humboldt Bay are two (2) key sporting and commercial fishing harbors on the north coast, vital to local economies of Del Norte and Humboldt counties. As the SRNF encompasses about 13 percent of this land base, featuring a vast network of stream systems, lake and ponds, the indirect benefits of Alternative 2 are vital to commercial fisheries and economic stability of businesses and quality of life for those living in small towns along these river corridors. The recovery of fisheries and near-stream riparian habitats would not only promote healthy fisheries and aquatic habitats, it would foster commercial, recreational, subsistence fishing and food gathering.

Chapter 1. Purpose and Need

Introduction

The USDA Forest Service (Forest Service) has prepared the *Six Rivers Aquatic Restoration Project Draft Environmental Assessment* (draft EA) *and Finding of No Significant Impact* (FONSI)[1] pursuant to the National Environmental Policy Act (NEPA; 42 USC 4321 et seq.) and the California Environmental Quality Act (CEQA; California Public Resources Code (CPRC) §21000 et seq.). The NEPA is a federal law that sets the parameters and principles of environmental review for federal agencies, while CEQA is a California law governing environmental review when conducting projects on state and private lands and/or when projects are funded in part by state, regional and local agencies.

This draft EA for the *Six Rivers Aquatic Restoration Project* (*Aquatic Restoration Project*) is jointly funded by the Forest Service and the California Natural Resources Agency under the Water Quality, Supply and Infrastructure and Improvement Act of 2014 (Proposition 1). The *Aquatic Restoration Project* aims to expedite the 1995 *Six Rivers National Forest Land and Resource Management Plan* (SRNF LRMP or forest plan) and the Klamath National Forest (KNF) LRMP, authorized in 1995 and amended in 2010; the 2014 *Southern Oregon/Northern California Coast (SONCC) Coho Salmon Recovery Plan* (NMFS 2014); and the California coho recovery strategy (CDFG 2004).

This assessment was guided by the California Office of Planning and Research 2014 guidance *NEPA and CEQA: Integrating Federal and State Environmental Reviews* which encourages federal, state and local agencies to coordinate the NEPA and CEQA process so that one environmental document is prepared that meets the requirements for both CEQA and NEPA. Lead state agencies may give notice that it will use the EA/FONSI in place of a Mitigated Negative Declaration, as authorized by CEQA Guidelines in §15225.

This draft EA discloses the following information to all interested parties, including federal, state, and local decision-makers concerning the physical, biological, and cultural effects associated with the proposed course of action:

- A description of the project
- An identification of the environmental setting,
- An identification of environmental effects (a checklist, matrix, and written disclosure),
- A discussion of project design acting to avoid significant effects and mitigate identified unavoidable minor effects, and

[1] A ***Finding of No Significant Impact*** (FONSI) is appropriate where any potentially significant impacts are mitigated to a point where they are no longer potentially for significance (40 CFR 1508.13). There is some divergence between the laws in the standard for determining significance. Under CEQA, an Environmental Impact Report (EIR) is required if substantial evidence supports a *fair argument* that a project *may* have a significant impact, even if other substantial evidence indicates that the impact would not be significant. Under NEPA, deference is given to the agency's determination based on its assessment of the context and intensity of the potential impacts, when that determination is demonstrated in the NEPA document and supported by the administrative record (40 CFR 1508.27).

- An examination of whether the project is compatible with existing agency laws, policies, regulations, federal LRMPs, state/county zoning and plans.

The *Aquatic Restoration Project* would advance the SRNF's watershed and fisheries program for anadromous and native resident fish, warm-water game fish and their habitats, and other aquatic species. The proposed suite of individual rehabilitation activities in and around ponds, lakes, within and on both sides of the Smith, Klamath, Salmon, Trinity, Mad, Van Duzen and Eel rivers and tributaries would by incrementally implemented, using a suite of manual and heavy equipment methods. A detailed description of the proposed activities is in *Chapter 2* and *Appendices A* and *B* of this draft EA. Heavy equipment would occur only where there is existing equipment access, and, for the most part, along stream reaches where past restoration actions have occurred. During outreach and public involvement, These potential activities and locations reviewed and recommended by stakeholders were brought forward as part of the Proposed Action.

Figure 1-1. Young coho salmon (l) and steelhead trout (r). USDA Forest Service photo.

Project Location

The project area (Figure 1-2, Figure 1-3 through Figure 1-6) pertains to all administrative units on the SRNF, as well as the Ukonom Ranger District of the KNF under SRNF delegated administrative authority. The proposed riparian and in-stream restoration activities would occur at sites in and alongside the 1,234 stream miles of fisheries spawning, rearing, and over-wintering habitats associated with the Smith, Klamath, Trinity, Salmon, Mad, North Fork Eel and Van Duzen rivers and their tributaries, and in and around ponds and lakes.

The majority of the activities would take place within the stream channel and immediate riparian zone with the potential for some projects extending up to 150 feet from the channels edge (i.e., large wood, invasive plant treatments) or greater (i.e., off-channel habitat). The typical size of an individual project area would range from 0.1 acres up to 5 acres with the possible exception of off-channel habitats.

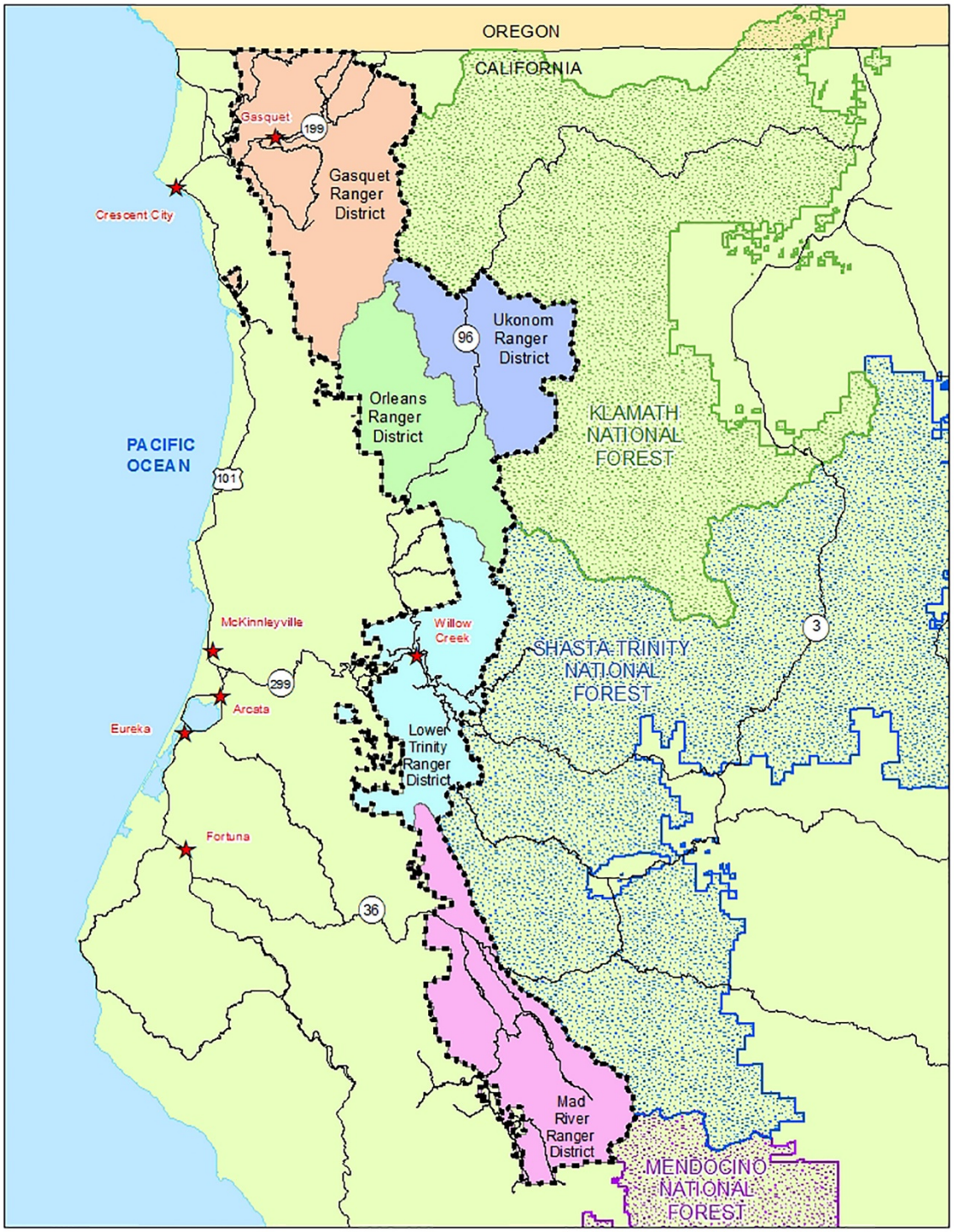

Figure 1-2. Project area vicinity map by administrative unit (ranger district).

Purpose and Need for the Proposal

The purpose/project objectives are to improve instream and riparian habitat to accelerate the recovery of north coast salmon populations (federally listed threatened coho salmon, steelhead and Chinook salmon) and other Forest Service aquatic species, thereby fulfilling tribal trust responsibilities and obligations to local communities, recreation and commercial fishing industries (SRNF and KNF LRMPs, state and federal recovery plan goals (NMFS 2014, CDFG 2004)).

This project responds to the following needs:

- Restore and improve instream conditions sufficient to support all life stages of salmonids and other aquatic species;
- Restore upstream and downstream passage conditions for all life stages of salmonids, where blocked;
- Restore continuous paths for wood dispersal, nutrient cycling, sediments and other vegetative material essential for productive fish habitat;
- Maintain or restore native plant communities and structure impacted by invasive plants and pathogens, while rehabilitating eroding or artificially diverted streambanks to maintain water quality and increase shade, large wood (LW) recruitment in streams, ponds, lakes and riparian areas for quality macroinvertebrate habitats; and
- Maintain, repair, or remove ineffective instream and lake structures.

In planning projects to meet the above needs, a clear definition of the individual problems or issues at the site scale is critical, one that relies on a larger view of watershed processes. Much effort has been devoted to developing such guidance for this restoration proposal. The available resources are diverse, reflecting wide-ranging approaches used and expertise required to develop effective restoration projects. Recently released technical guidance, *USDA Guidance for Stream Restoration* (Yochum 2018), provides a bibliographic repository of information available to assist with the collaborative process of planning, analyzing, and designing site-specific stream restoration projects.

While the Purpose and Need center around the need to accelerate recovery of listed species and restore riparian communities, there are also benefits to the local communities. Crescent City and Humboldt Bay are two key sport and commercial fishing harbors on the north coast and are vital to local economies. Recovering the fisheries would help protect commercial, recreational and sustenance fishing. Small towns along these river corridors rely on revenue brought in by recreational fishing through fisherpersons utilizing hotels, restaurants, gift shops and gas stations. This in turn provides jobs and brings needed income into the community.

The SRNF manages more than 13 percent of the land base and associated stream networks in Del Norte, Siskiyou, Humboldt, Trinity and Mendocino Counties, representing about 9 percent of California's total freshwater runoff. The communities of Mad River, Ruth, Willow Creek, Trinity Village and Gasquet are all within the forest and are all well below the state medium income level and are considered severely disadvantaged communities. This *Aquatic Restoration Project* would bring funding to the SRNF and to its partners creating jobs for planning, monitoring and contraction in the ground restoration work.

Principle Laws and Regulations that Influence the Scope of this EA

The maintenance of a quality environment for the people of California now and in the future is a matter of statewide concern, complementary to federal land management direction relevant to the *Aquatic Restoration Project* discussed below. The interrelationship of policies and practices in the management of natural resources, particularly watershed-scale proposals such as this *Aquatic Restoration Project,* require systematic and concerted efforts by multiple public and private interests to enhance environmental quality (CPRC Division 13 §21000(f)). Federal and state regulations mandate when agencies propose land management activities, major consideration be given to preventing environmental damage, while providing satisfying living environment for every Californian (CPRC §21000(g)). Planning and environmental review legislation further finds and declares that it is state policy that local agencies integrate the requirements of this division, otherwise by law so that all procedures, to the maximum feasible extent, run concurrently, rather than consecutively (CPRC 21003(a)).

Six Rivers and Klamath National Forest LRMPs

Land management direction relevant to the *Aquatic Restoration Project* provides the legal framework for opportunities and constraints to achieving desired conditions on National Forest System (NFS) lands, as well as forest-scale legal framework for setting project-design thresholds and context for determining the environmental effects to the human environment analyzed in the draft EA. The design of the Proposed Action is consistent with designated management areas (Table 1-1) identified in the SRNF and KNF LRMPs and Record of Decisions (ROD). Management areas represent lands managed in a uniform manner with unique prescriptions, management goals, desired conditions, and standards and guidelines (S&G). In some cases, several MAs spatially overlap the same land base area. In these cases, the Proposed Action conforms to the most restrictive prescription and related S&Gs. Actions occur primarily within the Riparian Reserve MA and actively implement its goals and objectives of restoring and enhancing streams and associated riparian areas (SRNF IV-46, KNF 4-106).

Standards and guidelines are the rules and limits governing federal actions and the principles specifying the desired environmental conditions or levels per 36 CFR 219.27. The S&Gs aim to help the manager achieve the goals and objectives of the forest, while staying within the constraints prescribed by law and the agency, to achieve the desired future conditions (DFC). Two (2) categories of S&Gs apply to management across the forest: 1) forest-wide S&Gs that apply to all MAs, unless specifically excluded by the direction for that specific MA; and 2) MA S&Gs that apply only to specific MAs. Aquatic restoration actions are allowed in all MAs.

Table 1-1. Management areas and proposed methods.

Management Area	Total Acres	Potential Heavy Equipment Use (acres)	Manual methods (acres)	Manual methods (miles)	Lake/pond (acres)
Riparian Reserves	561,221	923	35,274	1,234.0	1,156
Wilderness	235,989	0	7,975	225.0	528
Special Habitat LSR	392,278	265	12,284	333.0	283
Wild Rivers	31,473	0	3,505	97.3	18
Scenic Rivers	12,872	2	1,212	33.1	7
Recreation Rivers	54,945	316	9,454	261.0	92
Special Interest Areas	38,030	22	1,469	40	51
Yurok Experimental Forest	1,046	0	61	2.0	n/a
Research Natural Areas	12,475	0	283	7.0	0
Total Stream Miles		35.2 miles		1,234 miles[2]	

Figure 1-3 through Figure 1-6 graphically display LRMP MAs by administrative unit (i.e., ranger district), where phased restoration activities may occur. This direction applies to NFS lands only and are not applicable to private land inholdings, or parcels adjacent or surrounding the project area.

Management Areas

The design of the Proposed Action is consistent with designated MAs identified in the SRNF and KNF LRMPs and RODs. Management areas are listed in Table 1-1 with wilderness, wild and scenic rivers (WSR) and late-successional reserves (LSR), discussed in *Chapter 3* (Recreation and Wildlife). The following three (3) MAs overlap the project area with proposed activities consistent with S&Gs as described:

- **Special Interest Areas (SIA)**: Special interest areas on the forest include botanical, geological and cultural areas or a combination thereof. Restoration projects would not impact SIAs as any projects coinciding with SIAs would be implemented using manual methods of minimal ground disturbance and projects would be developed in coordination with staff specialists to ensure consistency with SIA goals and objectives (LRMP IV-50).
- **Research Natural Areas (RNA):** Opportunities for manual activities overlap up to 283 acres of RNAs. All potential projects would be developed in cooperation with the Pacific Southwest Research Station (PSW) to ensure activities would be consistent with management goals (IV-31).
- **Yurok Experimental Forest:** Opportunities for manual activities were identified for High Prairie Creek, located within the Yurok Experimental Forest. Potential projects would be developed with PSW to ensure activities would be consistent with management goals (IV-28).

[2] Includes the 35.2 miles of where use of heavy equipment would be allowed.

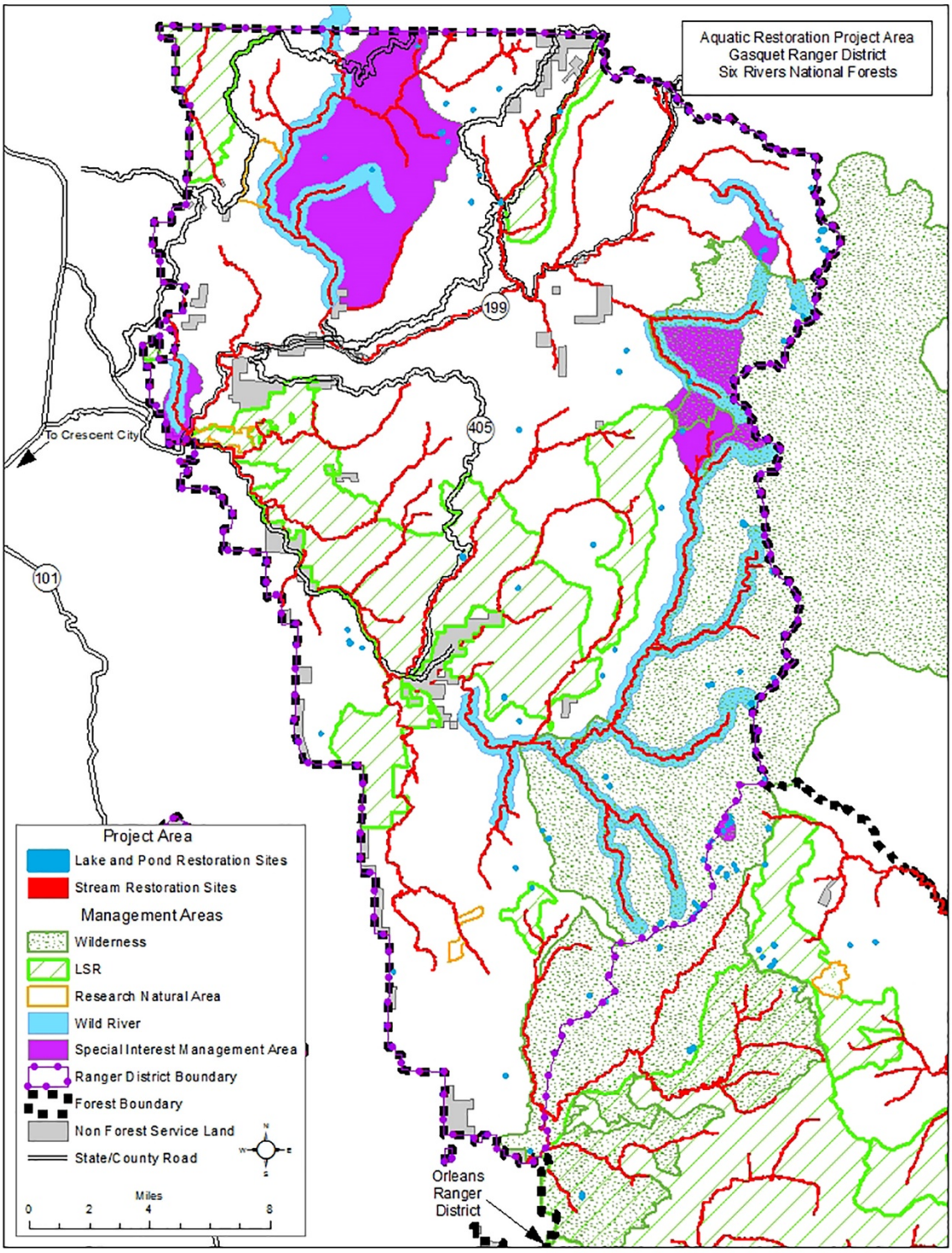

Figure 1-3. Gasquet Ranger District (Smith River NRA): Management areas overlapping proposed project locations.

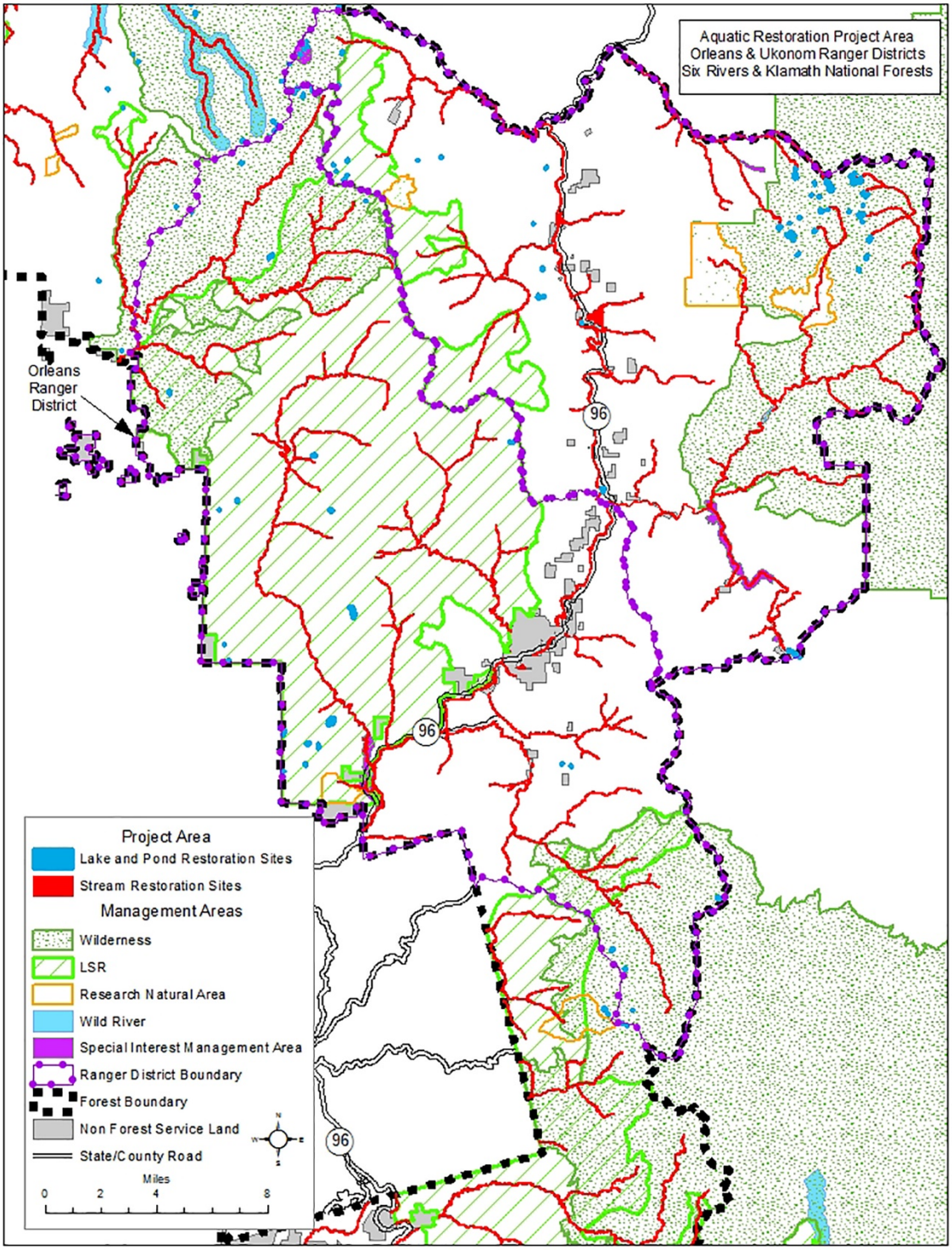

Figure 1-4. Orleans/Ukonom Ranger Districts: Management areas overlapping proposed project locations.

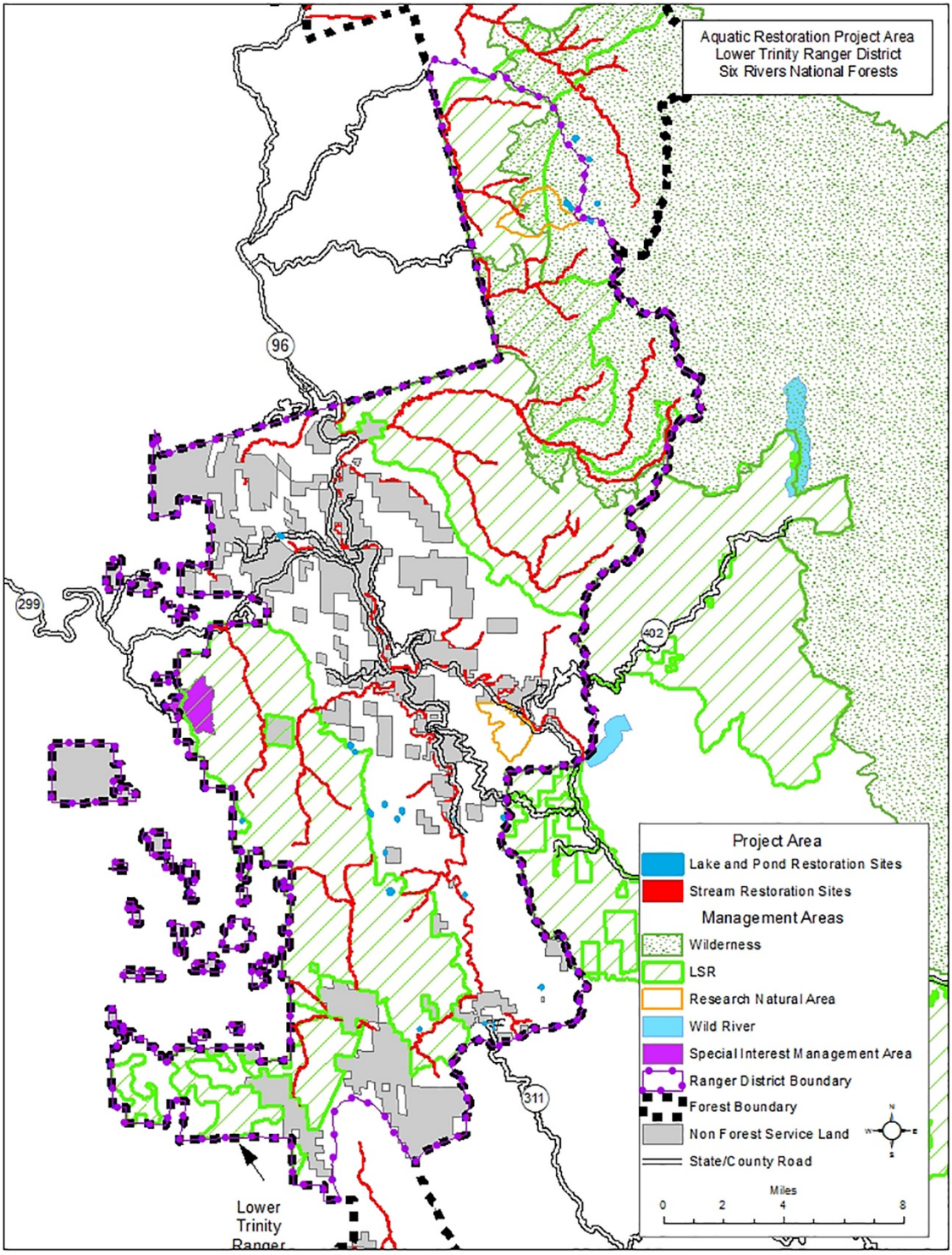

Figure 1-5. Lower Trinity Ranger District: Management areas overlapping proposed project locations.

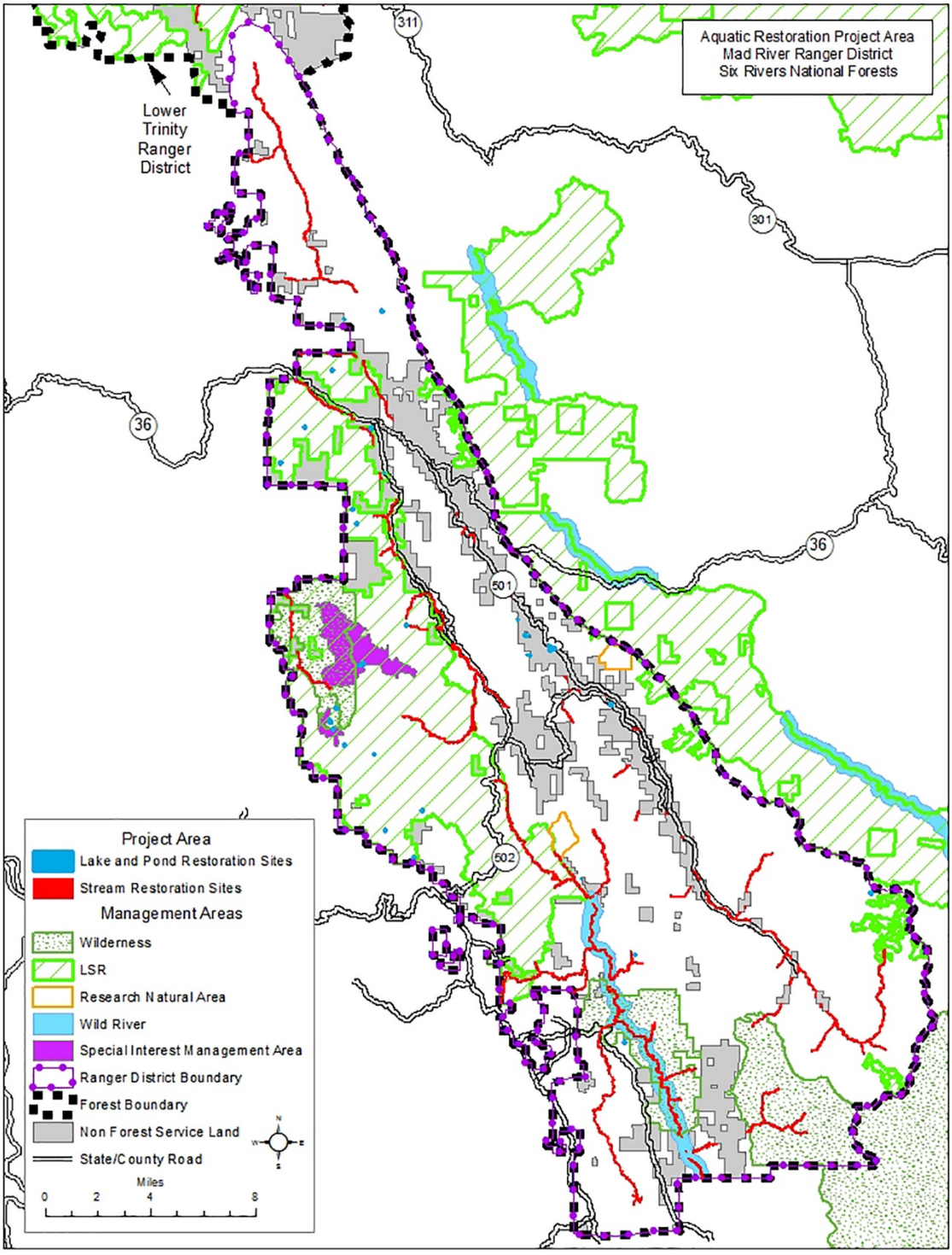

Figure 1-6. Mad River Ranger District: Management areas overlapping potential project locations.

The Aquatic Conservation Strategy

The proposed instream and riparian restoration activities included in the *Aquatic Restoration Project* were designed to implement the Aquatic Conservation Strategy (ACS) reflected in the ROD and S&Gs of the Northwest Forest Plan (NWFP; USDA and USDI 1994), as incorporated into the SRNF and KNF LRMPs. Consistency with the ACS is based on analysis of whether or not the project meets or does not prevent attainment of the ACS nine objectives.

The ACS (IV-106-111) has four (4) components, two (2) of which are land-based with specific S&Gs: *riparian reserve*s—areas used to maintain and restore riparian areas and enhance habitat conservation for stream; and *key watersheds*—watersheds that serve as refugia for maintaining and recovering instream habitat for aquatic species. The proposed activities would occur within riparian reserves, in both key and non-key watersheds, and would implement with ACS management direction.

The third component of the ACS strategy is *watershed analysis*, which outlines current and desired conditions to provide both a framework and target for restoration efforts, along with specific goals and objectives. Watershed Assessments have been done for the majority of the watersheds across the forest. Restoration actions described in those documents form the basis for the actions and locations described in this project.

The fourth component of the ACS strategy is *watershed restoration* with a focus on roads, riparian vegetation and instream habitat improvements. Project NEPA decisions must be consistent with the ACS, including consistency with the nine (9) ACS objectives (ACSO) described in the 1994 NWFP ROD (p. B-10) and in the May 22, 2007 Memorandum. The project would maintain and actively attain ACS objectives in the sub-watersheds in the short term and long term as follows:

- Maintain and restore spatial and temporal connectivity within watersheds to provide unobstructed routes to areas critical for fulfilling life history requirements;
- Maintain and restore the physical integrity of the aquatic system including shorelines, banks and bottom configurations;
- Maintain and restore water quality necessary to support healthy riparian and aquatic ecosystems;
- Maintain and restore the sediment regime including timing, volume, rate and character of sediment input;
- Maintain and restore species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion and channel migration and to supply amounts of and distribution of woody debris; and,
- Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-depended species.

Survey and Manage

The NWFP included S&Gs for species associated with late-successional forests (USFS et. al. 2001), termed *Survey and Manage* (SM) species. The most recent direction for SM species is from the May 13, 2014 *Direction Regarding the Survey and Manage Standards and Guidelines*. This new direction includes input on projects initiated after April 30, 2015, specifically a) a reference to the December 2003 species list and categories, except for the red tree vole, which remains as Category C across its range; and/or b) the four (4) categories of projects exempt from the SM S&Gs, as stipulated by Judge Pechman (October 11, 2006 *Pechman exemptions*).

Of the Pechman exemptions, one (1) includes activities associated with riparian and stream improvement:

> *Riparian and stream improvement projects where the riparian work is riparian planting, obtaining material for placing in-stream, and road or trail decommissioning; and where the stream improvement work is the placement of large wood, channel and floodplain reconstruction, or removal of channel diversions.*[3]

In light of this exemption, pre-disturbance surveys are not required for the project. The S&G pertaining to management of known sites would apply to this project through interdisciplinary review process (*Appendix C*).

Executive Orders 11990 and 11988

The purpose of Executive Order (EO) 11990 – Protection of Wetlands (as amended) is to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands." To meet these objectives, the EO requires federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. There are no wetlands in the project area.

Executive Order 11988 – Floodplain Management (as amended) requires federal agencies to avoid the long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid the direct or indirect support of floodplain development. If an action must be located in a floodplain, EO 11988 requires that agencies minimize potential harm to people, property, and to natural and beneficial floodplain values.

Executive Order 13112

Executive Order 13112 – Invasive Species called upon executive departments and agencies to take steps to prevent the introduction and spread of invasive species, and to support efforts to eradicate and control invasive species that are established. The EO also created a coordinating body—the Invasive Species Council, also referred to as the National Invasive Species Council—to oversee implementation of the order, encourage proactive planning and action, develop recommendations for international cooperation, and take other steps to improve the federal response to invasive species. Past efforts at preventing, eradicating, and

[3] Northwest Ecosystem Alliance et al. v. Mark E. Rey et al., No. 04-844P, (W.D. Wash. October 10, 2006).

controlling invasive species demonstrated that collaboration across federal, state, local, tribal, and territorial government; stakeholders; and the private sector is critical to minimizing the spread of invasive species and that coordinated action is necessary to protect the assets and security of the United States.

National Forest Management Act

The National Forest Management Act (NFMA), the primary statute governing the administration of NFS lands, requires the maintenance of productivity of the land and the protection and, where appropriate, improvement of the quality of the soil and water resources. The act specifies that substantial and permanent impairment of productivity (not defined) shall be avoided. Furthermore, activities shall be monitored to ensure that productivity is protected. This law led to subsequent regulation and policy to execute the law at various levels of management.

National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA)

The National Environmental Policy Act of 1969 (NEPA) applies to federal agency decisions on "proposals for legislation and other major Federal actions" (42 USC 4332(2)(c)) with the potential for environmental impacts, including specific federal projects (40 CFR 1508.18). NEPA also applies in cases where an agency is exercising its discretion in deciding whether and how to exercise its authority over an otherwise non-federal project (i.e., approving funding). Under NEPA, codified under 42 USC 4331 et seq., Congress established the White House Council on Environmental Quality (CEQ) to ensure that federal agencies meet their obligations of the Act. CEQ's *Regulations for Implementing the Procedural Provisions of NEPA* (CEQ NEPA Regulations) are in 40 CFR 1500 et seq. NEPA requires that all major federal actions significantly affecting the human environment are analyzed to determine the magnitude and intensity of those impacts, and the results be shared with the public coupled with an opportunity to comment.

The regulations implementing NEPA further require that, to the fullest extent possible, agencies shall concurrently be integrated with environmental analyses and related surveys and studies required by the Endangered Species Act of 1973 (ESA), the National Historic Preservation Act of 1966 (NHPA), and other environmental review laws and executive orders. Principle among these are the Multiple Use and Sustained Yield Act of 1960 (MUSYA); NFMA, as expressed through forest plans; the Clean Air Act of 1955; the Clean Water Act of 1948 (CWA); and the Forest and Rangeland Renewable Resources Planning Act of 1974.

The California Environmental Quality Act (CEQA) applies to state and local agency decisions to carry out or approve "discretionary projects… including, but not limited to, the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment" (CEQA Guidelines §15378). In California, CEQA was codified under Division 13 of CPRC §21000 et seq. The guidelines for implementing CEQA are in California Code of Regulations (CCR) Title 14 §15000 et seq. (CEQA Guidelines).

NEPA and CEQA are similar, both in intent and in the review process (i.e., analysis, public engagement, and document preparation) that they dictate. Those statutes require federal, state, and local

agencies to analyze and disclose the potential environmental impacts of their decisions, and, in the case of CEQA, to minimize significant adverse environmental effects to the extent feasible. The CEQ NEPA Regulations encourage cooperation with state and local agencies in an effort to reduce duplication in the NEPA process (40 CFR 1506.2). Federal agencies are directed to cooperate in fulfilling the requirements of state and local laws and ordinances where those requirements are in addition to, but not in conflict with federal requirements, by preparing one document that complies with all applicable laws (40 CFR 1506.2(c)). Importantly, both statutes encourage a joint federal and state review where a project requires both federal and state approvals. Indeed, in such cases, a joint review process can avoid redundancy, improve efficiency and interagency cooperation, and be easier for applicants and citizens to navigate.

Endangered Species Act

It is the Forest Service policy to implement the Endangered Species Act of 1973 (ESA) as amended "to seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act". Forest Service manual direction (2670.21) directs that NFS habitats and activities for threatened and endangered species shall be managed to achieve recovery objectives, so that special protection measures under the ESA are no longer necessary. This Proposed Action implements recovery items in the federal and state recovery plans (described below) for SONCC ESU (evolutionary significant unit) coho salmon, and the federal multispecies recovery plan for Northern California DPS (distinct population segments) steelhead and California Coastal (CC) Chinook ESU salmon.

The Proposed Action also meets the 2011 Revised Recovery Plan for northern spotted owl (NSO) and the Recovery Plan for the marbled murrelet (MAMU) in Washington, Oregon and California (USDI 1997) by ensuring the Proposed Action implements design features to maintain habitat components for threatened terrestrial species.

Magnuson-Stevens Act

The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA) of 2006 requires federal agencies to consult with National Marine Fisheries Service (NMFS) on all actions that may adversely affect essential fish habitat (EFH) for coho and Chinook salmon. The MSRA also required NMFS to develop a recovery plan for Klamath River coho salmon in 2007 and submit annual reports to Congress beginning in 2009. The MSRA Recovery Plan presents long-range guidance for various agencies, organizations, and individuals to use as they consider taking actions or pursuing projects that may affect Klamath River coho and Chinook salmon. These actions are consistent with and implement the MSRA and Klamath River MSRA Recovery Plan.

Other Supporting Plans and Assessments

This section describes documented assessments and restoration planning documents that are pertinent to the Proposed Action and the No Action alternative analyzed in this draft EA.

Watershed and Fisheries Restoration Program Biological Assessment 2015

The *Watershed and Fisheries Restoration Program Biological Assessment* (WFRPBA) prepared by the Forest Service addresses aquatic restoration activities at the programmatic level implemented on lands under the jurisdiction of the Forest Service. This consultation effort also covers actions that occur on non-federal lands when that action is located immediately adjacent to the forest, and when the project helps achieve Forest Service aquatic restoration goals as covered under Wyden Amendment authority (16 USC 1011(a), as amended by §136 of PL 105-277). This programmatic approach provides the SRNF with consistent criteria to design, implement, monitor, and document watershed and fisheries restoration activities in support of the ACS and listed salmonid recovery plans.

The WFRPBA meets the Endangered Species Act (ESA) §7 and MSRA requirements with NMFS. The WFRPBA provides information in sufficient detail and quality to support NMFS analysis for consultation and resulted in a biological opinion (BO) from NMFS (NMFS 2015). The activities listed are predictable as to their effects to ESA- and MSRA-listed species and consistent with broad-scale aquatic conservation strategies and the best available science. The Proposed Action in this draft EA represents a subset of actions consulted on through the WFRPBA. All aquatic design criteria, including planning, implementation and reporting, that apply to the activities listed in this draft EA are included in *Appendix A*.

Watershed Condition Restoration Framework Assessment (USDA 2010)

The *Watershed Condition Restoration Framework* (WCRF) is a comprehensive approach for proactively implementing integrated restoration on priority watersheds on national forests and grasslands. It is a means and strategy to identify restoration priorities and monitor program accomplishments per the *FY 2015-2020 USDA Forest Service Strategic Plan* (*Forest Service Strategic Plan*).

The WCRF also established a nationally consistent approach for classifying watershed condition using a comprehensive set of 12 indicators that are surrogate variables representing the underlying ecological functions that affect watershed condition and watershed health. The primary emphasis is on aquatic and terrestrial processes and conditions that can be influenced by Forest Service management activities.

The SRNF followed the WCRF's nationally consistent approach in designing the *Aquatic Restoration Project's* proposed activities to improve aquatic conditions (*Forest Service Strategic Plan*).

California Department of Fish and Wildlife Documents

State-Listed Threatened and Endangered Species

The California Endangered Species Act (CESA) of 1970 created the categories of *Endangered* and *Rare*. Species with a state list date of June 27, 1971, were protected under this statute. The Act was amended in 1984, at which time the *Rare* status was changed to *Threatened*. On January 1, 1985, all animal species previously designated as *Rare* were reclassified as *Threatened*. The official California listing of endangered and threatened animals is contained in CCR Title 14 §670.5. The current legal status for non-plant species is provided online (*http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109405*) and is

updated quarterly. The current legal status for botanical species is available upon request from the California Department of Fish and Wildlife (CDFW).

Recovery Strategy for California Coho Salmon (2004)

In February 2004, the California Fish and Game Commission (FGC) adopted the *Recovery Strategy for California Coho Salmon* (Recovery Strategy). The primary objective of the Recovery Strategy is to return coho salmon to a level of sustained viability, while protecting the genetic integrity of both the SONCC and Central California Coast (CCC) ESUs with the goals of delisting, thus making regulations or other protections under the CESA and ESA no longer necessary. A second objective of this Recovery Strategy is to achieve harvestable populations of coho salmon for tribal, recreational, and commercial fisheries (CDFG 2004).

In California, prior coastal watershed recovery projects are considered complementary to the objectives of the *Aquatic Restoration Project,* as they acted to: 1) restore and enhance suitable habitat conditions for juveniles and adults; 2) upgrade permitting and regulatory enforcement to protect coho salmon populations and their habitats; 3) promote continuation and further development of captive rearing programs at Warm Springs and Kingfisher Flat conservation hatcheries to help re-establish coho salmon in depleted streams north and south of San Francisco Bay, respectively; and, 4) implement range-wide and watershed-scale recovery actions.

State Wildlife Action Plan (2015)

In all regions of the state, aquatic, wetland, and riparian habitats support rich biological communities, including many special status species, and restoration of these habitats represents an important step for the state's biological heritage. The CDFW has a fundamental objective with regard to California's native anadromous fish species: to manage and conserve these species and the habitats they occupy for their ecological significance, recreation, commercial, and tribal values and for enjoyment by current and future residents and visitors. The *State Wildlife Action Plan* (SWAP) has six (6) core principles for managing these populations and their habitat. Four (4) of these principles are pertinent to this decision: water conservation, habitat restoration, species recovery and promoting partnerships. The SRNF would work closely with CDFW to reach these mutual goals. In addition, the SWAP has developed conservation strategies for conservation targets in the North Coast and Klamath Province, including a 5 percent increase in riparian and montane woodland habitat, a 5 percent increase in acres or stream miles with natural floodplain connectivity, and a 5 percent increase in acres or stream miles with natural hydrologic regime.

Steelhead Restoration and Management Plan for California (1996)

Steelhead are an important and valued resource to California's citizens and are an important component of the vast biodiversity of the state. Like many of the state's anadromous fish resources, steelhead are declining. Decline of steelhead populations is but one aspect of the present statewide decline in biodiversity, caused by California's burgeoning human population and the ever-increasing demand on natural resources. This plan focuses on restoration of native and naturally produced (wild) stocks because these stocks have the greatest value for maintaining genetic and biological diversity.

Steelhead restoration and management goals 1) increase natural production, as mandated by the *Salmon, Steelhead Trout, and Anadromous Fisheries Program Act of 1988*, so that steelhead populations are self-sustaining and maintained in good condition, and 2) enhance angling opportunities and non-consumptive uses. The strategies to accomplish these goals are to 1) restore degraded habitat; 2) restore access to historic habitat that is presently blocked; 3) review angling regulations to ensure that steelhead adults and juveniles are not over-harvested; 4) maintain and improve hatchery runs, where appropriate; and; 5) develop and facilitate research to address deficiencies in information on fresh water and ocean life history, behavior, habitat requirements, and other aspects of steelhead biology.

National Marine Fisheries Service Recovery Plans and Other Supporting Documents

SONCC Coho Salmon Recovery Plan (2014) and Designated Critical Habitat

The *SONCC Coho Salmon Recovery Plan* provides a roadmap guiding implementation of restoration based on the best available science; targeting identified threats and stresses to coho.

Coho salmon critical habitat (CCH) for SONCC coho salmon was designated by NMFS, on May 5, 1999. Coho salmon critical habitat is defined in §3(5)(A) of the ESA as "the specific areas within the geographical area occupied by the species ... on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection." Critical habitat was designated to include the water, substrate, and adjacent riparian zones of estuarine and riverine reaches (including off-channel habitats); not limited to, spawning sites, food resources, water quality and quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (64 Fed. Reg. 24049, May 5, 1999).

Coastal Multispecies Recovery Plan (2016)

National Oceanic and Atmospheric Administration (NOAA) Fisheries released its *Coastal Multispecies Recovery Plan* to recover CC Chinook, Northern California steelhead and Central California Coast steelhead by addressing the threats they face and restoring the ecosystem on which they depend. The recovery plan strategically targets restoration efforts to the needs of salmon and steelhead throughout each of their life stages, from their time as juveniles in freshwater habitat, through their maturation in the ocean, and their return to streams to spawn. Using this framework, the plan seeks to improve estuarine and riparian habitat conditions, restore floodplains and stream channels, enhance stream flows and improve fish passage across 8 million acres of California's north and central coast. Of these three (3) species, only Northern California steelhead migrate upstream onto SRNF land in the Mad, Van Duzen, and North Fork Eel rivers. California Coastal Chinook occur downstream of SRNF land in these drainages.

Pacific Lamprey Conservation Agreement (2012)

The *Pacific Lamprey Conservation Agreement* is a voluntary commitment by the interested parties, including the Forest Service, to collaborate on efforts that reduce or eliminate threats to Pacific lamprey to the greatest extent possible. The goal of the agreement is to achieve long-term persistence and support traditional tribal cultural use of Pacific lamprey throughout their range. This agreement provides a

mechanism for interested parties to collaborate and pool available resources to expeditiously and effectively implement conservation actions, including restoration actions.

Foothill Yellow-Legged Frog Conservation Assessment (2016)

The *Foothill Yellow-Legged Frog Conservation Assessment in California* (USDA Forest Service Pacific Southwest Research Station) provides a review of foothill yellow-legged frog (FYLF) status across federal lands in California, and evaluates risk factors likely to impact the FYLF and its habitat. The assessment informs a future conservation strategy for the species, and includes a number of potential actions for future conservation and management of the species, including waterflow management, stream restoration and non-native species management, and watershed management.

Federal and State Waivers, Permits and Agreements

In the case of a project described in subdivision (c) of §21065, the determination required by §21080.1, shall be made within 30 days from the date on which an application for a project has been received and accepted as complete by the project proponent (CEQA).

North Coast Region Water Waiver

In 2007, the compliance with the CWA and limits set by the total maximum daily load (TMDL) established would be achieved via application of project design, mitigations and application of best management practices (BMPs) in adherence to the terms and conditions 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* (Order No. R1-2015-0021; The Waiver). Enrollment in The Waiver under Category B would be obtained before project activities commence.

US Army Corps of Engineers Permit

The need for a permit from the US Army Corps of Engineers would be determined during the site-specific project planning (*Appendix C*) and would be obtained before commencing in-stream channel alterations.

California Department of Fish and Wildlife

The need for a lake or streambed alteration agreement would be determined during the site-specific project panning (*Appendix C*) and would be obtained from the CDFW, prior to any activity that could substantially modify the bed, bank, or channel of a stream. Where State funding is involved, incidental take authorization pursuant to the CESA would be obtained, before activities that may result in take of state-listed species.

Decision Framework

Both federal and state agencies must make certain findings prior to making a decision to select Alternative 2 (modified Proposed Action) as proposed, a modified Alternative 2 or Alternative 1 (No Action).

Forest Service

The Six Rivers National Forest Supervisor, as the Responsible Official, will use his discretionary authority to decide whether to implement Alternative 2 (modified Proposed Action) as proposed, a modified Alternative 2 or Alternative 1 (No Action).

Under NEPA, a federal agency must participate in the preparation of an environmental review (i.e., analysis and documentation) to satisfy NEPA (42 USC §4332(2)(D)(ii)). The SRNF forest supervisor, as the Responsible Official, would use his discretion to decide whether to authorize the suite of restoration activities and locations as proposed, or not implement all or portions of the plan or activities at this time.

If new information or changed circumstances relating to the environmental impacts of a proposed action come to the attention of the responsible official after a decision has been made and prior to completion of the approved project, the responsible official would review the information carefully to determine its importance. If, after review and consideration of new information within the context of the project, the responsible official would determine if a correction, supplement, or revision to the environmental document is necessary or not. If not, implementation would continue. If the responsible official determines that a correction, supplement, or revision to an environmental document is necessary, procedures per FSH 1909.15 §§18.2 to 18.4 shall be fulfilled.

When and where federal dollars could be spent on non-federal under Wyden Amendment authority (16 USC 1011(a), as amended by §136 of PL 105-277) for projects that help achieve Forest Service aquatic restoration goals would be determined during site-specific project development. Since this draft EA was prepared with the intent to fulfill CEQA requirements as per the 2014 NEPA/CEQA guidelines, a lead state agency may adopt the FONSI when a project receives state funding or approval.

California Department of Fish and Wildlife

The CEQA requires a lead agency to adopt several sets of determinations prior to approving a project. Where an Initial Study and Negative Declaration were prepared for the project, the lead agency must determine that there is no substantial evidence that the project may cause a significant effect. CEQA also requires agency decisions to be made with varying degrees of formality. When the statute or the guidelines uses the terms *determine* or *determination*, the agency can simply announce a conclusion on an issue, as long as there is evidence in the record to support that conclusion.

The CDFW Responsible Official would either approve or disapprove the project, providing a statement that no environmental impact report (EIR) would be prepared pursuant to the provisions of CEQA (4 CCR §763), based on a determination the project would not have a significant effect on the environment.

Public Involvement

The public notice and comment procedures per NEPA/CEQA provide opportunities for interested individuals and partners to play a role in the planning process, influencing the scope of the Proposed Action, design features, mitigation and consideration for other action alternative(s) (CEQA §§15073, 15086-15088). The objective is to be responsive to species conservation, tribal trust responsibilities and

obligations to local communities. Scoping is an effective way to bring together and resolve the issues and recommendations of affected federal, state, and local agencies, the proponents of the action, and other interested persons, including those who might not be in accord with the action on environmental grounds.

Collaboration

In preparation for the California State Coastal Conservancy grant application, the Mid Klamath Watershed Council (MKWC; grant applicant) and SRNF reached out to watershed restoration partners throughout the area to provide letters of support to complete the *Aquatic Restoration Project*. These letters strongly supported a collaborative landscape level approach as proposed in this draft EA.

In 2012, collaboration with stakeholders who expressed a keen interest in exploring partnerships and collaborative funding opportunities with the Forest Service began, including the Karuk, Yurok and Hoopa tribes, the CDFW, NMFS and local watershed restoration groups. All agreed to employ an *all lands* landscape/watershed approach to fisheries restoration planning, so more restoration work could occur.

On December 16, 2014 (Orleans), December 18, 2014 (Eureka), January 21, 2015 (Gasquet) and January 28, 2015 (Mad River), the SRNF hosted public meetings to discuss preliminary project plan development and design, review preliminary maps and answer questions. Fifty-one (51) stakeholders attended these meetings.

Tribal Consultation

On June 14, 2013, the SRNF initiated formal government-to-government consultation with 12 federally recognized tribes and conferred with four (4) non-federally recognized tribal groups. The Forest Service sent meeting notifications via email on During this period, forest resource staff coordinated with their tribal representatives to discuss the project area, proposed and possible restoration activities and opportunities, as well as potential effects to traditional cultural properties (TCPs), sites, practices and beliefs. As part of the consultation pursuant to §21080.3.1, the parties may propose mitigation measures, including, but not limited to, those recommended in §21084.3, capable of avoiding or substantially lessening potential significant impacts to a tribal cultural resource.

The California State Legislature finds and declares the California Native American tribes traditionally and cultural affiliated with a geographic area may have expertise concerning their traditional cultural resources (CEQA §21080.3.1). The SRNF has a long cultural history, spanning thousands of years. Evidence of past use is prevalent upon the landscape; material remains are scattered throughout the environment, indicating a use pattern with strong ties to riverine and riparian environments. Remnants of tribal villages, gathering areas, ceremonial grounds, historic mining complexes, homesteads, and trails are all alongside streams. Many of the tribes who have inhabited this land for generations have expressed an interest in the *Aquatic Restoration Project*, as a possible means to rehabilitate resource areas, which have suffered in recent years.

On September 28, 2018, the California Department of Fish and Wildlife (CDFW), in compliance with PRC section 21080.3.1, provided official notification to 24 federally recognized tribes in Northern California.

This letter stated CDFW's consideration of using the Aquatic Restoration draft EA in the place of an environmental impact report or negative declaration pursuant to CEQA Guidelines section 15225.

Scoping

The *scoping* process informs the agencies regarding relationships between the maintenance of high-quality ecological systems and the general welfare of the people of the state, including enjoyment of the natural resources (CEQA §21000(c)). The Forest Service initiated the scoping period from July 2, 2015, to August 3, 2015. On July 2, 2015, a summary of the Proposed Action and maps were mailed letters and/or emailed to 327 individuals and groups, including federal, state and local agencies, tribes, nearby property owners, advocacy groups and interested public. On July 9, 2015, the Proposed Action information and maps were available on the SRNF Schedule of Proposed Actions (SOPA) for public review, inviting comments. The forest received eight (8) letters/emails during the scoping period. Seven (7) of these letters specifically expressed support for the programmatic approach. Several comments acted to modify the Proposed Action, discussed in *Chapter 2* in detail.

During 2017 and 2018, the Forest Service continued to reach out to the public through the SRNF's social media sites (i.e., Facebook and Twitter) and informally through partners. On April 30 2018, the forest sent an email to interested parties and agencies announcing the preparation of the draft EA.

Significant Issues

The Forest Service is required to make a determination on whether a project may have significant effects on the environment based on substantial evidence in light of the public comments, facts, scientific evidence and expert opinion. Upon review of the public comments and the whole record, there were no significant issues identified or potential for significant effects associated with implementing the Proposed Action (modified). The evaluation for the rationale determining there would be no potential for significant effects is disclosed in the FONSI, with consideration for the context and intensity of effects (40 CFR 1508.27(b); CEQ §15064)

Non-Significant Issues

Non-significant issues were defined by the interdisciplinary team (IDT) as those 1) outside the scope of the Proposed Action; 2) already decided by law, regulation, forest plan, or other higher-level decision; 3) irrelevant to the decision to be made; 4) conjectural and not supported by scientific or factual evidence; or 5) the comment could not be phrased as a cause-effect relationship. NEPA regulations explain this delineation in §1501.7, "…identify and eliminate from detailed study the issues, which are not significant or which have been covered by prior environmental review… (§1506.3)." Non-significant issues considered outside the scope are addressed in the response to scoping comments under the description of Alternative 2 in *Chapter 2*.

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Chapter 2. Alternatives Considered in Detail

The agencies are required to study and develop a no action/no project alternative, along with action alternatives to the Proposed Action, in the event the Proposed Action involves unresolved issues or conflicts concerning alternative uses of available resources (40 CFR 1501.2(c); California Public Resources Code (CPRC) §21083), and/or instances, whereby significant impacts can be feasibly avoided or mitigated. The initial study and consideration of public comments received during collaboration and the 30-day scoping period did not reveal any potential for significant impacts, unresolved issues or conflicts. Therefore, the Forest Service prepared the No Action alternative (Alternative 1) and the Proposed Action (Alternative 2) in preparation of the *Six Rivers National Forest Aquatic Restoration Project* (*Aquatic Restoration Project*) *Draft Environmental Assessment* (draft EA), as described below.

Alternative 1 – No Action/No Project

The No Action alternative provides a baseline for comparing predicted effects of the modified Proposed Action. It represents the environmental setting of the baseline physical conditions to determine whether the Proposed Action (modified) would have significant effect(s).

Under the No Action alternative, proposed restoration activities under Alternative 2 would not occur. The current limited pace and scale of essential restoration project work on the Six Rivers National Forest (SRNF or forest) to aid in the recovery of threatened and sensitive fish species would continue, as district staff develop projects and secure funding and secure resources to fulfill legal mandates for individual notice and comment, National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) requirements, biological evaluations (BE)/biological assessments (BA) consultation, and heritage compliance with §106 of the National Historic Preservation Act of 1966 (NHPA).

Alternative 2 – Proposed Action (Modified)

Alternative 2 would implement a suite of phased, forest-wide instream and riparian restoration activities to maintain, enhance, and restore instream processes benefitting aquatic species, riparian habitats and water quality. Alternative 2 aims to restore connectivity and enhance instream spawning and rearing habitat, and increase complexity of riparian areas solely to improve instream and riparian conditions for all life stages of salmonids and other aquatic species.

The project area includes fish bearing streams, riparian areas, ponds and lakes. It encompasses a maximum of 1,234 stream miles of fisheries spawning, rearing, and over-wintering habitats associated with the Smith, Klamath, Trinity, Salmon, Mad, North Fork Eel and Van Duzen rivers and their tributaries as well as 1,156 acres of lakes and ponds. The proposed suite of riparian and in-stream restoration activities would be implemented. The extent and intensity of the individual project activities within and alongside the 1,234 stream miles and associated riparian areas would typically be less than 5 acres, completed over a few days or a couple of weeks, and spread throughout the forest to avoid

measurable impacts and potential for significant impacts. Within the project area, a combination of manual and heavy equipment methods would occur within and alongside approximately 35 stream miles at specific sites identified through collaboration (*Appendix D*). Along the remaining 1,199 stream miles, manual methods would occur at specific sites informed and identified by stream surveys. Manual restoration techniques would occur within and around ponds and lakes, with the exception of Fish Lake on the Orleans Ranger District (RD), which may require the use of heavy equipment.

Alternative 2 aims to rectify and compensate for past natural and human-caused disturbances (i.e., impacts) to aquatic and riparian resources, regardless of the disturbance agent (e.g., floods, landslides, unmanaged recreational uses). Proposed activities would repair, rehabilitate and restore the environment, and compensate for past disturbances by replacing or providing substitute resources or environments to eliminate impacts over time. Invasive plant species management (i.e., Climate change is a known threat to the recovery of listed salmonids per the *2014 Southern Oregon/ Northern California Coast (SONCC) Recovery Plan*. Climate change would likely alter water runoff patterns, lower summer flows and intensify storms to increase peak flows, with detrimental effects to SONCC coho salmon populations in freshwater habitats (Barr et al. 2010; Kiparsky and Gleick 2003; Furniss et al. 2013). The most effective response to a changing climate is a renewed commitment to watershed restoration. Habitat restoration can play an important role in offsetting the effects of climate change, although results suggest that most expected climate impacts cannot be entirely mitigated (Battin et. al 2008; Beechie et al. 2010).

Project Development and Design

Alternative 2 incorporates resource-specific General Aquatic Conservation Measures (GACMs) and project design criteria (PDC) from the *Watershed and Fisheries Restoration Program Biological Assessment* (WFRPBA) and corresponding biological opinion (BO) from the National Marine Fisheries Service (NMFS 2015) to optimize the response to the Purpose and Need for the Proposed Action and avoid significant impacts (*Appendix A*). *Appendix B* lists additional mitigations, pertinent water quality and invasive species best management practices, and monitoring considerations. Design features for wildlife, botany, cultural resources and recreation are located in *Chapter 2*.

The following provides highlights on how the design of Alternative 2 acts to avoid significant impacts to key resources:

- **Endangered Species Act (ESA):**
    - **ESA-Listed Fish and their Designated Critical Habitat (CH):** The application of GACMs and project design features (PDF)/PDC align with those described in the WFRPBA and corresponding BO from the NMFS (2015), incorporated by reference. These design criteria supplement the most recent version of California Department of Fish and Wildlife's (CDFW) Fisheries Restoration Grant Program (FRGP) minimization measures.
    - **ESA-Listed Wildlife Species and their Designated Critical Habitat (CH):** Design features to mitigate impacts to northern spotted owl (NSO) and marbled murrelet (MAMU) and their respective CH are found in the resource-specific PDFs and in the

Aquatic Restoration Wildlife Biological Assessment (BA) submitted to US Fish and Wildlife Service (USFWS). The wildlife biologist would review all projects to ensure suitable habitat for these species would not be removed or downgraded.

- **Special Habitat Management Areas** are intended to provide a core of relatively natural, undisturbed habitat for plants and animals associated with mature and old growth forests including ESA-listed NSO and MAMU. This management area (MA) also consists of special provisions for peregrine falcon, bald eagle and late-successional reserves (LSR), wetlands and floodplains, and botanical areas with unique geologic features, tree and plant species. Design features were developed for NSO and MAMU through the consultation process with USFWS. Project design features were also developed for activities that may occur in occupied bald eagle, northern goshawk or peregrine falcon nest territory or occupied bald eagle winter roost sites. Besides full avoidance, the PDFs target restricting noise disturbance, habitat removal and ground disturbances to avoid the potential for significant impacts, described comprehensively.
- **Project Implementation Process and Checklist** (*Appendix C*) requires that each site-specific project go through an interdisciplinary review process to ensure other resource-specific PDFs and mitigations (best management practices (BMPs) and limited operating periods (LOPs)) that avoid significant impacts would also be fully incorporated into the site specific project development through an IDT process. The combination of the GACMs, PDCs/PDFs and the mitigations would effectively avoid or reduce unintended effects so there is no quantifiable adverse impacts while still meeting the Purpose and Need.

The manual and heavy equipment instream and riparian reserve restoration activities proposed under Alternative 2 aim to leverage benefits of prior instream and upland restoration work[4], ESA consultation, and NEPA and CEQA administrative review processes to support future funding opportunities. For these reasons, this jointly funded endeavor by the Mid Klamath Watershed Council (MKWC), USDA Forest Service (Forest Service), and the California Natural Resources Agency (CNRA) provides an increased opportunity for collaboration. The grant funding not only provides for the completion of federal and state agency environmental procedures; it also supports the collaborative development of an *Aquatic Restoration Action Plan* (ARAP) after the NEPA decision has been signed. The ARAP entails convening participating programs, agencies and stakeholders to develop consensus goals and objectives for aquatic restoration and would include existing resource conditions identified through field assessments. The objective is to escalate species conservation, meet tribal trust responsibilities, and obligations to local communities and interest groups.

[4] Prior instream and upland restoration work began in the 1980s, including efforts by SRNF staff in partnership with CDFW biologists. Boulders and large conifers were placed in stream channels to provide cover for fish and habitat complexity, primarily along tributaries of the Middle and South Fork of the Smith River, Willow and Horse Linto creeks on the Trinity River, and Bluff and Red Cap creeks on the Klamath River. The Proposed Action would complement completed upland watershed restoration work, including over 462 miles of roads decommissioned, 400 landslides stabilized and 197 main arterial road systems upgraded to address known sediment sources to enhance habitat quality. Between December 2017 and July 2018, the SRNF authorized 7,231 acres of fuels reduction and fire restoration.

Figure 2-1. Large woody material that could be utilized to create complex wood structures. Horse Linto Creek, Lower Trinity RD, SRNF. Photo courtesy of Ely Boone.

The scope of the Proposed Action has evolved since its inception in 2013, influenced by public feedback and ideas. The following recommendations were included in the Proposed Action as presented during the scoping period in 2015:

- Non-mechanized restoration activities in wilderness areas associated with identified fish bearing streams;
- Restoration activities for non-anadromous fish and other aquatic species found in natural ponds and lakes;
- Restoration and cleanup of illegal cannabis grow operations that may be impacting the quantity and quality of water, as well as aquatic species and their associated habitat;
- Restoration actions on private lands based on voluntary owner interest, as allowed under the Wyden Amendment; and
- Maintain brush structures in Ruth Reservoir in support of warm-water fisheries.

Modifications to the Proposed Action in Response to Public Scoping Comments

In 2018, the Forest Service modified the Proposed Action, after additional IDT input and reconsidering the comments received prior to the 30-day scoping period, the scoping comments received, while concurrently reviewing the preliminary analysis prepared thus far. Table 2-1 describes the scoping comments received for the *Aquatic Restoration Project* in no priority order, followed by a response indicating if it acted to modify the Proposed Action or not. In the event the comment did not act to modify the Proposed Action, the response provides further clarifications of the proposed planning process and project design.

Table 2-1. *Aquatic Restoration Project* comments received in response to the 30-day scoping period, followed by responses.

Scoping Comment	Response
Include restoration of fire ecosystems and road decommissioning.	The scope of this Proposed Action targets restoration of solely instream and riparian areas, so vegetation/fuels management and road decommissioning is outside the scope of the Purpose and Need. The restoration of fire ecosystems would occur under separate environmental analyses. Road decommissioning is occurring under existing decisions with additional NEPA analysis identified in the future.
Concern over the potential of disease entering the stream system through adding nutrients (i.e., carcasses).	The placement of salmon carcasses or carcass analogs (i.e., processed fish cakes) in stream channels was excluded due to the uncertainty for contamination, acting to modify the Proposed Action.
Consider time of year given the different life cycles of aquatic species and the variable water conditions of different seasons.	Each restoration project would be subject to the interdisciplinary *Aquatic Restoration Project* development, review and compliance process, prior to implementing ground-disturbance operations. This allows for flexibility in design, placement and timing to account for changing conditions associated with future natural events (e.g., fires and floods), or where resource damage is occurring or has the potential to occur. The Responsible Official (RO) shall review and approve (signature) compliance documentation before any on-the-ground restoration work may occur. The signature indicates the RO has determined the project has been thoroughly vetted through the IDT process, public input sought and considered, tribal consultation completed, and partner agency concurrence sought based on level of impacts.
Improve available upslope water sources for livestock. Where streamflow is an issue, ensure water is not being pumped out of the stream channel during low-flow period (possibly storage tanks with winter/spring pumping).	Improvements to upslope water sources for livestock is outside the scope of the Purpose and Need, unless the water source is within the proposed project area (i.e., 300-foot buffer around fish bearing streams and all lakes) and improvements would be consistent with the proposed activities and design.
Concern over channel adjustment occurring post restoration that could affect streambanks, bridges and potential to disturb associated cultural properties.	The potential for affecting streambanks and downstream bridges, which in turn could impact cultural resources, would be identified and channel adjustment would be avoided as part of the site-specific project development. The IDT discussed methods explicitly to mitigate these potential impacts.
Add two (2) new project locations within the Klamath watershed were included under Alternative 2.	These two (2) sites were included to modify the Proposed Action.
Include removal or redistribution of mine tailings, if tailings are impeding the stream's access to the floodplain and establishment of riparian vegetation.	The agency recognizes and appreciates public concerns for environmental impacts of mining as part of the aquatic restoration strategy. Independent efforts serve to address the design and environmental analysis complexity linked to the excavation and removal of mine waste from stream channels, banks, terraces and lower hill slopes, stabilization and revegetation of mines and associated waste areas, transportation of waste materials to safe impoundment areas, and capping of impoundments with soil and vegetation. However, within the 300-foot buffer, riparian revegetation, bank stabilization and invasive species management would occur under the scope of the modified Proposed Action (including all design features) at non-active mine locations not subject to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly known as Superfund, enacted in 1980.
Consider chemical contamination of wood from illegal cannabis grows and the need to keep large wood on site for microhabitat conditions.	Large wood from illegal grows is identified as a potential source for instream restoration and design features were developed to address these concerns. The initial scoping document included a specific activity to reduce the impacts related to illegal cannabis grows. Since the initial scoping occurred, efforts from law enforcement and partners have been actively restoring illegal sites. Proposed activities such as streambank stabilization and riparian restoration could still be implemented where illegal cannabis grows that overlap the project area.
Add a description of the compliance review process in the EA to ensure design features are tailored to localized conditions: 1) Review and consideration of most current best available science; 2) Conduct necessary field review, accounting for the seasonal nature of some surveys for wildlife, cultural resources etc.; and 3) Continue collaboration with partners and tribes.	Consultation with National Marine Fisheries Service on the Watershed and Fisheries Program (2015) required a compliance review process. Through the development of the draft EA, this process was modified and incorporated into the draft EA (*Appendix C*). In addition, grant funding received supports the collaborative development of an *Aquatic Restoration Action Plan* (ARAP). The ARAP entails convening participating programs, agencies and stakeholders to develop consensus goals and objectives for aquatic restoration in SRNF and would include existing resource conditions identified through field assessments.

Description of the Proposed Activities

The Proposed Action (modified) would be implemented through a programmatic strategy to optimize community collaboration, implement effective designs to benefit multiple resources and to avoid significant effects, and mitigate minor unavoidable effects. The proposed suite of individual restoration activities listed below would be selected from to meet site-specific objectives within the Smith, Klamath, Salmon, Trinity, Mad, Van Duzen and Eel watersheds would by incrementally implemented, using a suite of manual and heavy equipment methods. The individual proposed activities would avoid significant effects by incorporating aquatic, wildlife, botany, invasive species, cultural resources and recreation design features and mitigations through the interdisciplinary review process (*Appendix C*).

This project implementation process is designed to not only avoid or reduce negative impacts to resources, but design for potentially beneficial outcomes for these resources. Recently released technical guidance, *USDA Guidance for Stream Restoration* (Yochum 2018), provides a bibliographic repository of information to assist with the collaborative process of planning, analyzing, and designing site-specific stream restoration projects, including information on the effectiveness of project designs.

The suite of proposed activities would be implemented within fish bearing streams as well as ponds and lakes. Heavy equipment would occur only where there is existing equipment access, and, for the most part, along stream reaches where past restoration actions have occurred. During outreach and public involvement, these potential activities and locations reviewed and recommended by stakeholders were brought forward as part of the Proposed Action.

The following provides a description of the activity categories proposed under Alternative 2, responsive to the purpose and need and public comments:

Fish Access to Habitat/Habitat Connectivity

1. **Fish Passage Restoration:** Reconnecting downstream movement of habitat components (e.g., instream/flow related, weir modification) by providing physically unobstructed routes to areas critical in fulfilling all life stages of aquatic and riparian-dependent species. These restoration activities are designed to improve passage for most aquatic species by modifying the barrier(s) by hand (e.g., using a chainsaw to buck logs, and movement of sediment particles, logs, and a portion of the obstruction with a grip hoist, blocks and cables). Natural barriers (e.g., boulder barriers that move during high flows), that in the past have allowed for salmon and steelhead passage, would be considered for improvement. Restoration activities would address non-salmonid fish passage for other aquatic species, including Pacific lamprey and salamanders. After annual site inspections, this type of restoration activity would be done on an as needed basis and would incur the minimum amount of stream channel reconfiguration needed to achieve the effective aquatic species passage.

Instream Habitat Enhancement

2. **Large Wood and Boulder Placement** (e.g., adding wood and/or boulders, engineered log jams, boulder weirs): These restoration activities would occur in stream channels and adjacent floodplains to increase channel stability, rearing habitat, pool formation, spawning gravel deposition, channel complexity, hiding cover, low-velocity areas, and floodplain function. Equipment such as helicopters, excavators, dump trucks, front-end loaders, full-suspension yarders, and similar equipment may be required. Large wood (LW) could come from existing riparian sources (see p. 50) or brought in from off-site sources via trucks or helicopters.

Figure 2-2. A functioning and dynamic large woody debris jam consisting of large and small wood. Monkey Creek, Smith River NRA/Gasquet RD. USDA Forest Service photo.

The role of wood in creating aquatic and riparian habitat has led many regulatory agencies and fisheries advocates to recommend the reintroduction of large wood. The methods and manner in which wood is reintroduced would differ based on hydro-geomorphic conditions and project goals. In 2016, the Bureau of Reclamation and the US Army Engineer Research and Development Center developed a *National Large Wood Manual: Assessment, Planning, Design, and Maintenance of Large Wood in Fluvial Ecosystems: Restoring Process, Function, and Structure.* Using manuals like this to assess, design, and manage wood projects to restore streams would result in a higher success. By understanding the geomorphology, hydraulics, and geotechnical aspects of a project and with good engineering, stable wood structures can be designed for various situations and longevity. In many situations, it may be desirable to place wood that can move, but designers should understand the fate and function of such programs. In the end, it is stable wood that most directly benefit restoration, and the underlying goal of wood projects should be to restore the function of wood until riparian forests are able to supply the large trees that can sustain those functions.

3. **Legacy/Existing Structure Improvements or Removal** (e.g., instream enhancements, water-flow controls/diversions): These restoration activities would reconnect stream corridors, floodplains and estuaries; reestablish wetlands; improve aquatic organism passage; and restore more natural channel and flow conditions. Activities would include adding components and modifying those existing legacy structures that are no longer functioning properly (e.g., fenced rock gabions or log weirs that have undercut and may be a low-flow barrier to juvenile salmonids). This would be accomplished by removing or modifying channel-spanning weirs and existing habitat structures involving earthen embankments, subsurface drainage features, outfalls, pipes, instream flow redirection structures (e.g., drop structure, gabion, groin), or similar devices used to control, discharge, or maintain water levels. Equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

Figure 2-3. Previous restoration work completed on Cedar Creek, Lower Trinity RD. Gabion basket (cyclone-fencing baskets filled with rocks) in forefront with rebar-pinned full spanning large wood structures in background. Photo courtesy of Ely Boone.

Water diversions require a special use permit for infrastructure crossing National Forest System (NFS) lands. Improvements to these diversion sites would decrease impacts to water quality and potentially water quantity. Water diversion intake and return points may be redesigned—to the greatest degree possible—to prevent all native fish life stages from swimming or being entrained into the diversion. Abandoned ditches and other similar structures would be plugged or backfilled to prevent fish from swimming or being entrained into them, as well as to reduce water from being diverted and introducing sediment into a stream channel. When making improvements to pressurized diversions, installation of a totalizing flow meter capable of measuring rate of water use would occur. For non-pressurized systems, installation of a staff gauge or other measuring device capable of measuring instantaneous rate of water flow would occur. Multiple existing diversions may be consolidated into one diversion, as long as there is new instream construction or structures and if the consolidated diversion is located at the most downstream existing barrier.

4. **Beaver Habitat Restoration** (installing structures to mimic beaver-created habitat): This restoration activity includes installation of in-channel structures to encourage beavers to build dams in incised channels and across potential floodplain surfaces. The dams are expected to entrain substrate, aggrade the bottom, and reconnect the stream to the floodplain. Like natural beaver dams, these beaver dam analogs (i.e., beaver dam support (BDS) structures or post-assisted woody structures (PAWS)) are temporary features on the landscape. These structures are intended to aid in the development of beaver dams where beavers are present. In addition, like streams with beaver colonies, multiple placements of these analogs are important to increase the overall system resilience and not count on any one resulting dam (Pollock et al. 2015). Most work would be accomplished by hand; however, use of equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

Figure 2-4. Wood showing signs of beaver activity even when beaver dams are not present. USDA Forest Service photo by Andrea McBroom.

5. **Gravel Augmentation** (clean weed-free gravel from existing approved sites): This restoration activity would place gravel directly into the stream channel, at tributary junctions, or other areas in a manner that mimics natural debris flows and erosion. Augmentation would only occur in areas where the natural supply has been eliminated, significantly reduced through anthropogenic disruptions, or used to initiate gravel accumulations in conjunction with other projects, such as simulated logjams and debris flows. Gravel to be placed in streams shall be a properly sized gradation for that stream, clean, and non-angular. When possible, use gravel of the same lithology as found in the watershed. Crushed rock is not permitted.
6. **Off- and Side-Channel Habitat Restoration:** These restoration activities would be designed to reconnect past side channels with floodplains by removing off-channel fill and plugs. Furthermore, new side channels and alcoves may be constructed in geomorphic settings that would accommodate such features. This activity category typically applies to areas where side channels, alcoves, and other

backwater habitats have been filled or blocked from the main channel, disconnecting them from most if not all flow events.

Riparian and Streambank Restoration

7. **Streambank Restoration**: These restoration activities would improve streambank condition by stabilizing streambanks, including small landslides with appropriate site-specific techniques. Reduction of streambank sediment input would improve fish habitat and fish survival by increasing fish embryo and alevin survival in spawning gravels, and minimizing the loss of, or reducing the size of, pools from excess sediment deposition. Streambanks that are currently eroding fine sediments into the channel would be protected through the placement of boulders, logs and native plant material to deflect flows away from raw banks until revegetation would occur. Activities would include bank shaping and installation of biotechnical slope protection and erosion control measures such as coir logs or other soil reinforcements as necessary to support riparian vegetation; planting or installing large wood, trees, shrubs, and herbaceous cover as necessary to restore ecological function in riparian and floodplain habitats; or a combination of the above methods. Equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used.

Figure 2-5. Habitat inventory on Myrtle Creek, Smith River NRA/Gasquet RD. Inventories like this one help identify places that may need streambank stabilization. USDA Forest Service photo.

8. **Riparian Vegetation Treatment.** These restoration activities would include planting of native riparian species that would occur under natural disturbance regimes, girdling alders to promote conifer growth, and, cutting of small trees (up to 9 inches dbh (diameter at breast height)) to maintain existing meadows within the project area. Activities may include planting conifers, deciduous trees and shrubs; placing sedge and/or rush mats; and gathering and planting willow cuttings. Species planted would be the same species that naturally occur in the project area. The removal of non-native vegetation and construction of temporary enclosures (i.e., fencing) may occur in the event deer, elk, and livestock grazing could compromise survival. To rectify damage from past and future flood events, girdling of alders—a technique used to suppress and then stop the growth of a living tree without felling it among other healthy plants—may be used to accelerate conifer growth in areas to promote shade and future woody recruitment. The resulting benefits to the aquatic system would include desired levels of stream shade, bank stability, stream nutrients, large wood inputs; increased grasses, forbs, and shrubs; and reduced soil erosion. The majority of the projects would be accomplished with manual tools; however, equipment such as excavators, backhoes, dump trucks, power augers, could occur in areas allowing heavy equipment.

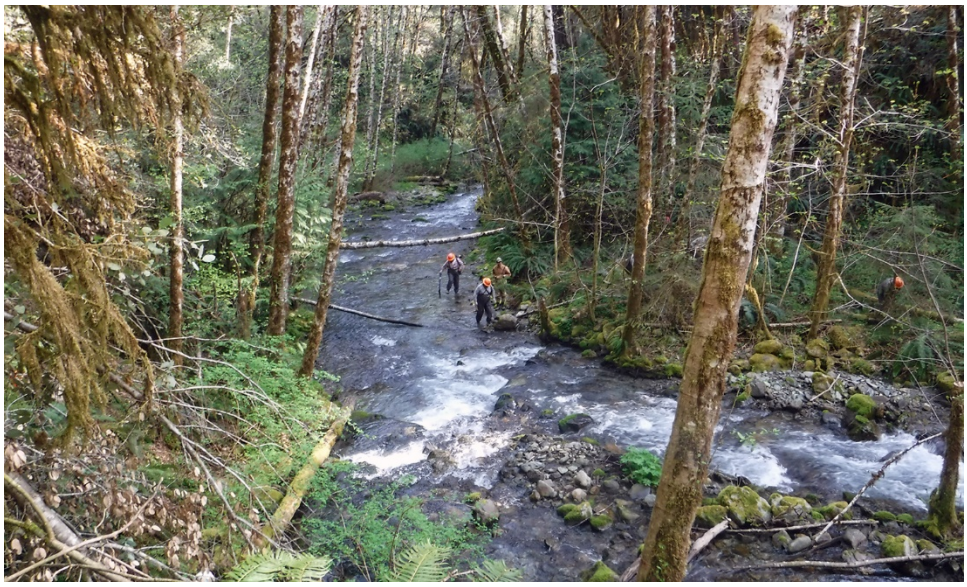

Figure 2-6. Alders along Little Jones Creek, Smith River NRA/Gasquet RD. USDA Forest Service photo.

9. **Non-Native Invasive Plant Control.** This activity includes removing and managing invasive non-native plants within riparian areas. This activity would aim to restore the composition, structure, and abundance of native riparian plant communities important for bank stability, stream shading, large wood and other organic inputs into streams, all of which are important elements to fish habitat and water quality.

   Project activities accomplished with field crews using hand tools or hand-held motorized equipment (manual methods) would remove localized invasive plant populations, including their root systems. Methods to eradicate vegetation would vary, either through hand cutting or mowing to temporarily

reducing the size and vigor of plants. Where invasive plant cover is relatively high and extensive (e.g., Himalayan blackberry), the use of heavy equipment, such as backhoes with brush rakes and trucks for hauling, could occur in areas where heavy equipment is allowed. Depending on the findings from site-specific resource surveys, management could also include revegetation with native, riparian shrubs, planting trees, and placing down logs or other native debris to block motorized access.

10. **Reduction/Relocation of Recreation Impacts.** These restoration activities are designed to adjust dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation Strategy (ACS) objectives by restoring impacted riparian vegetation, streambank stability and reducing sedimentation into adjacent streams. Examples of project activities include managing visitor access within riparian areas in the project area to reach dispersed campsites, rivers and lakes; placing educational signing; restricting or redirecting motor-vehicle and foot traffic using logs, boulders or other natural features; constructing fences; increasing maintenance, including trash removal from rivers and streams; relocating fire rings, picnic tables, and other temporary dispersed features if causing resource damage, excluding developed facilities and NFS trails. Manual tools would be primarily used although mechanized equipment, such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used in developed sites.

Other – Resident Fish and Aquatic Species

The SRNF watershed and fisheries program also has responsibilities to native resident fish, other aquatic species, and for desired warm water game fish and their habitats. Most resident cold-water species are found either co-located with anadromous fish, or are found higher in the watersheds above anadromous salmonid barriers. Activities under Alternative 2 would also target habitat restoration and enhancement for other water bodies with native non-salmonid aquatic fish and wildlife species:

11. **Resident Aquatic Species Pond and Lake Enhancement** (improve habitat for western pond turtles, remove invasive species). The restoration activities would provide for invasive weed removal in natural lakes and ponds, installation of western pond turtle basking platforms, and eradication of bullfrog/non-native aquatic species through non-chemical methods (e.g., seining, draining) of natural and artificial (livestock) ponds and or screening. Pond levels may be lowered to aid in removal of non-native species would occur. Wood used in pond enhancement would follow all design features related to stream improvement. Implementation of these types of projects would involve use of hand tools, including chainsaws, and hand labor.

Figure 2-7. Western pond turtle at Ammon Ranch, Lower Trinity RD. USDA Forest Service photo by Jamie Bettaso.

12. **Maintain or Enhance Brush Structures in Ruth Lake:** These restoration activities would enhance habitats and improve recreational fisheries in Ruth Lake (Matthews Dam) and in natural lakes, where fishing is allowed. Implementation of these types of projects would involve use of hand tools, including chainsaws, and hand labor.

All proposed activities are based on the driving natural processes and an identified need to restore aquatic habitats. Table 2-2 provides a matrix displaying the relationships between the proposed activities by aforementioned number listing, ecosystem feature, natural driving process, and ACS objectives. The proposed restoration activities are primarily at the watershed and stream-reach scale that control delivery of sediment, water, organic matter, nutrient and chemicals, light and heat, and biota from the surrounding environment into floodplains and stream channels (Beechie 2010), in alignment with SONCC coho salmon and multispecies recovery action items and the WFRPBA (USDA 2015). Table 2-3 is the result of all surveys, collaboration and public meetings, and displays the opportunities to meet the Purpose and Need in each 5th-field watershed.

Table 2-2. Natural Driving Processes and links to ACS Objectives and Alternative 2.

Ecosystem Features	Natural Driving Process (Beechie et al. 2010)	Aquatic Conservation Strategy Objectives	Alternative 2[5]
Watershed Scale			
Sediment	Sediment delivered to river systems through land sliding, surface erosion and soil creep.	Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.	7, 10
Hydrology	Runoff delivered to streams through surface and subsurface flow paths.	Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.	3, 6
Organic matter	Tee fall and leaf litter fall.	Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation.	8-9
Light and heat	Solar insolation and advective heat transfer to water column.	Maintain and restore species composition and structural diversity of riparian plant communities to provide summer and winter thermal regulation.	8-9
Nutrients	Delivery of nutrients via groundwater flow.	Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing.	6, 8
Biota	Migration of aquatic organisms, seed transport.	Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian species.	1-2, 4-5, 11
Reach Scale			
Channel morphology and habitat structure	Channel migration, bank erosion, bar formation, and floodplain sediment deposition create a dynamic mosaic of main-channel, secondary-channel, and floodplain environments. Wood recruitment results in part from bank erosion and channel migration, and wood accumulations reduce bank erosion rates or enhance island formation. Sediment and wood transport and storage processes drive channel cross-section shape, formation of pools, and locations of sediment accumulation. Bank reinforcement by roots reduces bank erosion rates and may force narrowing and deepening of channels. Animals such as beaver physically modify the environment creating new habitats.	Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations. Maintain and restore species composition and structural diversity of riparian plant communities to provide for channel migration and amounts and distributions of woody debris to sustain physical complexity and stability.	1-10
Thermal regime	Local stream shading and exchange of water between surface and hyporheic flows regulates stream temperature at the scale of habitat units and reaches.	Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation	2, 4, 8, 11

[5] See pages 30 to 37 for activities.

Ecosystem Features	Natural Driving Process (Beechie et al. 2010)	Aquatic Conservation Strategy Objectives	Alternative 2[5]
Water chemistry	Delivery of dissolved nutrients through groundwater and hyporheic exchange; uptake of nutrients by aquatic and riparian plants. Delivery of pesticides and other pollutants at point sources damage health and survival of biota.	Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of nutrient, routing.	4, 8-9
Riparian species assemblages	Seedling establishment, tree growth, succession drive reach-scale riparian plant assemblages.	Maintain and restore species composition and structural diversity of riparian plant communities to provide summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of woody debris to sustain physical complexity and stability.	2, 8-9
Aquatic species assemblages	Photosynthesis drives primary production of algae and aquatic plants. Leaf-litter inputs drive detritus based food web strands. Habitat selection, predation, feeding, growth, and competition drive species composition of invertebrate, amphibian, and fish assemblages.	Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.	2-4, 6, 8, 11

Table 2-3. Potential stream project activities by targeted species and watershed.

Watershed	Potential Restroation – Stream Miles	Heavy Equipment – Stream Miles	Manual – Stream Acres	Heavy Equipment – Stream Acres	Lake – - Acres	Fish Access to Habitat	Large Wood/Boulder Projects – Heavy Equipment	Large Wood Projects – Hand Treatment	Legacy/Historic Structure	Beaver Habitat Restoration	Off-Side Channel Habitat Restoration	Streambank Restoration	Riparian Vegetation – planting	Riparian Vegetation – girdling	Non-native invasive plants	Reduction of Recreation Impacts	Lake/Pond Restoration
	Miles	Miles	Acres	Acres	Acres												
Smith River	29	0.0	777	0	0	Y[6]	N/A[7]	Y	N/A	Y	N/A	Y	Y	Y	Y	Y	N/A
North Fork Smith River	70	0.0	1,633	0	24	Y	N/A	Y	N/A	Y	P[8]	Y	Y	Y	Y	Y	Y
Middle Fork Smith River	113	10.0	2,840	108	88	Y	Y	Y	Y	Y	P	Y	Y	Y	Y	Y	Y
South Fork Smith River	211	4.0	5,840	43	158	Y	Y	Y	Y	Y	P	Y	Y	Y	Y	Y	Y
Ukonom Creek-Klamath River	26	0.0	816	0	127	Y	N/A	Y	N/A	P	P	Y	Y	Y	Y	Y	Y
Rock Creek-Klamath River	59	3.0	1,986	305	50	Y	Y	Y	Y	P	Y	Y	Y	Y	Y	Y	Y
Bluff Creek-Klamath River	187	8.0	5,471	195	177	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Dillon Creek	21	0.0	666	0	55	Y	N/A	Y	N/A	P	P	Y	Y	Y	Y	Y	Y
Wooley Creek	63	0.0	2,019	0	174	Y	N/A	Y	N/A	P	P	Y	Y	Y	Y	Y	Y
Salmon River	25	0.2	734	25	30	Y	Y	Y	Y	P	Y	Y	Y	Y	Y	Y	Y
Blue Creek	70	0.0	2,162	0	63	P	N/A	P	N/A	P	P	Y	Y	Y	Y	Y	Y
Turwar Creek-Klamath River	2	0.0	65	0	6	P	N/A	P	N/A	P	P	Y	Y	Y	Y	Y	N/A
Big French Creek-Trinity River	15	1.0	433	23	0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N/A
Horse Linto Creek-Trinity River	117	2.0	3,317	46	27	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Lower South Fork Trinity River	76	1.0	1,964	21	78	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Upper Mad River	32	0.0	896	0	29	P	P	Y	P	N/A	N/A	Y	Y	N/A	Y	Y	Y
Middle Mad River	28	0.0	702	0	6	P	N/A	Y	Y	P	N/A	Y	Y	P	Y	Y	Y
North Fork Eel River	86	2.0	2,018	39	7	P	N/A	Y	Y	N/A	N/A	Y	Y	P	Y	Y	Y
Dobbyn Creek	0	0.0	0	0	26	N/A	N/A	P	N/A	N/A	N/A	P	P	N/A	Y	Y	Y
Upper Van Duzen River	30	4.0	789	121	23	P	Y	Y	N/A	P	P	Y	Y	P	Y	Y	Y
Lower Van Duzen River	6	0.0	149	0	8	P	N/A	P	P	N/A	N/A	P	P	N/A	Y	P	Y

[6] Y = Yes, opportunities exist.
[7] N/A = Activity unlikely in watershed.
[8] P = Potential, surveys required.

Upper Limits on Actions

Due to the programmatic, large-scale nature of Alternative 2, the Forest Service as the lead agency considered the potential for direct physical changes to the environment from operations, along with past and reasonably foreseeable indirect physical changes to the environment. The Forest Service incorporated a key design feature from the *Watershed and Fisheries Restoration Program* (WFRP) consultation (WFRPBA 2015), which entails setting annual project limits of the number of projects (Table 2-4). These limits address the potential for negative cumulative effects of sediment and potential for harassment of ESA-listed salmonids. Ultimately, the number and types of activities would likely to be substantially below these thresholds (Table 2-4), based on other resource design features, opportunities, current staffing levels and projected funding.

However, these maximum thresholds or limits would provide for spatial and temporal flexibility during the site-specific project development and implementation process (*Appendix C*), to accommodate local site conditions, life cycles, seasonal influences, future natural disturbances, private land actions, etc. Prior to individual operational design efforts, a review of all ongoing and foreseeable actions would occur to ensure no significant cumulative impacts would occur.

Table 2-4. Upper limits of activities.

Restoration Activity	Annual Project Limit per 5th-Field Watershed (WFRPBA)
Instream	
• Fish passage projects: involve modification of legacy structures or modifying creek mouths for access to cool water refugia.	• 1 sites: heavy equipment. • 5 sites: handcrews.
• Large wood and boulder placement: LW from on site (see Wildlife PDFs) or brought in via existing access or helicopter.	• 2 sites: heavy equipment. • 5 sites: handcrews. • Wildlife PDFs and surveys/approval. • Botany surveys/approval.
• Existing/legacy structure modification or removal	• 2 sites: heavy equipment. • 5 sites: handcrews.
• Beaver habitat enhancement	• 2 sites: reaches, no more than 1,000 feet. Combination heavy equipment and handcrews.
• Gravel augmentation	• 1 site: heavy equipment.
• Off- and side-channels: potential reaches for these identified on the maps and primarily occur in the Klamath-Trinity.	• 2 sites: combination heavy equipment and handcrews.
Riparian and Streambank Restoration	
• Restore streambank conditions: by stabilizing eroding, compacted and barren area and realignment/reconstruction of streambanks to reduce sedimentation degrading fish habitat and fish survival.	• 3 sites: combination heavy equipment and handcrews. • Not for mitigation for other disturbance.
• Reduction/relocation of recreation impacts	• 2 sites: heavy equipment • 5 sites: handcrews • Each site typically less than ¼ acre.
• Riparian/Vegetation activities • Planting (including landslides) • Alder girdling: Individual locations would be small patches (0.5 acres) separated by untouched areas. • Meadow enhancement/protection	• 100 sites: all handcrews.

Restoration Activity	Annual Project Limit per 5th-Field Watershed (WFRPBA)
• Non-native invasive plant control: A site would typically range from ¼ acre up to 2 acres with patchy ground disturbance.	• 25 sites: heavy equipment where applicable on existing access roads and routes and manual (including planting) removal in other riparian settings.
Resident Aquatic Species – Stream and Lake	
• Manual invasive species (plant and animal) removal in natural lakes and ponds. • Installation of western pond turtle basking platforms. • Maintenance of bass structures at Ruth Reservoir.	• 5 sites
• Manual bullfrog or other non-native species eradication: undertaken through non-chemical methods in streams, natural lakes and artificial ponds (e.g., seining, draining).	• 5 sites

The estimation for setting annual activity threshold limitations were set at the 5th-field watershed scale as listed in Table 2-5 and displayed in Figure 2-8 through Figure 2-12. The red polygons identified as "Heavy Equipment" represent areas where ground disturbing activities could occur and, where cultural surveys were performed.

Table 2-5. 5th-field watersheds – partially or fully overlapping the project area.

5th-Field Watershed Name	Watershed Acres	Watershed Acres in Project Area (%)
North Fork Smith River	101,114	1.6
Middle Fork Smith River	83,731	3.6
South Fork Smith River	186,855	3.2
Smith River	88,489	0.9
Dillon Creek	46,789	1.5
Blue Creek	80,274	2.8
Rock Creek–Klamath River	69,510	3.4
Bluff Creek–Klamath River	174,781	3.3
Turwar Creek–Klamath River	68,016	0.1
Ukonom Creek–Klamath River	87,882	1.1
Salmon River	69,348	1.1
Wooley Creek	95,116	2.3
Horse Linto Creek–Trinity River	193,890	1.7
Lower South Fork Trinity River	129,107	1.7
Big French Creek–Trinity River	172,821	0.3
Dobbyn Creek	47,924	0.1
North Fork Eel River	180,853	1.1
Lower Van Duzen River	131,789	0.1
Upper Van Duzen River	54,645	1.7
Middle Mad River	56,461	1.3
Upper Mad River	77,106	1.2

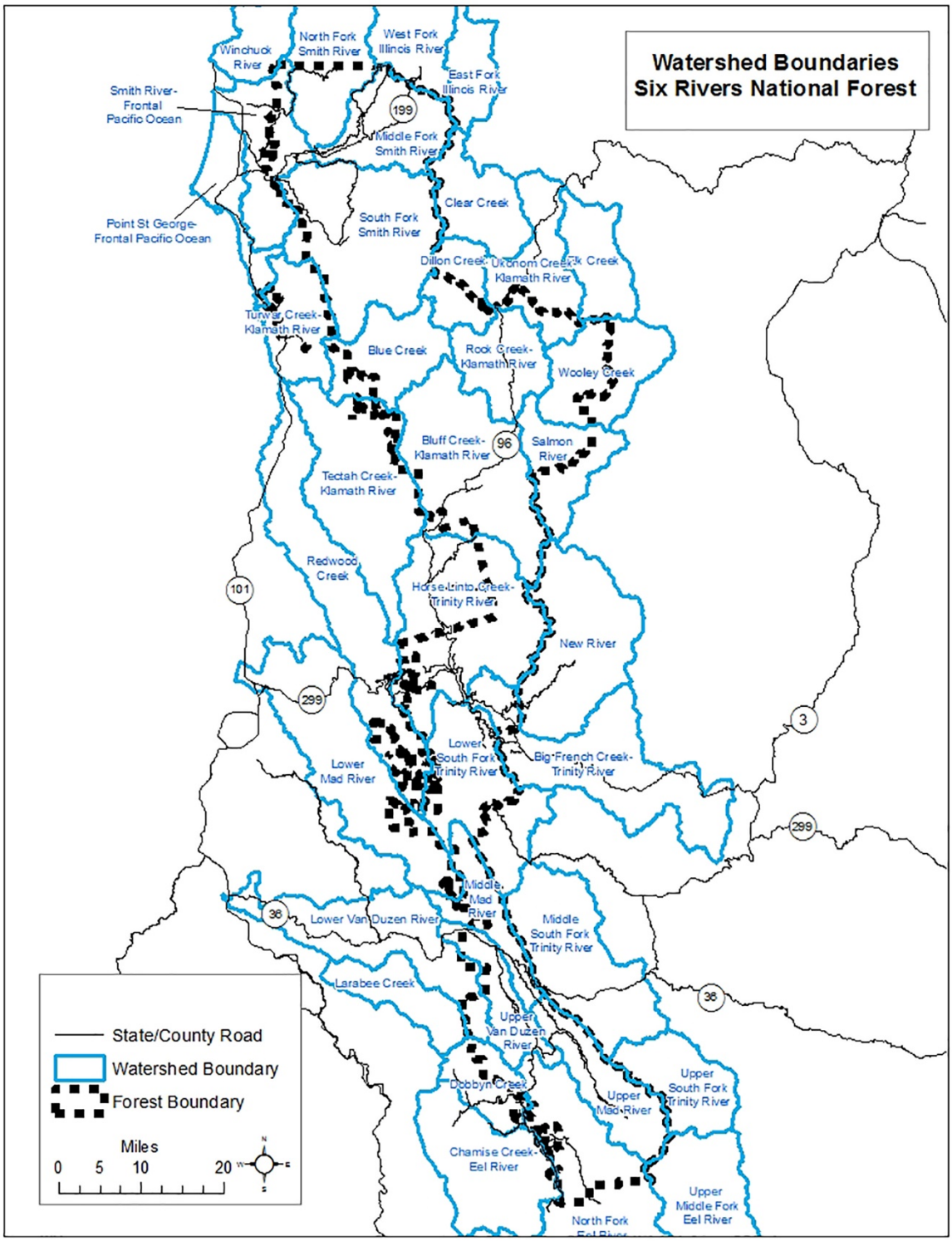

Figure 2-8. The 5th-field watersheds partially or fully overlapping the SRNF administrative boundary linked to project activity annual thresholds to avoid significant effects.

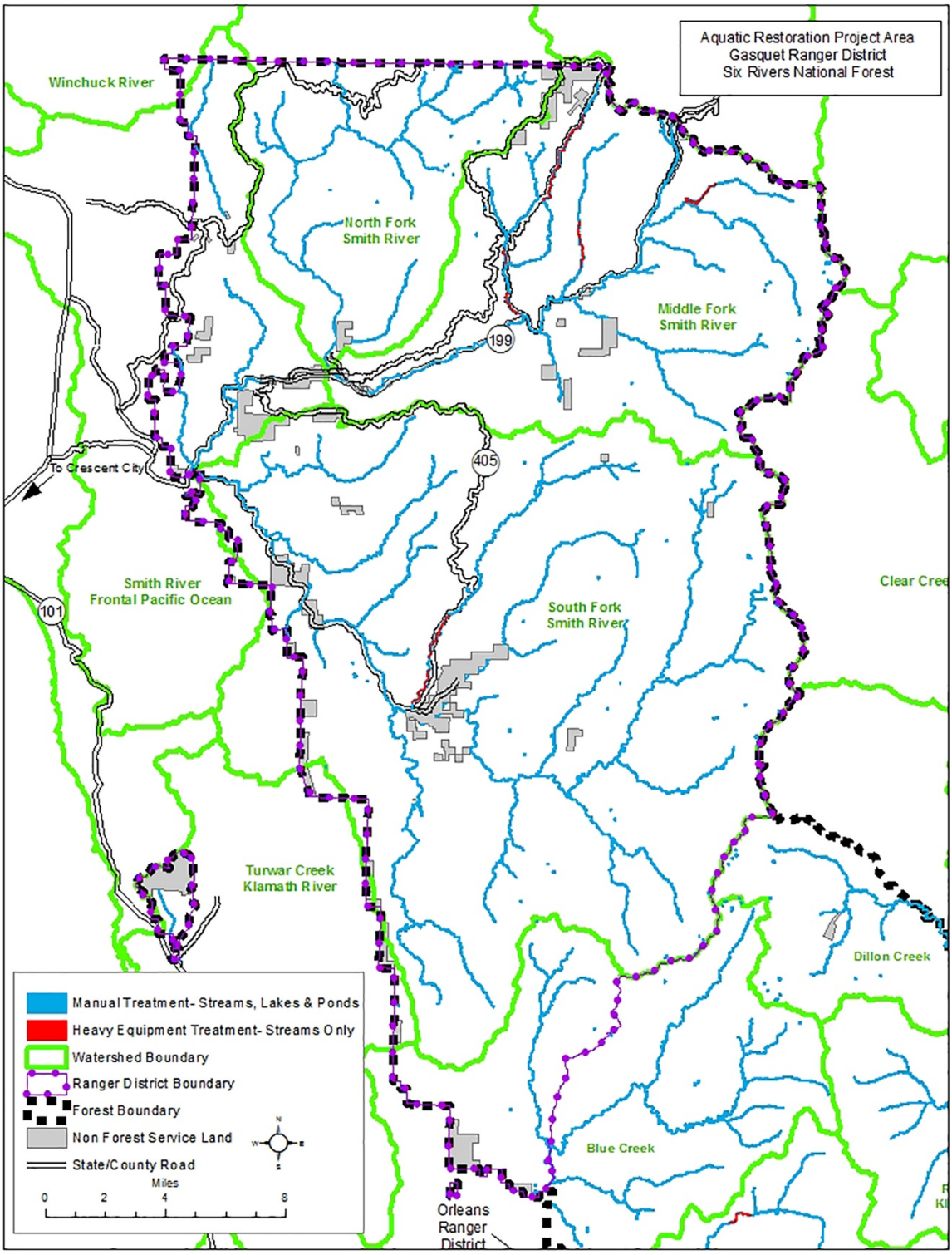

Figure 2-9. Gasquet Ranger District (Smith River NRA): *Aquatic Restoration Project* area.

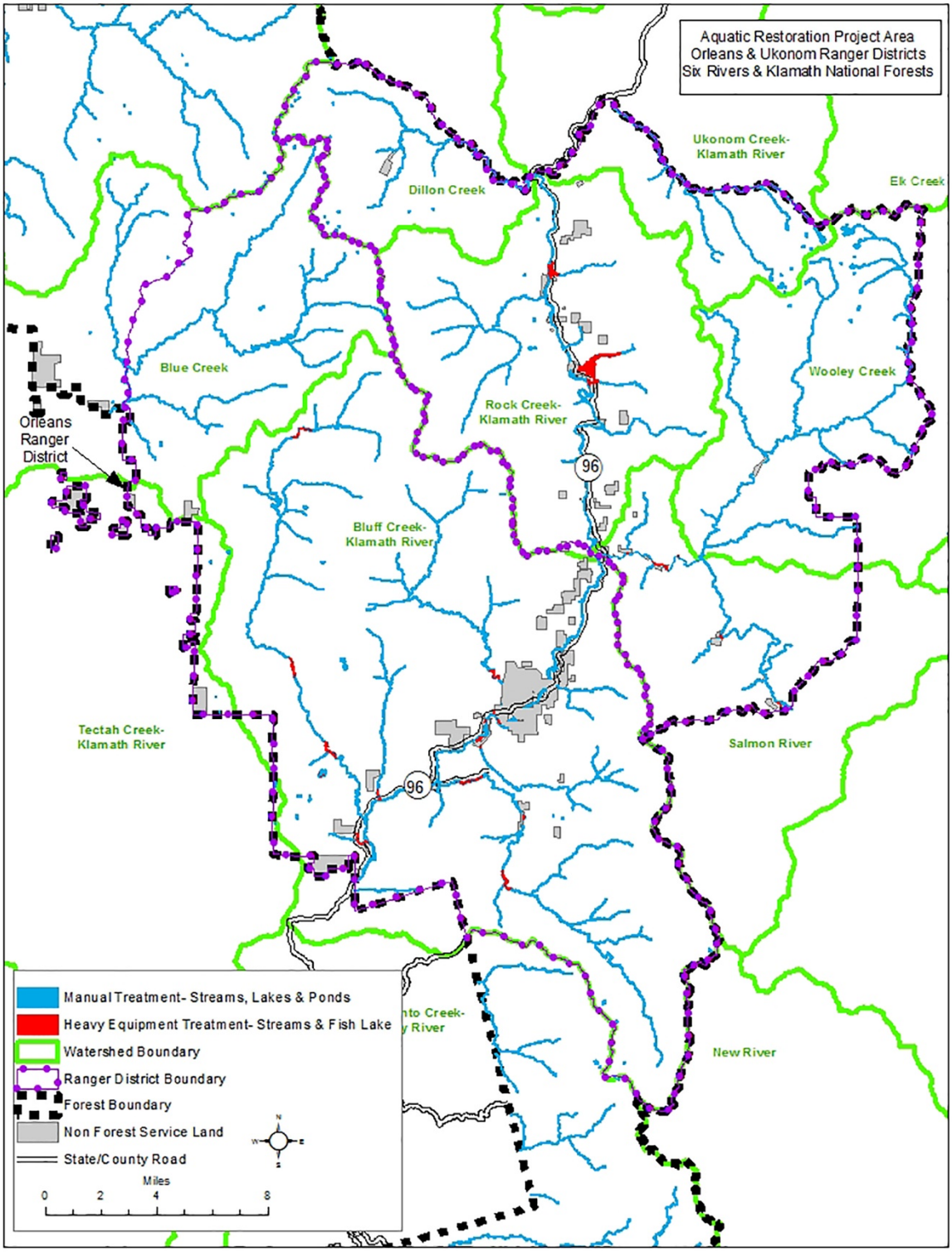

Figure 2-10. Orleans/Ukonom Ranger Districts: *Aquatic Restoration Project* area.

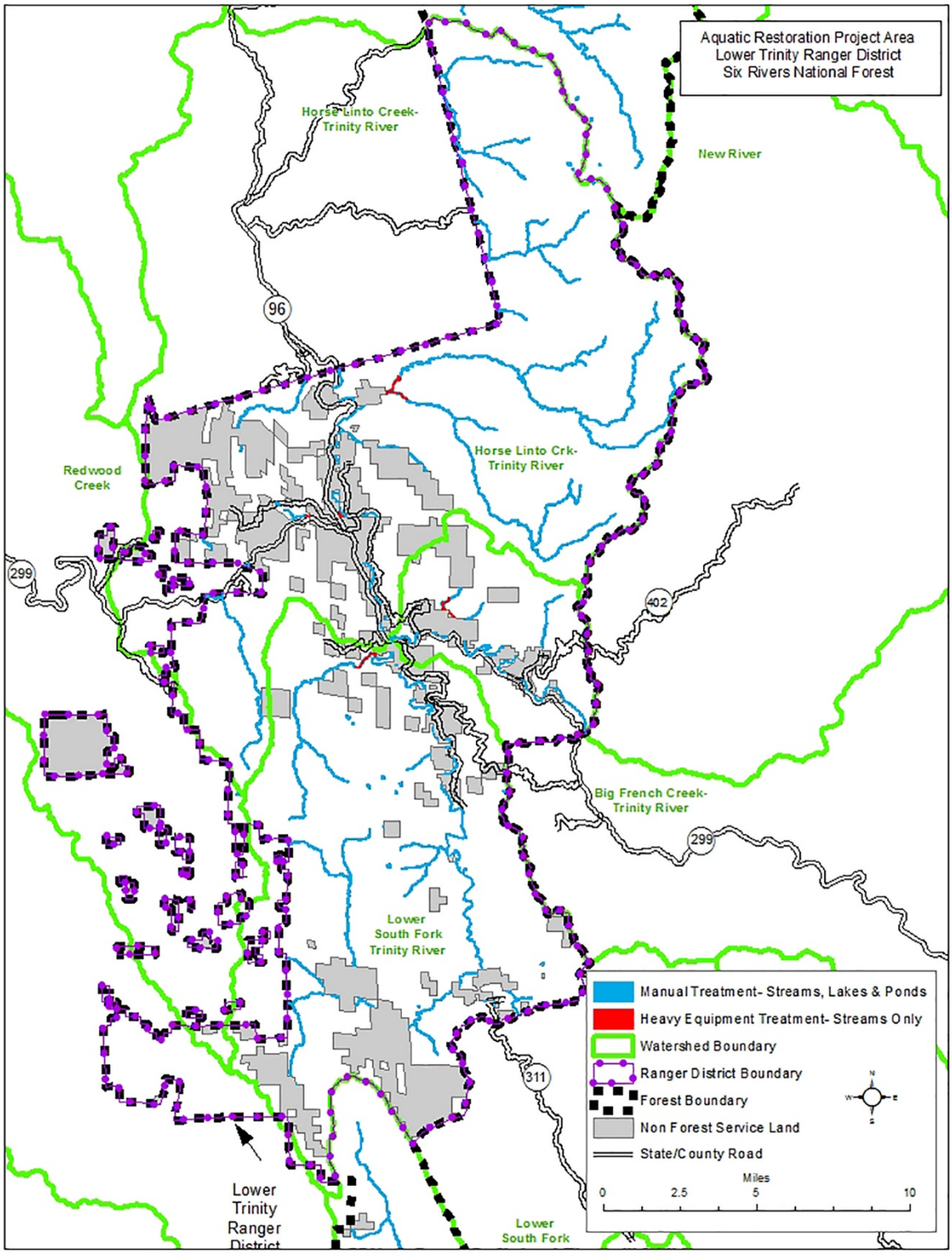

Figure 2-11. Lower Trinity Ranger District: *Aquatic Restoration Project* area.

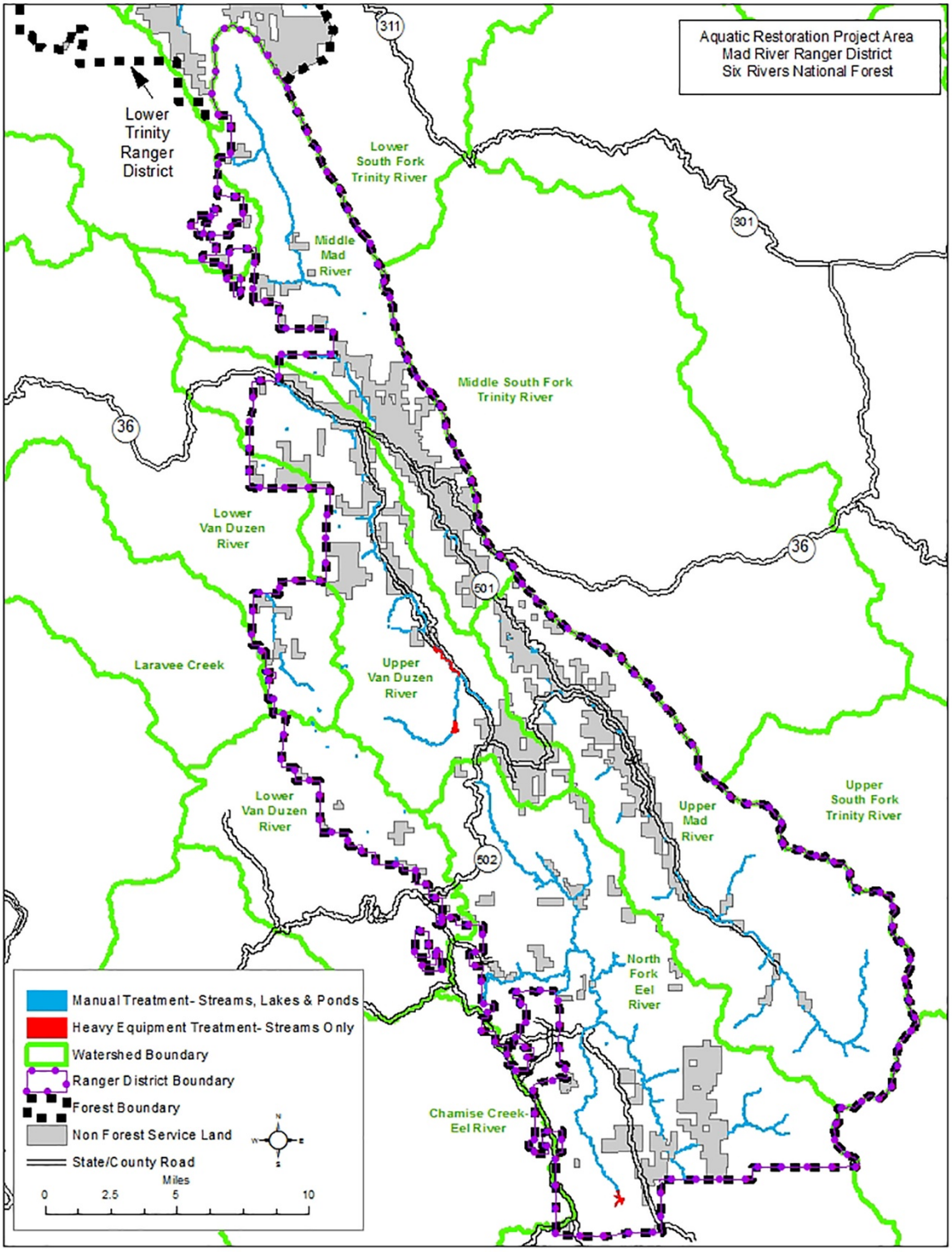

Figure 2-12. Mad River Ranger District: *Aquatic Restoration Project* area.

Connected Actions

According to Council on Environmental Quality (CEQ) Regulations (§1508.25), connected actions are closely related actions that automatically trigger (or are triggered by) other actions, cannot or would not proceed unless other actions are taken previously or simultaneously, and/or are interdependent parts of a larger action and depend on the larger action for their justification. The following connected actions would apply:

- Gravel augmentation may utilize existing weed free gravel sources. No new sources or expansions of existing gravel pits is proposed.
- Use of existing National Forest Transportation System (NFTS) roads and temporary routes for access by foot travel and transport of mechanical equipment.
- Application of temporary trail and road closures may be required (1 to 2 days) to ensure public safety when heavy equipment is in use.
- Use of existing landings and disposal sites for either disposal or storage of debris, parking for equipment and vehicles, or helicopter staging.
- Use of off-site large woods from NFS lands, when available via other authorized projects.
- Burning piles of invasive plant debris may occur when individual aquatic restoration project areas overlaps spatially and within the approved methods for the life of other authorized NEPA projects.

Project Design

Alternative 2 would minimize minor operational effects by applying a combination of mitigation measures, resource design features, BMPs, and standard operating practices (SOP); refer to resource specific design criteria below, Appendices A, B and C). The BMPs and SOPs included under Alternative 2 represent additional design features and mitigation measures applied to NFS lands in past with positive monitoring findings, indicating such methods have been effective in lessening environmental impacts.

In developing projects, the GACM and the applicable activity specific PDC from the WFRPBA must be fully incorporated into the planning, implementation and monitoring of each project in order to be compliant with consultation (WFRPBO). Conservation measures necessary for developing site-specific projects to reduce impacts to ESA-listed salmonids that cover planning, implementation, post implementation and monitoring would be incorporated into site-specific projects. The PDC include activity specific best available techniques for planning and implementing restoration actions that also minimize effects to ESA-listed coho and steelhead (Appendices A, B and C).

In addition, the Proposed Action (modified) employs other resource-specific PDFs and mitigations (BMPs and LOPs) to avoid significant impacts with the most restrictive applying at the site scale. The following description of the combination of the GACM, the PDC, the resources PDFs and the mitigations would effectively avoid or reduce unintended effects so there is no quantifiable adverse impacts, while still meeting the Purpose and Need.

Interdisciplinary Planning

Appendix A describes the technical skill and planning requirements that would take a project through site selection, planning, interdisciplinary involvement and use of best available aquatic restoration techniques. *Appendix C* details the process for this site-specific planning effort to ensure all resources are considered to implement the NEPA/CEQA decision.

Locations

In developing the Proposed Action, areas were delineated where a need for restoration was identified, using both heavy equipment and manual techniques. The locations that include areas with the potential for heavy equipment and ground disturbance may occur all have existing access via NFTS roads. Through the interdisciplinary process, resources specialists surveyed these locations and identified design features to mitigate impacts to resources. See resource design features and *Chapter 3* for resource-specific information.

As early in the process as possible, coordinate on site-specific project locations to avoid impacts to other resources and identify site-specific mitigations. Where impacts cannot be avoided or mitigated, while still meeting the aquatic restoration design needs, then the project could not proceed at that location.

Timing/Work Periods

Planning would address the timing of the project as relates to the following areas:

- **Surveys/Progression of Work:** Identify and plan to allow for surveys that may need to occur at certain times of year, or that may take multiple years (see botany, POC and wildlife PDFs).
- **Sediment:** Individual projects with the potential to generate sediment would tend to occur during the Normal Operating Season (between June 15 and November 1[9]) or first significant rainfall, whichever comes first.
- **Flows:** Instream projects in occupied habitat should consider flow levels and life history stage when implementing projects with heavy equipment. Instream projects would occur during times of low stream flow, which typically occurs during summer and early fall months.
- **Port-Orford-Cedar (POC):** Identify the need to mitigate the spread of POC root disease by scheduling project activities in the dry season and/or blocking motor vehicle access where feasible.
- **Limited Operating Periods (LOP):** Based on noise generation, LOPs may apply to all or part of the project based on location and surveys completed (see wildlife PDFs and mitigation measures).
- **Timing and Project Location:** Determine through interdisciplinary review if the timing of the project at a specific location may impact cultural practices, recreational uses or other resource areas. Adjust project riming accordingly to avoid impacts (see cultural and wildlife PDFs).

Heavy Equipment Use

Heavy equipment would be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (e.g., minimally sized, low pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils). The GACM for using

[9] FRGP instream work period

heavy equipment include design features for working in streams, fueling locations, road-related activities including water drafting, and considerations for noise, spreading invasive species (terrestrial and aquatic, POC pathogens; *Appendix A*). Design features and mitigations developed include:

- Water quality BMPs to mitigate potential for unavoidable sedimentation or hazardous fuel spills;
- Invasive species BMPs to mitigate the potential for spread of invasive species;
- POC risk assessment and PDFs to mitigate the potential for spread of root-rot disease;
- Botany and cultural resources *flag and avoid* to mitigate effects to site specific resources; and
- Closure orders for public safety.

Large Wood Sources and Placement Considerations

Large wood (LW) may be obtained from existing riparian wood sources (e.g., dropping spanner logs into channel; moving downed LW from adjacent riparian areas; cutting, falling, or tipping individual trees into channel) after meeting resource design features and Forest Plan standards and guidelines. Large wood could also come from off-site sources and be brought in via trucks on existing access routes or helicopters. Where access does not exist or where cutting and falling sufficiently sized trees from the adjacent riparian areas would impact habitat components of species identified in this document, trees from other management activities, including hazard trees, may be relocated and stock piled for instream restoration projects. The size of the LW needed for instream enhancement is typically based on the width of the channel. The actual size of LW would be determined based on site-specific surveys and interdisciplinary design of projects to reduce impacts to ESA-listed wildlife. Based on surveys and best available science, the following are guidelines for size of wood:

- If at all possible, keep root wads attached;
- Minimum length is 1.5 to 2 times bank-full width;
- Minimum diameter of key[10] LW is based on stream size (Table 2-6); and
- Additional pieces could be smaller to create complexity.

Table 2-6. Example of minimum diameter limits and lengths for instream projects based on stream width (ODFS 1995/2010).

Bank-Full Width (feet)	Minimum Diameter (inches)	Minimum Length (feet; 1.5 to 2 x Bank-Full Width)
0 to 10	10	15 to 20
10 to 20	16	15 to 40
20 to 30	18	30-60
Over 30	22	45+

[10] The key to establishing a logjam is utilizing larger diameter wood that resists decay. These pieces of wood are often called *key pieces*, and serve as the anchors for the logjam structure.

Fisheries design features to ensure large wood additions do not result in negative impacts to stream stability, fluvial processes, other resource values and human areas of concern (e.g., downstream bridges, cultural sites and recreation) are found in *Appendix A* and in the following resource areas:

- Invasive species design features;
- Wildlife design features;
- Cultural resources design features; and
- Botany design features.

Site Restoration

Upon project completion, rehabilitate all disturbed areas in a manner that results in similar or better than pre-work conditions through removal of project related waste, including flagging, spreading of stockpiled materials (e.g., soil, large wood, trees). Follow with seeding, and/or planting with local native seed mixes or plants as approved by the forest botanist (botany, invasive species and recreation PDFs and *Appendix A*).

Resource Specific Design Features, Mitigation Measures and Monitoring

The following section presents a listing by resource of various source-specific PDFs, mitigations measures (BMPs and SOPs) and monitoring to be considered during individual project development identified in the *Appendix C*, with the most restrictive resource protection provisions applying at the site scale. Project monitoring is considered an important element in the activity development and implementation process. The monitoring process provides performance control during the activity and helps provide a measure of the benefits, insights and guidance for future projects.

Aquatics: Water Quality and Soils

Integral to aquatic restoration, the following design criteria were incorporated into design features to improve water quality and protect soils, coupled by BMPs to mitigate unintended sedimentation from proposed activities:

- Apply and monitor relevant national BMPs (USDA Forest Service 2012) associated with all project activities. Best management practices would be subject to 100 percent implementation monitoring documented by means of photographs and inspection reports. Effectiveness monitoring adheres to established BMP protocols and would be conducted, after one or more post-treatment winters. Effectiveness monitoring results, and any follow-up corrective measures taken would be reported annually to partners and applicable regulatory agencies. A complete description of the BMPs and the specific measures employed to meet resource objectives, are included in *Appendix B*.
- For projects involving the use of heavy equipment, clearly delineate and minimize locations where equipment may operate. Limit soil disturbance to less than 15 percent of the total project activity area.

- Soil erosion and compaction would be minimized by utilizing existing access routes to project sites, as well as limiting turning of machinery to prevent soil displacement.
- Provide for effective ground cover where existing soil cover was impacted by heavy equipment.
- All projects would have approved erosion control plans and operate during the dry season.

Invasive Species: Plants and Aquatics

Removal of invasive species is a proposed activity that would include the following plant and aquatic management at small discrete sites:

- Utilize hand tools, such as weed wrenches or Pulaskis, to ensure removal of the root system; do not use weed whackers, as this would only result in multiple branched sprouting, and thus, more seeds.
- Treat early in the growing season to minimize the spread of invasive species before flowering.
- Locate removed invasive plants/stems or canes to a suitable location (e.g., burn pile, area already dominated by the respective species), if the removed plants are mature shrubs with fruits (e.g., Scotch broom) or Himalayan blackberry, do not leave on site.
- Monitor at least annually and repeat treatment until eradicated or controlled (e.g., likely to be out-competed by native vegetation), adapt schedule as needed;
- Actively revegetate, if suitable, with relatively fast-growing native trees or shrubs to provide competition to invasive plants and canopy cover to reduce productivity during the early phases of treatment (Bennett 2007).
- Eradicate bullfrog/non-native aquatic species, including aquatic plant species, through non-chemical methods (e.g., seining, draining) of natural and artificial (e.g., livestock) ponds. Pond levels may be lowered to aid in removal of nonnative species.

However, in pursuit of all proposed activities, potential vectors that involve use of contaminated materials or equipment associated with particular activities of this project occur could result in the introduction and spread of invasive plant species. Risk factors include the presence or absence of invasive species, the species, and the extent of cover, operating or staging heavy equipment, importing material such as rock, boulders, or wood products from a non-local source, and use of in-stream gear that has been in contact with invasive plants. Mitigations to reduce the risk of invasive plant introduction and spread are listed in *Appendix B* and include such actions as cleaning of all heavy equipment used in the project before operating on the forest.

Cleaning Equipment to Reduce Risk of Introduction

The following mitigations would be implemented to reduce the risk of introduction and spread of invasive plants and aquatic species:

- Clean, with a high-pressure hose at a suitable site, heavy equipment prior to operating on the forest or between watersheds;
- Clean heavy equipment exposed to invasive plants or aquatic species before operating elsewhere;

- Avoid staging mechanical equipment where there is a risk of contact with invasive plants;
- Ensure sources of gravel or wood material originate from an invasive plant free setting; and
- Clean gear and mechanical equipment regularly before accessing riparian areas and when moving between watersheds (see *Appendix B* for gear contamination guidelines applicable to all resources).

There are elements of project activities that could indirectly lead to the spread of invasive plants beyond their current distribution and include increased light to the riparian area after felling trees to serve as LW in the stream. Increased light to the understory of the riparian area can enhance growth and fruiting of such invasive plant species as Himalayan blackberry.

Where invasive plants already occur as a *leading edge*, the PDF to reduce the risk of spread of invasive plants from its current area of occupancy into uninfected areas is:

- Avoid any heavy equipment use that would result in changes in canopy structure or ground disturbing activities.

Wildlife

Site-specific projects not meeting the following design criteria described in this document would require separate consultation with the USFWS, unless the Level 1 Team agrees effects are consistent with those described in this document. The following project design and mitigation measures would avoid any potential for jeopardizing the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species (CEQA §2053):

- All proposed restoration activities within riparian reserves, late-successional reserves. Critical Habitat units (CHU), botanical areas, and suitable threatened, endangered and sensitive species habitat must maintain or improve conditions and ecological processes. Limited modification of suitable habitat may occur, but the habitat must remain suitable post-project.
- Northern spotted owl and marbled murrelet (MAMU) nesting/roosting habitat functionality shall not be downgraded or removed. Suitable NSO and MAMU habitats treated and modified, but would retain their pre-project functionality with respect to life history requirements for these species.

Cutting/Falling Trees for Large Wood Instream Projects

The following project design and mitigation measures would avoid any potential for destruction or adverse modification of habitats essential to the continued existence of endangered species or threatened species (CEQA §2053):

- No timber felling for instream LW recruitment within known NSO nest groves.
- Tree cutting and felling along stream corridors into streams within LSRs, Zone 1 high quality MAMU and wilderness would have a less than or equal to 20-inch dbh limit. A maximum of 20 trees per mile could be cut and felled along stream corridors (300-foot polygon or 150 feet on either side of a stream channel) for instream LW recruitment.

- Cutting and felling of trees along stream corridors for instream LW recruitment within the remainder of the project area would have a less than 30-inch dbh limit. A maximum of 20 trees per mile could be cut and felled along stream corridors (300-foot polygon) for instream LW recruitment. Within that mile, five (5) trees could be cut and felled within a 0.25-mile segment. If the trees are cut and felled in close proximity (cluster) to each other, no more than one may be cut at maximum dbh (22 to 30 inches).
- A variance to the tree felling dbh range would allow site-specific tree felling size ranges for instream LW recruitment based on wildlife and botany Level 1 review and approval.
- The project would not remove active or potential threatened, endangered, Forest Service listed sensitive or potential candidate (TESP) habitat nest trees or affect the canopy around potential nest trees (pre-dominant and dominant trees). No pre-dominant and dominant tree species would be felled for large wood recruitment. Directional falling would protect all predominant and dominate trees and the any tree forming a canopy around the predominant from logging damage.
- A wildlife biologist shall be fully involved in all tree-falling planning efforts, and in making decisions on whether individual trees are suitable for nesting or have other important listed-bird habitat value. The wildlife biologist shall inspect trees prior to cutting felling in riparian areas.
- Snags and trees with broad, deep crowns (i.e., wolf trees), broken tops, damaged tops, cavities, large limbs, basal hollows or other abnormalities that may provide a valuable wildlife habitat component shall be retained.
- **Gasquet, Orleans, Lower Trinity and Mad River Ranger Districts:** Snags and logs would be retained per *SRNF Land and Resource Management Plan* (LRMP) S&Gs 4-6 through 9, 14-9, Table IV-8, and Appendix L. Under this programmatic document, site-specific project activities within LSRs, riparian reserves, CHU, and suitable NSO nesting/roosting habitat (regardless of land allocation) would maintain snags (20-inch dbh and greater) and downed logs (20 inch and greater and at least 10 feet long) at the 80 to 100 percent level.
- **Ukonom District:** Snags and logs would be retained per Table 4-4 of the Klamath National Forest (KNF) LRMP and Table I-1 of the LRMP final environmental impact statement (FEIS) provides standards for snag retention. The LRMP guidelines recommend 5 to 8 snags per acre averaged across a 100-acre area. The number of snags on a given acre would vary, depending on the site and on the number of snags within the landscape. As a site-specific recommendation, the FEIS (Table I-1) advises that NSO high-quality habitat would have eight (8) snags per acre on an average area basis.
- **Ukonom District:** Large wood debris would be retained from five (5) to 20 pieces of LW per acre in various stages of decay per LRMP S&G 6-16 (p. 4-25). Large logs, conifer and hardwood, sound and cull of at least 20 inches in diameter would be retained, about 40 cubic feet in volume when they are available. The tree species of down logs should reflect the mix of species in the stand.

Wildlife Mitigations – Limited Operating Periods for Noise Disturbance

Any activities that may exceed ambient noise levels would require LOPs as follows:

Northern Spotted Owl

- Any noise generating activity within 0.25 miles of a known NSO activity center (AC) would not occur between February 1 and July 31 (*Appendix A*). A September 15 LOP would be used if the AC is occupied by a breeding pair or within nesting/roosting habitat if no surveys are not conducted.
- No noise-generating activity or felling of trees within nesting/roosting habitat or less than 0.25 miles of unsurveyed NSO nesting/roosting habitat would not occur between February 1 and September 15, unless surveys determine the habitat to be unoccupied. This mitigation applies to the KNF and the Ukonom RD.
- The LOP for noise disturbance may be lifted in project areas with high ambient noise (e.g., adjacent to high-use roads, campgrounds) or if the area is determined to be unoccupied or owls are non-nesting using a modified survey protocol (i.e., 3 visits in the year of operations).

Marbled Murrelet in Zone 1 – Smith River NRA and parts of Orleans, Ukonom and Lower Trinity

- Any noise-generating activity within 0.25 miles of known MAMU nests would not occur between March 24 and September 15.
- Any noise-generating activity within 500 feet of unsurveyed, suitable MAMU nesting habitat would not occur between March 24 and August 5. In addition, work between August 5 and September 15 would not begin until 2 hours after sunrise and stop 2 hours before sunset unless surveys determine the site to be unoccupied.
- For disturbance activities in and within 500 feet of low-quality habitat for the MAMU, based on field review (e.g., small patch size, few predominant trees with limited nesting opportunities or more open canopy closure), no activities may occur from March 24 through August 5, which is outside the peak breeding period for the MAMU. In addition, a daily operating restriction (i.e., no work 2 hours after sunrise and 2 hours before sunset) would be imposed for all units treated from August 6 through September 15 to further reduce the potential for disturbance.

Marbled Murrelet in Zone 2 – Parts of Orleans, Lower Trinity, and Ukonom and all of Mad River

- No LOPs are required for MAMU for activities occurring in Zone 2.

Helicopter Activities and LOPs

- Long-term activity, such as helicopter use, requires a 0.25-mile distance for LOPs for both MAMU and NSO. Helicopter flight paths would avoid known nest sites and areas of suitable TES species nesting/roosting habitat during the breeding season (February 1 to September 15) unless surveys determine the site to be unoccupied. Helicopters should fly at least 500 feet above the canopy until it reaches the project site. Flight paths should be located at least 0.25 miles and landing sites should be located 0.5 miles from known nest sites or unsurveyed suitable NSO or MAMU nesting/roosting habitat.

Forest Terrestrial Sensitive Species

Projects located within the nest protection or primary disturbance zones of any Forest Service wildlife Sensitive species would be evaluated on an individual basis to determine appropriate mitigations to minimize disturbance or impacts to habitat (SRNF LRMP p. IV-97). The following avoidance design would prevent the potential for adverse effects to forest terrestrial sensitive species:

- During the interdisciplinary process (*Appendix C*) the need for surveying for bald eagle, northern goshawk, peregrine falcon marten, fisher, or wolverine would be determined and surveys done. If the site were by bald eagle, northern goshawk or peregrine falcon nest territory or within 0.25 miles of an active den site for marten, fisher, or wolverine then limited operating periods for FSS species would apply (LRMP p. IV-98). Activities may occur if surveys confirm non-reproduction, failed breeding attempt, young have fledged, or left the den site.

Botany: Forest Sensitive Vascular and Non-Vascular Species

Ground-disturbing activities involving the use heavy equipment or other activities such as movement of logs with grip hoist and cables and felling of trees to provide LW structure to the riparian area that coincide with potentially suitable habitat, would require field review by botany staff and the application of project design features to reduce potential direct and indirect impacts to Forest Service Sensitive (FSS)/CDFW species and their habitat. Most other non-LW activities proposed (e.g., moving existing coarse woody debris by hand, cutting small diameter willows, modifying existing structures) would not be expected to negatively affect FSS/CDFW species. The following PDFs apply:

- During project planning, the project lead shall consult with the forest botanist. The consultation would inform what, where, and when all project implementation activities are planned, with enough lead-time to allow for surveys during the season when plant species are detectable (*Appendix C*).
- Forest botanist or botanical technicians shall survey potential habitats during the appropriate time of year for those proposed activities to protect FSS/CDFW species.
- If any FSS/CDFW plant, lichen, or bryophyte species are found during pre-implementation surveys, and the Proposed Action (modified) has the potential to result in direct or indirect impacts to the species and its habitat, all occurrences would be flagged and avoided to protect individuals.

Port-Orford-Cedar

Port-Orford-cedar (POC) is a unique conifer growing only in northwestern California and southwestern Oregon. For a variety of reasons, including its ability to tolerate ultramafic (i.e., serpentine) soils and live along streams and where soils are saturated, POC plays an important role in fish-bearing streams by providing shade, keeping water cool during hot summers, and by eventually falling into streams to provide structure and essential fish habitat. The following PDFs and mitigation measures would avoid and lessen the potential for adverse effects to POC, either directly via retaining uninfected healthy trees or minimizing the risk of new infections of *Phytopthora lateralis* (PL), which can cause tree mortality over time:

- **Project Scheduling:** Schedule project activities during the dry season (June 1 to September 30).

- **Planning:** Prior to entering a POC area or leaving a known PL area, all heavy equipment would be washed according to management guidelines in the *Port-Orford Cedar Range wide Assessment* (USDA/USDI 2003).
- **Progression of Work:** Conduct work on streams where PL is not present before working on sites infested with PL. Wash project equipment, work boots and hand tools before entering National Forest land or project location for the first time in the work period. Wash equipment again before changing watersheds if work is halted and equipment is taken to another job site or for any reason equipment is taken to another job site away from this project.
- **Instream Work:** To minimize risk to POC, log placement and any associated work would occur downstream from infected POC areas, then upstream from infected POC areas, before they occur within infected POC areas. After working in infected stands, all heavy equipment would be pressure washed, including undercarriages, with uninfested water. Cleaning shall be defined as removal of dirt, grease, plant parts, and material that may carry PL into uninfected POC areas.
- **Access:** Designate access and egress routes to minimize exposure to PL.

If during planning phase, it is unclear as to the infection status of a POC stand, wash project equipment, work boots and hand tools before entering NFS lands for the first time in the work period and wash again before entering another watershed or stream location.

Cultural Resources

The following project design and mitigation measures would act to avoid substantial adverse change in the significance of ancestral territories and traditional cultural properties (TCP) of Native American tribes, listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in CPRC 5020.1(k) and 5024.1:

- Treatments may be allowable within site boundaries provided on-site historic property protection measures are followed as stipulated in the Region 5 Programmatic Agreement (R5 PA), and it is determined those activities would have no significant impact to the integrity of historic properties.
- Developed forest transportation systems and existing access ways can be used by heavy equipment, where a Forest Service archeologist has determined that use would not have any adverse effect on historic properties.
- Consultation was initiated with the tribes and local Native American communities and/or interested parties in accordance with the R5 PA, NHPA, and other laws and regulations.
- Prior to implementation of specific projects, additional tribal consultation shall occur on a case-by-case basis and may include the following:
    - Prior to construction of beaver analogs, which require a significant amount of willows, ensure timing of willow cutting would not interfere with gathering;
    - Removal and/or use of traditionally utilized plants would take place outside of known resource gathering areas, unless otherwise specified through tribal consultation;

  - Ceremonial closure orders and no fly zones would apply to restoration activities, including the use of helicopters;
  - Any projects occurring within TCPs must be closely coordinated with the affected tribes to mitigate any potential short-term impacts; and
  - Any projects occurring in or around a known viewshed must be closely coordinated with the affected tribes.
- Monitoring by a Forest Service archeologist or tribal monitor may be required on a case-by-case basis.
- Any activities with an Area of Potential Effect (APE) entirely within obviously disturbed contexts (e.g., borrow pits) and the disturbances are such that the presence of historic properties be considered highly unlikely shall be allowed.
- Cutting or falling of trees is allowed given it does not involve ground or surface disturbance and it has been determined that the activity would not affect access to or use of resources by tribes (see *Large Wood* design features below).
- Activities limited within stream channels, which do not include disturbance of terraces, cut banks, etc., shall be allowed. If the adjacent terrace, bank, etc., has received survey coverage, restoration activities may occur given they follow the stipulations outlined under *Improvement Sites – Heavy Equipment Treatment* below.
- Activities that involve less than 1 cubic meter (m^3) of cumulative ground disturbance per acre, where such activities would not affect the integrity of historic properties, shall be allowed.
- Repair of livestock fences and/or barriers would be allowed where it has been determined by a Forest Service archeologist that there are no known historic properties or where the presence of historic properties is considered highly unlikely.
- Tree planting using low-impact methods (e.g., planting bar, no mechanical auger) shall be allowed where it has been determined by a Forest Service archeologist that such activities would not affect the integrity of historic properties if present.
- Non-disturbing broadcast seeding and mulching for establishment of vegetation shall be allowed.
- Removal of non-native, invasive plant species using hand tools shall be allowed where it has been determined by a Forest Service archeologist that such activities would not affect the integrity of historic properties if present.
- Non-ground disturbing project sites may have additional design criteria developed based on records search and project specifics.

Improvement Sites – Heavy Equipment Treatment

The following site-specific protections measures (SPMs) as stipulated in the R5 PA would act to avoid significant impacts to historic properties:

- Polygons within which ground disturbance could occur (typically use of heavy equipment) have been surveyed. These SPMs may include full avoidance and/or other on-site historic property protection measures.
    - If SPMs include equipment exclusion zones, these areas would be marked on the ground prior to implementation.
    - Buffer zones may be established on a case-by-case basis for highly sensitive areas. These buffer zones would be marked prior to implementation and avoided. Tribes would be consulted on the use and size when the protective buffer is determined for Native American TCPs.
- For linear sites (e.g., mining ditches, historic trails), equipment may cross in areas where the features and characteristics clearly lack historic integrity. Crossings would be designated by a Forest Service archeologist. The remainder of the site would be avoided, and traffic would be clearly routed through designated crossings.
- Existing access roads that bisect a cultural site may be determined acceptable for re-use if vehicles stay on the previously disturbed roadbed.
- Existing gravel pits may be utilized for gravel, given that the activity occurs entirely within the obviously disturbed context and the presence of historic properties is considered highly unlikely. No new gravel pits shall be created, and existing mines shall not be expanded.
- Removal of non-native, invasive plant species using a combination of hand tools and heavy equipment shall be allowed where survey coverage applies, and it has been determined by a Forest Service archeologist that such activities would not affect the integrity of historic properties if present.

Large Wood

The following design features and mitigations would mitigate the potential for direct effects from tree felling and vegetative manipulation:

- Any trees cut in or near site boundaries would be directionally felled away from archeological features or artifacts.
- Removal and/or use of traditionally utilized plants would take place outside of known resource gathering areas, unless otherwise specified through tribal consultation.
- Girdling of alders would occur in small patches separated by untouched areas. Avoid cutting any alders with cultural significance (i.e., blazes or those within a known resource gathering area).

Recreation

The following design and mitigations would act to lessen unavoidable impacts to provide the people of this state with clean air and water, enjoyment of aesthetic, natural, scenic, and historic environmental qualities, and freedom from excessive noise (CEQA §21001(b)):

- The use of heavy equipment is not permitted within wilderness, *wild* portions of wild and scenic rivers, or research natural areas (RNAs).
- Instream work located within potential kayaking reaches would be free from water-related hazards (i.e., no rebar or cables would be used within high water or, would be secured in a way that would not come loose or protrude).
- Campgrounds and dispersed sites would be maintained so they are free from safety hazards.
- Utilize signing, press releases, and work with local user groups to redirect recreation activities to safe areas during restoration activities, a minimum of one week prior to restoration activities beginning at or directly adjacent to recreation sites.
- If helicopters are utilized, provide temporary area closures during operations to minimize potential for accidental injury to recreationists during restoration activities. Trailheads would be identified by forest recreation officer during project development process (*Appendix C*).
- Protect, repair, and restore any damage to recreation site infrastructure (e.g., dispersed sites, trailheads, signs) caused by the restoration activities to pre-work conditions.
- Visual quality objectives (VQOs) were developed using Agriculture Handbooks 462 and 559, which define nationally established principles and methods of the Visual Resource Management System. The VQOs apply to site-specific projects visible from the forest's inventoried moderate and high sensitivity viewpoints (Level 1 and 2). The VQOs are minimum conditions to be achieved as soon as possible in all MAs and within three (3) years for all VQOs except Preservation and Maximum Modification, which must be met immediately.
- Facilities and developments, such as roads, trails, campground facilities, structures, signs and interpretive stations, are not required to meet the MA VQOs when viewed in immediate foreground (i.e., 300 feet; KNF LRMP p. 4-35).
- State Highways 96, 299 and 36, and US Highway 199 are potential State Scenic Highways, which would be managed to maintain their eligibility. These highways would be managed to meet a Partial Retention VQO for the middle ground views in the viewshed.

Chapter 3. Environmental Consequences of the Proposed Action and No Action Alternative

Introduction

This section describes the best available science and analytical basis for comparison of the alternatives presented in *Chapter 2: Alternatives Considered in Detail.* Each resource topic section provides a summary of the project-specific reports, assessments, consultation and input prepared by USDA Forest Service (Forest Service) specialists, which are incorporated by reference to this draft environmental assessment (EA). Reports pertinent to the analysis include the *Watershed and Fisheries Restoration Program Biological Assessment for Anadromous Salmonids*; *Invasive Weed Risk Assessment*; *Biological Assessment/Biological Evaluation (*Wildlife BA/BE*) for Wildlife Threatened Species; Biological Evaluation for Wildlife, Aquatic and Botanical Sensitive Species (*Sensitive Species BE*)*; *Management Indicator Species Report (*MIS Report*)*, *Neotropical Bird Migration Report (*NTBM Report*)*; *Port-Orford-Cedar Risk Assessment (*POC Assessment*)*; and *Cultural Resources Report* (CR Report). These specialist reports, BEs and other technical documentation used to support the analysis and conclusions in this draft EA are located in the project record (40 CFR 1500.4) for the *Six Rivers Aquatic Restoration Project* (*Aquatic Restoration Project*). The objective is to furnish enough information to demonstrate a reasoned consideration of the environmental impacts of the Proposed Action (modified) and how the potential for unavoidable impacts would be mitigated, without repeating detailed analysis and background information available elsewhere.

The process leading to this analysis for each resource below mirrors the information required for the California Environmental Quality Act (CEQA): (1) identification of environmental impacts; (2) an assessment of environmental impact early in project design; (3) project modifications to avoid or mitigate adverse impacts; and (4) factual documentation for a finding, if appropriate, that the project would not have a significant adverse effect on the environment (CEQA Guidelines §15063).

The project record is available for review at the Six Rivers National Forest (SRNF or forest) Supervisors Office in Eureka, California. This document is available online on the SRNF website at *www.fs.usda.gov/project/?project=42051*.

Resources that would not be impacted by the Proposed Action (Alternative 2), and therefore, not further analyzed include:

- **Air Quality:** The Proposed Action does not influence air quality, as no burning and any dust from road use is insignificant as level of use would be low; therefore, there would be no violation of air quality standards (National Environmental Policy Act (NEPA) and CEQA).
- **Fire and Fuels:** No fire or fuel treatments are proposed. Projects would not increase the fuel loading of any location. Any trees cut and felled into the stream would retain all limbs so no fuel loading would occur.

- **Inventoried Roadless:** The Proposed Action would not result in a change to the Inventoried Roadless characteristics. No new roads would be constructed.
- **Geology:** The site-specific project review process (*Appendix C*) would ensure the project would not be located on a geologic unit is unstable or that would become unstable as a result of the project (CEQA). Therefore, geology would not be addressed as an individual section.
- **Transportation and Facilities:** None of the activities involves construction or decommissioning of National Forest Transportation System (NFTS) roads or facilities. Existing routes would be used and any maintenance would be accomplished under the *Forest-wide Road Maintenance Categorical Exclusion* (*Roads CE*; 2015).
- **Visual Resources:** The Proposed Action does not affect visual resources as activities would use natural materials and would not create visual openings.

Required disclosure for CEQA compliance includes the following resources that would not be impacted by the Proposed Action and therefore would not be discussed further:

- **Aesthetics:** The project activities would not have any impact on the scenic resources, as projects are designed using native material that blends into the surrounding environment.
- **Agriculture and Forestry Resources:** the proposed activities do not occur in agriculture or farmland nor result in change to forest conditions.
- **Greenhouse Gas Emissions:** The project activities would not generate greenhouse gas emissions.
- **Hazards and Hazardous Materials:** The project activities do not involve hazardous materials outside of petroleum products used for heavy equipment and chainsaws. Water quality best management practices (BMP; *Appendix B*) for equipment use near waterways would prevent introduction into streams and soils.
- **Land Use and Planning:** The project is compliant with land and resource management plans (LRMP or forest plans) and does not involve changes to private land use.
- **Mineral Resources:** The project does not involve mineral resources on public or private lands.
- The project is entirely on National Forest System (NFS) lands and would have no impact on **Population and Housing, Public Services, Transportation/Traffic,** or **Utilities and Service Systems**.

Aquatics

This section presents the scientific and analytical basis for the aquatic assessment methodology and predicted direct, indirect and cumulative effects of the No Action alternative, compared to the Proposed Action (modified) (40 CFR, §1502.16 and 1502.24; CEQA §21002.1(d)). The objectives for Forest Service Sensitive (FSS) species is to develop and implement management practices so that species do not become threatened or endangered because of Forest Service actions (FSM 2670.22). The resources

included in this section are threatened, endangered and sensitive (TES) anadromous salmon and steelhead, aquatic sensitive species, and water quality, including soils.

Salmon and other anadromous fish are the biological foundation of river ecosystems. Nutrients brought upstream from the ocean are incorporated into food webs in rivers and surrounding landscapes by a host of over 50 species of mammals, birds, and fish that forage on salmon eggs, juveniles, and adults in freshwater. These species are also important to tribes (see *Cultural Resources*) and local economies (see *Recreation*).

The discussion below focuses on the current habitat conditions, natural driving processes, recovery goals by watershed (basin) and administrative unit and the primary threats to species recovery for Endangered Species Act- (ESA) listed fish species and non-ESA anadromous salmonids. Following the basin summaries, a description of species focuses on the potential pathways of affects, along with a list of FSS non-salmonid species, their status and their occurrence in relation to the project area, addressed in the *Watershed and Fisheries Restoration Program Biological Assessment* (WFRPBA), and the *Sensitive Species BE*. Under the modified Proposed Action, the presentation targets an evaluation of the restoration effectiveness and unavoidable minor effects to fisheries or their habitats relative to proximity, magnitude and probability. It also provides the rationale for how the project's design achieves restoration benefits while avoiding significant impacts, along with feasible mitigations incorporated to minimize potential for harassment, harm and direct mortality.

Each restoration project would be subject to the interdisciplinary development, review and compliance process, prior to implementing ground-disturbance operations specified in *Appendix C*, to ensure design (i.e., methods, placement and timing) and mitigations are relevant to changing conditions and unique species life cycles.

The mission of the Forest Service is to manage aquatic dependent species and their habitats, while maintaining a diversity of riparian botanical communities to recover ESA-listed salmon and steelhead (Resource Planning Act of 1974, National Forest Management Act of 1976 (NFMA), Forest Service Manual (FSM) 2670.21). Restoration projects would occur in partnership with California Department of Fish and Wildlife (CDFW) and the National Marine Fisheries Service (NMFS) to achieve their goals for conservation of endemic species (FSM 2607.32). California's State Wildlife Action Plan (SWAP) is a comprehensive, statewide plan for conserving the state's fish and wildlife, and their vital natural habitats for future generations (CDFW 2015). It is part of a nationwide effort by all 50 states and five (5) US territories to develop conservation action plans and participate in the federally authorized State and Tribal Wildlife Grants (SWG) Program. At the center of CDFW's recommendations and future actions are six (6) core principles. For each species and ecoregion, and for the anadromous fish guild and state as a whole, these principles would guide CDFW in its actions and collaborations with federal, state, private, and public partners. Of the six (6) goals, the only core principal outside the scope of this draft EA involves hatchery management.

- **Habitat Restoration:** Restoring and enhancing physical and water habitat, restoring unimpeded flows, securing sustainable ecological processes, addressing future environmental stresses (sea-level rise, increased water temperature, prolonged drought), and eradication or control of invasive species.

- **Species Recovery:** Identifying and implementing actions to recover species until protections under state and/or federal endangered species act listing are no longer warranted.
- **Promoting Partnerships:** Pursuing inter-state, agency, tribal, private, and academic partnerships and cooperative efforts to conserve and manage California anadromous species.
- **Water Conservation:** Identifying and implementing water management strategies designed to provide sufficient instream flow quality and quantity to meet suitable fish and habitat needs.
- **Angling Opportunities:** Ensuring the public has appropriate recreational, commercial, and tribal anadromous fisheries harvest opportunities in ocean, estuary, and river waters of the state.

Analysis Methodologies and Assumptions

The basis of direct, indirect and cumulative effects analyses at the program level are best available science, including recent instream restoration manuals, and the professional judgement of aquatic specialists. The following considerations were addressed:

- Determine distribution of threatened and endangered and Region 5 Sensitive[11] aquatic species within the analysis area, including anadromous salmonids and other aquatic species.
- Determine potential effects to aquatic species, both beneficial long-term and adverse short term, by project activity categories. This analysis was completed in the 2015 Watershed and Fisheries Restoration Program (WFRP) consultation and is summarized below.
- Determine potential effects to water quality and soil, and impaired water bodies, per §303(d) of the Clean Water Act (CWA), defined for the Proposed Action (modified) due to the potential introduction of sediment.

Effects to ESA-Listed Fish Species and Non-ESA Anadromous Salmonids

Aquatic restoration activities proposed in this draft EA are intended to have an overall beneficial impact on ESA-listed salmonids and the watersheds in which they are found and therefore can be a surrogate for other aquatic species. These restoration activities have been identified in the SONCC Recovery Plan (NMFS 2014) and Coho Recovery Plan (CDFW 2005). In implementing these restoration activities, the possibility exists that adverse impacts could occur; however, the majority of the restoration activities would result in minimal impacts. In *Watershed and Fisheries Restoration Program* (WFRP) consultation, activities included in this draft EA that were determined to result in the potential for a negative effect to occur include projects where:

- Fish may be incidentally injured or killed by all activities involving heavy equipment within the stream channel. Use of helicopters to transport wood or pile driving posts for beaver restoration in occupied habitat could also directly harass fish.

[11] CDFW CESA listed species are included and their state designation identified.

- Projects that occur in occupied habitat may involve isolation, capture, handling, transport, and relocation of TEP salmonids (including water withdrawal). Fish handling has the potential to result in fish injury or death.
- Project results in sediment entering occupied habitat such that individual's behavior is significantly altered, or harm occurs (see *water quality analysis indicator* below).
- Projects that occur in lakes and ponds would have no effect on anadromous salmonids.

Table 3-1 includes a list of ESA-listed fish species.

Table 3-1. Fish species on the Endangered Species list.

Species / Scientific Name (ESA Federally Listed)	Status (F = Federal S = State)	Occurrence
Southern Oregon/Northern California Coast (SONCC) ESU Coho Salmon (*Oncorhynchus kisutch)* – designated CH	Threatened (F, S)	Found in the Smith, Klamath, Salmon, and Trinity rivers. Found downstream of the SRNF in the Mad, Van Duzen and Eel rivers.
Northern California (NC) DPS Steelhead (*Oncorhynchus mykiss)* – both summer and winter runs; designated CH	Threatened SSC[12]	Species is located within the Mad, Van Duzen and North Fork Eel rivers.
California Coastal (CC) ESU Chinook salmon (*Oncorhynchus tshawytscha)* – designated CH	Threatened	Species located downstream of SRNF in the Mad, Van Duzen and Eel rivers.
Eulachon (*Thaleicthys pacificus)*	Threatened SSC	Species located in the lower Klamath River closest project location is in Yurok Experimental Forest.
Tidewater Goby (*Eucyclogobius newberryi)*	Endangered (F, S)	Tidewater goby habitat exists downstream of SRNF boundaries. It is located in the Smith River and Redwood Creek estuaries but does not travel upstream due to being restricted to low-salinity water (Swift et al.1989). This project would have no effect on tidewater goby.

Forest Service Sensitive Aquatic Species

Some of the aquatic restoration activities proposed in this draft EA are also intended to improve habitat for non-fish aquatic species. Table 3-2 below is a list of FSS non-salmonid species, their status and their occurrence in relation to the project area. (USDA Forest Service 2016). In implementing these restoration activities, the possibility exists that negative effects to species or their habitat could occur; however, with the majority of the restoration activities would result in minimal impacts. Design features and mitigations were developed to minimize impacts to these species based on timing of action, location of action and, potentially moving individuals out of the project area.

Sensitive species that occur outside of the project areas (i.e., fish bearing streams, lakes and ponds on NFS lands) or that do not have suitable habitat in the project area would not be affected and therefore not carried forward in this analysis as indicated in the following table (*Sensitive Species BE* 2018).

[12] Species of Special Concern identified in SWAP (CDFW 2015).

Table 3-2. Forest Service Sensitive/California Endangered Species Act (CESA) species.

Species / Scientific Name	Status	Occurrence and Habitat Preference	Overlap with Project Area
Upper Klamath and Trinity Rivers (UKTR) ESU Chinook salmon (*Oncorhynchus tshawytscha)*	FS Sensitive; Spring Run Petitioned at F and S; SSC	Found in the Klamath/Trinity basin above their confluence.	Located within streams in the project area.
Southern Oregon/California Coasts (SOCC) ESU Chinook salmon (*Oncorhynchus tshawytscha)*	FS Sensitive	Found in the Smith River and Klamath River up to the confluence of the Klamath/Trinity.	Located within streams in the project area.
Klamath Mountain Province (KMP) DPS Steelhead (*Oncorhynchus mykiss)* – both summer and winter runs	FS Sensitive; SSC	Found in the Smith, Klamath, Salmon and Trinity rivers. Includes summer run populations.	Located within streams in the project area.
Cutthroat Trout[13] (*Oncorhynchus clarkia)* – resident and anadromous populations	FS Sensitive; SSC	Found in the Smith River and downstream of the SRNF below the Klamath/Trinity confluence.	Located the Smith River and tributaries in the project area.
Pacific lamprey (*Entosphenus tridentatus*) / Western brook lamprey (*Lampetra richardsoni)*	FS Sensitive	Found in all rivers and many streams; however, species distribution is unknown.	Located within streams in the project area. PDF for habitat, access, timing.
Klamath River lamprey (*Entosphenus similis*)	FS Sensitive – Ukonom RD; SSC	This species of exist in the upper Klamath River upstream of Iron Gate Dam.	No known populations within the project area. PDFs for other lamprey would be applicable.
California Floater[14] (*Anodonta californiensis*)	FS Sensitive	Found in low numbers in the Klamath, Trinity, and Mad rivers with populations downstream of forest boundary in the Eel River.	Located within streams in the project area.PDF to avoid populations.
Chace Juga (*Juga chacei)*	FS Sensitive; S1[15]	Limited to spring and stream habitats that are small and cool, with coarse substrates, tributary to the Smith River.	No overlap or suitable habitat in the project area.
Pristine Spring snail (*Pristinicola hemphilli*)	FS Sensitive; S1	Occurs mostly in very small springs and seeps, but sometimes in larger springs, spring runs or strongly spring-influenced small streams.	No overlap or suitable habitat in the project area.
Western Pond Turtle (*Clemmys marmorata*)	FS Sensitive; SSC	Found throughout the forest in rivers, streams, lakes and ponds.	Located within streams and pond in the project area. PDFs to move individuals.
Southern Torrent Salamander (*Rhyacotriton variegatus*)	FS Sensitive; SSC	Preferred habitat is described as cold, permanent seeps and small streams with a rocky substrate. Found on SRNF; however, the project area is unlikely to overlap preferred habitat.	No overlap of suitable habitat.
Foothill Yellow-Legged (FYL) Frog (*Rana boylii*)	FS Sensitive; SSC; Candidate CESA	There are recorded sightings across the project area. Projects may occur in suitable breeding and rearing FYL frog habitat.	Located within streams in project area. PDFs to move individuals; timing of instream restoration.
Northern Red-Legged (NRL) Frog (*Rana aurora aurora*)	FS Sensitive; SSC	Habitat is limited across the SRNF. Incidental sightings in the Smith River NRA, the Yurok Experimental Forest, and Lower Trinity RD.	NRL frogs may overlap with streams in the project area.
Cascade Frog (*Rana cascadae)*	FS Sensitive; SSC	The project area has no overlap in suitable cascade frog habitat.	No overlap of suitable habitat within project area.

[13] Coastal cutthroat trout is under the jurisdiction of USFWS due to a primary stream resident life cycle; therefore, it was not included in the analysis under the WFRPBA. See BE for this project for more information on this species.
[14] Design features for this species would also mitigate impacts to two other freshwater mussels located within the same habitat: western pearl shell (*Margarita falcate*) and western ridged mussel (*Gonidea angulate*).
[15] S1 = NatureServe State Conservation Rank. An S1 ranking is defined as critically imperiled in the state.

Non-Salmonid Aquatic Biota Indicators

Outside the indicator of restoring instream habitat for targeted fish species and improving lake and pond habitat (modified Proposed Action), an additional indicator would be the potential for direct and indirect impacts non-salmonid aquatic species and their habitat (FSM 2670.22). Habitat effects while being beneficial to salmonid species may result in a reduction of another species habitat within the project area where instream restoration activities may occur. Effects could also range from harassment, harm and direct mortality.

Water Quality Analysis Indicator

The potential direct and indirect effects of increased sediment from the proposed activities would be primarily analyzed qualitatively as a result of channel restoration or sediment delivered through disturbance in the riparian areas are unlikely to occur until the onset of rain. Aquatic restoration actions that remove vegetation and expose soils or cause soil displacement from the use of heavy equipment are more likely to result in sediment entering the stream channel. The proximity of ground disturbing activities to riparian reserves is an important factor in controlling sediment delivery (Rashin et al. 2006). However, the proposed activities include project design features (PDF; *Chapter 2*, *Appendices A* and *B*) to ensure no adverse impacts to water quality would occur following implementation.

Wetlands and Floodplains Analysis

The purpose of Executive Order (EO) 11990 is to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands". To meet these objectives, the EO requires federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. There are no wetlands within the project area; therefore, wetlands would not be discussed further.

Executive Order 11988 – Floodplain Management (1977) requires federal agencies to avoid the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid the direct or indirect support of floodplain development. If an action must be located in a floodplain, EO 11988 requires that agencies minimize potential harm to people and property and to natural and beneficial floodplain values.

The project is designed to restore connectivity and inundation of the floodplain and increase complexity of riparian areas. Any side channels constructed would be within historic channels and would not impact people or property. The Proposed Action is designed solely to improve instream and riparian conditions for all life stages of salmonids and other aquatic species, thereby enhancing beneficial uses in the project area; therefore, floodplains would not be discussed further.

Spatial and Temporal Bounding of the Analysis Indicators

The primary spatial analysis of direct and indirect effects to aquatic TES species is the streams and lakes shown on the maps in *Chapter 2*, which include 150 feet on either side of the stream. Temporal bounding for direct effects is short term—during project implementation. Indirect effects would be both short term

(see *water quality indicator*) and long term (2 to 50 years) depending on the resource and activity. Addition of large woody debris would cause immediate complexity, improve pool depth during winter flows, whereas girdling alders to open up the canopy for conifer growth would take decades.

Direct (those occurring immediately within the project area) and indirect effects (those that occur later in time and for sediment, downstream) to water quality are expected to be short-term (1 to 2 years), when suitable vegetative cover is expected to be established and soils are no longer exposed. For cumulative watershed effects (CWE), the analysis area is the 5th-field watersheds containing proposed acres where the potential for restoration activities could occur. The CWE were analyzed over the long term (10 to 20 years). Table 3-3 lists the 5th-field watersheds addressed by the analysis. Figure 3-1 displays the spatial boundaries the effects analysis.

Table 3-3. Affected watersheds.

5th-Field Watershed Name	Watershed Acres	Watershed Acres in Project Area (%)
North Fork Smith River	101,114	1.6
Middle Fork Smith River	83,731	3.6
South Fork Smith River	186,855	3.2
Smith River	88,489	0.9
Dillon Creek	46,789	1.5
Blue Creek	80,274	2.8
Rock Creek-Klamath River	69,510	3.4
Bluff Creek-Klamath River	174,781	3.3
Turwar Creek-Klamath River	68,016	0.1
Ukonom Creek-Klamath River	87,882	1.1
Salmon River	69,348	1.1
Wooley Creek	95,116	2.3
Horse Linto Creek-Trinity River	193,890	1.7
Lower South Fork Trinity River	129,107	1.7
Big French Creek - Trinity River	172,821	0.3
Dobbyn Creek	47,924	0.1
North Fork Eel River	180,853	1.1
Lower Van Duzen River	131,789	0.1
Upper Van Duzen River	54,645	1.7
Middle Mad River	56,461	1.3
Upper Mad River	77,106	1.2

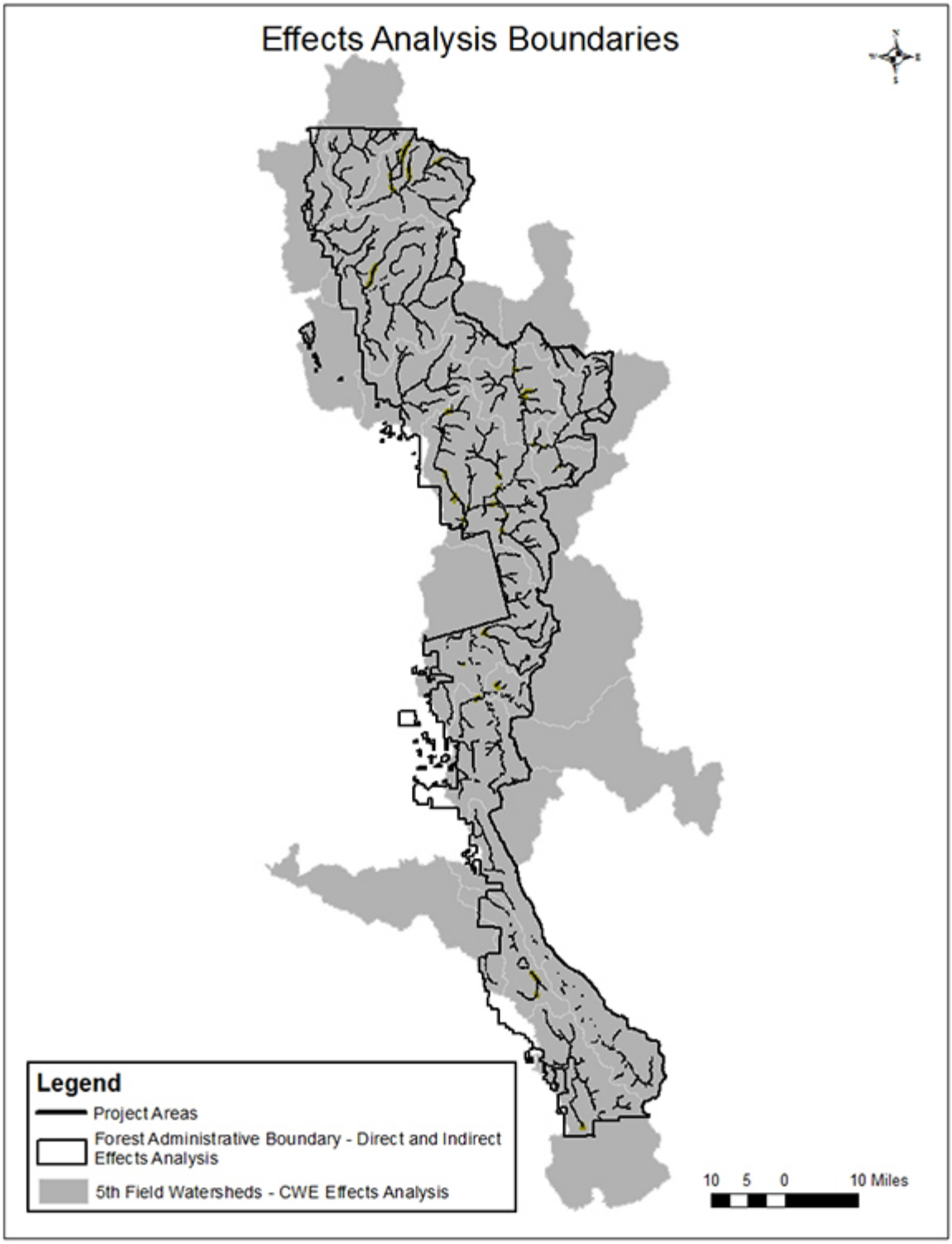

Figure 3-1. Map of cumulative watershed effects (CWE) analysis areas to water quality.

Affected Environment

The following summarizes habitat conditions and recovery goals by watershed and administrative unit existing conditions, the primary threats according to the USDA Forest Service's *Watershed Condition Framework* (USDA Forest Service 2012) recovery plans (NMFS 2014, CDFW 2015) and the CDFW *Coastal Watershed Planning and Assessment Program* (upper Van Duzen). The project area is contained within the SWAP North Coast and Klamath Province (CDFW 2015) and includes the following watersheds: Smith River, Redwood Creek, Mad River, North Fork Eel River, mainstem Eel River, Lower Eel River/Van Duzen River, Middle Klamath River, Lower Klamath River, Salmon River, Lower Trinity River, and South Fork Trinity River. The entire project is within the Southern Oregon/Northern California Coasts (SONCC) coho salmon evolutionarily significant unit (ESU), which was federally listed in 1999 with status confirmed in 2005. Coho salmon was also listed under the California Endangered Species Act in 2000 (CESA) throughout its range in California.

Consultation on the WFRP began with NOAA's NMFS in 2014. On December 15, 2015, they concluded that the WFRP implemented recovery actions, and based on the best scientific and commercial information available, the WFRP, is not likely to jeopardize the continued existence of the SONCC ESU of coho salmon or Northern California (NC) steelhead distinct population segments (DPS); and is not likely to result in the destruction or adverse modification of designated Critical Habitat (CH) for these species (CEQA §2053).

The NMFS has concurred with the SRNF's determination that the WFRP may affect, but is not likely to adversely effect, California Coastal (CC) Chinook Salmon ESU (*O. tshawytscha*) and its designated CH. The essential fish habitat (EFH) consultation was prepared pursuant to §305(b) of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA). Activities described in the Proposed Action and *Appendix A* are consistent with that consultation effort along with the corresponding biological opinion (BO; December 14, 2015), including meeting recovery goals for SONCC coho salmon and NC steelhead. The TES aquatic species distribution by basin are described by watershed below.

Basin Descriptions with focus on TES Salmonids, including Key Restoration Actions

Smith River – Smith River National Recreation Area/Gasquet Ranger District

Stream habitat conditions in the Forest Service portion of the Smith River basin have been impacted by mining, timber harvest activities and associated road construction. These activities in riparian areas have reduced the recruitment potential for large wood (LW) for decades or centuries (USDA Forest Service 1995). Early logging removing much of the streamside vegetation, particularly along larger, more accessible channels. In many cases, regeneration within these areas is now dominated by hardwoods. Hardwood dominance has the dual effect of not providing adequately sized wood to adjacent channels while suppressing conifer regeneration.

Key instream recovery actions for coho salmon include maintain or improve existing instream structures and improve riparian conditions for conifer growth. Opportunities exist to reduce riparian and aquatic invasive species (*Appendix D*).

Klamath River – Orleans and Ukonom Ranger Districts

The Klamath River once supported diverse, abundant anadromous fish runs thought to number in the millions. Now, all of the anadromous fish species inhabiting the Klamath River are in a state of serious decline (Higgins et al. 1992), especially those species or stocks that depend on summer freshwater aquatic habitat, such as coho salmon, steelhead, or spring Chinook salmon.

In the Klamath River, poor water quality during the summer season is considered a major contributing factor to the decline of anadromous fish runs (Bartholow 1995). The main causative factors behind the poor water quality in the mainstem Klamath River are the large-scale water impoundment and diversion projects above Iron Gate Dam. The large volume of water diverted significantly affects downstream flow levels and aquatic habitat. Low summer flows within the Klamath River can increase daily maximum water temperatures by slowing flow transit rates and increasing thermal loading relative to higher flows (Deas and Orlob 1999). Lower summer flows emanating from the Klamath Project (*i.e.*, released at Iron Gate Dam) are exacerbated by diminished inflow from many of the major tributaries to the middle Klamath River. Significant investments in habitat improvement and fisheries restoration have been ongoing throughout the Klamath Basin for decades.

The Klamath River is listed under §303(d) of the CWA as water quality limited (CSWRCB 2003) for nutrients, organic enrichment/low dissolved oxygen, and temperature. Aquatic species within the project area in the Klamath River basin include ESA-listed SONCC coho salmon and FSS aquatic species Upper Klamath and Trinity River (UKTR) Chinook salmon, KMP steelhead trout, Pacific lamprey, western brook lamprey, Klamath River lamprey, California floater mussel, FYL frog and western pond turtle.

Key instream recovery actions include addition of side channel rearing habitat, increasing access to cool water refugia, addition of large wood for complexity, maintenance or improvement of existing instream structures and the improvement of riparian conditions (*Appendix D*). Opportunities exist to reduce invasive species as well as improving western pond turtle habitat.

Salmon River – Ukonom Ranger District

The Salmon River is listed under §303(d) of the CWA as water quality limited (CSWRCB 2003) for nutrients, organic enrichment/low dissolved oxygen, and temperature. Aquatic species within the project area in the Salmon River basin include ESA-listed SONCC coho salmon and FSS aquatic species Upper Klamath and Trinity River (UKTR) Chinook salmon, KMP steelhead trout, pacific lamprey, western brook lamprey, Klamath River lamprey, California floater mussel, FYL frog and western pond turtle.

Elevated summer water temperatures, reduced floodplain connectivity, diminished channel structure, coarsened riverbed material, degraded riparian condition, and barriers to fish passage are all major stressors to fish in the Salmon River. Key instream recovery actions include improvements to degraded habitats for juvenile rearing habitat, overwintering habitat, and suitable spawning habitat. Opportunities also exist to reduce the spread of invasive species.

Trinity River – Lower Trinity Ranger District

Much of the Trinity River basin is under federal ownership and not managed for intensive timber harvest. The Trinity River is listed under §303(d) of the CWA as water quality limited (CSWRCB 2003) for

sedimentation/siltation. Aquatic species within the project area in the Trinity River basin include ESA-listed SONCC coho salmon and FSS aquatic species UKTR Chinook salmon, KMP steelhead trout, pacific lamprey, western brook lamprey, Klamath River lamprey, California floater mussel, FYL frog, northern red-legged frog and western pond turtle.

Key instream recovery actions include addition of large wood for complexity, maintain or improve existing instream structures and improve riparian conditions for conifers (*Appendix D*). Beaver are known to occur on several tributaries throughout the Lower Trinity and available habitat may be improved to encourage continued colonization of streams. Opportunities exist to reduce riparian and aquatic invasive species as well as improving western pond turtle habitat.

Mad River – Mad River Ranger District

The Mad River drains approximately 497 square miles of the Coast Range Geomorphic Province and empties into the Pacific Ocean north of Humboldt Bay (Mad River Watershed Assessment 2010). The upper Mad River watershed extends from the headwaters to Matthews Dam on Ruth Reservoir. NC steelhead are found below Matthews Dam. Habitat surveys within the Mad River watershed detail the low amount and small size of existing LW (primarily 1- to 2-foot diameter pieces). Due to past logging practices, flood events and development along streams, many riparian zones tend to be dominated by alder, willow, and younger conifers. Given the current vegetation age structure and past logging history along streams, recruitment of adequately sized woody debris to many Mad River tributaries is not likely to occur for several decades. The Mad River watershed is §303(d) listed for turbidity and sedimentation due to timber harvest, resource extraction, and nonpoint sources (CSWRCB 2003).

Aquatic species within the project area in the Mad River basin include ESA-listed NC steelhead and FSS aquatic pacific lamprey, western brook lamprey, FYL frog and western pond turtle. The ESA-listed SONCC coho salmon and CC Chinook salmon are located 30 miles downstream of the SRNF boundary and would not be affected by the project. In addition, Ruth Reservoir provides recreational fishing for bass and rainbow trout. Existing manzanita structures are in need of repair.

Key instream recovery actions include addition of large wood for complexity and improve riparian conditions for conifers (*Appendix D*). Opportunities exist to reduce riparian and aquatic invasive species as well as improving western pond turtle habitat.

Eel River – Mad River Ranger District

Historic land and water management, specifically large-scale timber extraction and water diversion projects, contributed to a loss of habitat diversity within the mainstem Eel River and many of its tributaries. The Eel River is listed under §303(d) of the CWA as water quality limited due to excessive sediment and high water temperatures (CSWRCB 2003). Essential habitat feature limitations include high water temperatures, low instream cover levels, high sediment levels, and low LW abundance.

The **North Fork Eel River** watershed is a very rugged and remote watershed characterized by gentle upland terrain that has been dissected by steep, inner gorge canyons. The bulk of sediment generated by landslides is of natural, non-management related origin. The mainstem North Fork Eel River is primarily low

gradient interspersed with higher-gradient boulder and bedrock stretches. The channel is defined by large amounts of course sediment (e.g., gravel, cobble, boulder) especially in the mainstem and major tributaries.

For the North Fork Eel River and its tributaries, Tom Keter, SRNF archaeologist (Keter 1995), states that long-time residents of the area interviewed agreed that 40 to 60 years ago the streams within that basin used to run at higher water levels in the summer than they do today. Split Rock (River Mile 5 in the North Fork Eel River) was previously thought to limit the upstream migration of *P. grandis*; however, surveys done by the USDI Bureau of Land Management (BLM), Round Valley Indian Tribes and Eel River Recovery Group have documented an adult and a few juveniles up to Hulls Creek. Water quality within the North Fork Eel River is listed as sediment and temperature impaired under §303(d) of the CWA and was assessed through the Total Maximum Daily Load (TMDL) process. Aquatic species within the project area in the North Eel River basin include ESA-listed NC steelhead and FSS aquatic species pacific lamprey, western brook lamprey, FYL frog and western pond turtle. Endangered Species Act-listed SONCC coho salmon and CC Chinook salmon are located downstream of the SRNF boundary and would not be affected by the project.

Key instream recovery actions include addition of large wood for complexity, maintenance or improvement of existing instream structures, improvement of riparian conditions for conifers and the reduction of invasive species (*Appendix D*). Opportunities exist to reduce riparian and aquatic invasive species as well as improving western pond turtle habitat.

The **Van Duzen River** watershed reflects a long legacy of upstream and upslope impacts coupled with the effects of continued instream disturbances. The Van Duzen River is listed under §303(d) of the CWA as water quality limited due to excessive sediment (CSWRCB 2003). Much of the available salmonid habitat within the Van Duzen watershed is downstream of NFS lands and has high levels of sediment, low pool density, high water temperatures, and low instream cover levels (CDFW Coastal Watershed Planning and Assessment Program). The upper Van Duzen has higher quality habitat, cleaner gravels and more boulder areas to provide cover. A recent genetics study indicates steelhead occasionally reach the upper watershed (personal communication, Bret Harvey, Pacific Southwest Research Station) migrating past Eaton Falls. The Little Van Duzen and associated tributaries are known to contain populations of NC steelhead. Aquatic species within the project area that in the Van Duzen basin include ESA-listed NC steelhead and FSS aquatic species pacific lamprey, western brook lamprey, FYL frog and western pond turtle. The ESA-listed SONCC coho salmon and CC Chinook salmon are located downstream of the SRNF boundary and would not be affected by the project.

Key instream recovery actions include addition of large wood for complexity, opening access to cool water refugia, maintenance or improvement of existing instream structures and improvement of riparian conditions by planning and creating openings for conifers (*Appendix D*). Opportunities exist to reduce riparian and aquatic invasive species as well as improving western pond turtle habitat.

Species Descriptions

Anadromous ESA-listed and FS Sensitive Salmonids and their Designated Critical Habitat

The emphasis of this *Aquatic Restoration Project* is on meeting recovery actions for TES anadromous salmonids while minimizing short-term negative effects (*Chapters 1* and *2*; *Appendices A*, *B* and *C*). Distribution and habitat conditions for these species are summarized in the basin descriptions above. A complete analysis is found within the WFRPBA (2015) which is incorporated by reference.

Forest Service Sensitive Aquatic Species

Based on distribution of FSS aquatic species and location of project area, the following species would not be affected by the Proposed Action and therefore would not be carried forward for analysis: ESA-listed eulachon, tidewater goby, and FSS species Chace juga, pristine spring snail, and southern torrent salamander (*Aquatic Restoration Project BE – Wildlife, Aquatic and Botanical Forest Service Sensitive Species* (2018)). Species that may be affected by the proposed activities are below.

Coastal Cutthroat Trout (Oncorhynchus clarkia)

Forest Service Sensitive/California Species of Special Concern – Coastal cutthroat trout exhibit diverse patterns in life history and migration behaviors. Population of coastal cutthroat trout show marked differences in their preferred rearing environments (river, lake, estuary, or ocean); size and age at migration; timing of migrations; age at maturity; and frequency of repeat spawning. Cutthroat require cool water, diverse and complex habitat, and clean gravels to reproduce successfully. Habitat needs of cutthroat are similar to coho, therefore no additional mitigations or design features are necessary.

Lamprey Species

Lamprey are specialized aquatic vertebrates, eel-like in form but lacking the jaws and paired fins of true fishes. Generally, adults migrate upstream from a large body of water into a tributary stream to spawn. They build a nest in a gravel-bottomed area, spawn and usually die. The embryos hatch and the lamprey larvae or ammocoetes are carried downstream to mud- or sand-bottomed backwaters and edges. They burrow into the bottom and spend the next few years growing on a diet of detritus and algae. There are three species of lamprey found within the project area.

Pacific Lamprey (Entosphenus tridentatus)

Forest Service Sensitive Species – Pacific lamprey are anadromous with migration to the ocean occurring in the winter and early spring. As adults in the ocean, Pacific lamprey are parasitic and feed on the body fluids and blood of marine fishes. After spending 1 to 3 years in the marine environment, Pacific lamprey stop feeding and migrate back to freshwater between February and June. They overwinter in fresh water until they spawn the following year between March and July. After spawning, lamprey die within days. Shortly after hatching in freshwater streams between April and August, ammocoetes drift downstream into areas of low velocity and fine substrates where they burrow, and live as filter feeders for up to 7 years.

Declines in Pacific lamprey are largely unrecognized in part because they still occupy much of their historic range and most streams seems to retain at least small runs. However, the latter may be due to a low degree of fidelity to spawning areas (Goodman et al. 2008) so recolonization of altered streams may

occur quickly when better conditions return. Thus, a few rivers with relatively large populations may sustain populations in neighboring smaller streams. The US Fish and Wildlife Service (USFWS) recognizes the need for a comprehensive plan to conserve and restore Pacific lamprey in collaboration with Native American tribes; federal, state, and local agencies; and other entities. The *Pacific Lamprey Conservation Initiative* is the USFWS's strategy to improve the status of Pacific lamprey throughout their range by helping implement research and conservation actions. The landscape level approach of the Conservation Initiative is a three-part process: 1) an assessment and template for conservation measures (assessment); 2) a conservation agreement; and 3) regional implementation plans. The assessment was completed in October 2011 and the conservation agreement completed on June 2012. The next steps in the Conservation Initiative are to work with partners to develop regional plans for implementing conservation actions.

Western Brook Lamprey (Lampetra richardsoni)

Forest Service Sensitive Species – Western brook lamprey are likely to have significant population structure in coastal areas because neither adults nor larvae are capable of entering salt water or of making long-distance movement within a river system (Kostow 2002, Moyle 2002). Kostow (2002) believes that many populations are likely in complete isolation and have been for thousands of years leading to distinct population segments in the Columbia Basin, because they do not move much within or between basins. Lamprey spawning, development and habitat conditions are very similar between species (see *Pacific lamprey discussion* above).

Klamath River Lamprey (Entosphenus similis)

Forest Service Sensitive/California Species of Special Concern – Details about the life history of this species are largely unknown. It is parasitic and non-anadromous. Kan (1975) described the ammocoetes and metamorphosing life stages to be very much like those of the Pacific lamprey.

Key mitigations and design features for lamprey species would include review and integration of the *Best Management Practices to Minimize Adverse Effects to Pacific Lamprey* (USDI Fish and Wildlife Service 2010) during project development and planning, including timing of instream work, avoidance of nests and backwater habitat, and passage considerations for lamprey. Timing of instream enhancement would to avoid impacts to anadromous salmonids and ESA wildlife species would be sufficient to protect lamprey nests, eggs and emerging larvae (USDI Fish and Wildlife Service 2010).

California Floater Freshwater Mussel (Anodonta californiensis)

Forest Service Sensitive – Anodonta californiensis occurs in "lakes and slow rivers" (Taylor 1981), "generally on soft substrates (mud-sand), in fairly large streams and lakes only, in relatively slow current; a low elevation species" (Frest and Johannes 1995). Howard and Cuffey (2003) found that *A. californiensis* was almost exclusively found in pools, with no occurrences in riffles and very few in runs in the South Fork of the Eel River. Davis et al. (2010) discovered a small population of Anodonta below Iron Gate Dam on the Klamath River, Individuals are believed to reach sexual maturity in about seven years and live 10 to 20 years. Mussels are present year round and seasonal restrictions for mobile species do not protect freshwater mussels (Blevins et al. 2017). Mussels are relatively immobile, and an individual mussel may

have been present for decades. Anodanta may be found within mussel beds containing western pearlshell and gonidea, two (2) more common freshwater mussels found within the project area.

Key mitigations and design features based on overlap with distribution and life history would be integrated during project planning and would include primarily of avoidance of existing mussel beds in site selection and project type (Blevins et al 2017).

Frogs

Foothill Yellow-legged Frog (Rana bolyii)

Forest Service Sensitive, California State Candidate – The foothill yellow-legged (FYL) frog is found in or near rocky streams or rivers in a variety of habitats. Pebble/cobble river bars along both riffles and pools, with at least 20 percent shading, seems to be preferred habitat by sub-adults and adults. Breeding habitat, the most likely to be affected by instream projects, occur in wide, shallow, slow flowing water with at least some pebble and cobble substrate often near confluences with tributaries (Lind and Fuller 1995, Kupferberg 1996). Breeding and egg laying usually wait until the end of spring flooding, and may commence anytime from Mid-March to mid-June, depending on the occurrence of spring rains. *Rana boylii* show high fidelity to breeding sites (Kupferberg 1996). Metamorphosis occurs in low-flow backwaters 4 to 5 months after hatching (Jones et al. 2005). Foothill yellow-legged frogs are diurnal with adults often basking on exposed rock surfaces near streams. When disturbed, they dive into the water and take refuge under submerged rocks or sediments. During periods of inactivity, individuals seek cover under rocks, in the rocks or on shore within a few meters of water. Wheeler and Welsh (2008) studied a breeding population on Hurdygurdy Creek on the Smith River National Recreation Area (NRA, Gasquet Ranger District (RD)) from 2002 to 2007. The CNDDB (2013) reports 227 occurrences of this species within Del Norte, Humboldt, Siskiyou, Trinity and Mendocino counties. The FYL frog is common across the forest with observations on all districts.

Northern Red-legged Frog (Rana aurora aurora)

Forest Service Sensitive, California Species of Special Concern – Red-legged frogs are inhabitants of moist forests and riparian areas usually below 2876 feet (850 meters) in elevation. They are generally found near permanent bodies of quiet water including small ponds, quiet pools along streams, springs, lakes, and marshes (Gordon 1939, Nussbaum et al. 1983, Stebbins 2003). Northern red-legged frogs usually breed from December to March, soon after the ice melts from spawning areas and water temperatures reach at least 6 or 7°C (Licht 1971). The females joins the male and 750 to 2,000 eggs are then attached to vegetation at depths of up to 23 inches (60cm) below the surface (McAllister and Leonard 2005). Habitat for this species is limited across the SRNF. Incidental sightings have been recorded in the northwestern section of the Smith River NRA, the Yurok Experimental Forest, and the western edge of the Lower Trinity RD.

Key mitigations and design features based on overlap with life history would be integrated during project planning and would include: Timing of instream work would be during lowest flows and would therefore avoid breeding and egg-laying; choosing project location and project type to minimize changes

to habitat of known breeding sites; and, consideration of moving individuals during heavy equipment use (CDFW 2018, USDA Forest Service 2016).

Western Pond Turtle (Clemmys marmorata)

Forest Service Sensitive, California Species of Special Concern – The western pond turtle inhabits fresh or brackish permanent and intermittent water from sea level to about 4,500 feet (1,372 meters). Turtles are often concentrated in low gradient and low velocity sections of creeks and rivers, especially in sloughs, side channels and backwater areas. Adults prefer creeks that have deep still water, sunny banks and undercuts which are used as refugia from predators. Basking structures are important habitat elements, and may be particularly important along channels that are dammed where water temperatures are often lower than undammed sites (Reese and Welsh 1998). Potential basking sites include protruding or floating woody debris, protruding rocks, emergent vegetation, overhanging vegetation that touches the water, and banks. According to Jennings et al. (1992), activity begins in March, peaks in June/July, decreases gradually in August, increases briefly in September, and usually terminates in November. Some of the population leave the watercourse in October-November and move into adjacent upland habitats to overwinter under the duff layer until March/April. They can overwinter up to 500 meters from the watercourse (Reese and Welsh 1997). Hatchlings over-winter in the nest, and move to the watercourse in early spring, usually March or April. Management direction calls for maintaining habitat characteristics consistent with their habitat capability model within 300 feet (91 meters) of occupied pond and stream habitat.

Key mitigations and design features based on overlap with life history would be integrated during project planning and include heavy equipment on existing roads and access points and would not affect breeding habitat. Timing of instream work would be during lowest flows and would avoid breeding and egg-laying; choosing project location and project type to minimize changes to maintain habitat characteristics (i.e., basking sites) and, consideration of moving individuals during heavy equipment use. Project activities include specifically target western pond turtle habitat to increase basking opportunities.

Environmental Consequences

Alternative 1 – No Action

Direct Effects – All Aquatic Species

Under the No Action alternative, there would be no direct effects to TES aquatic species, as potentially harmful activities would not occur within occupied habitat (Forest Service Handbook (FSH) 2670, CEQA §21000(c)).

Indirect and Cumulative Effects to Aquatic Species and Water Quality

The No Action alternative would have indirect and cumulative effect on recovery of TES aquatic species as the habitat would not be restored or enhanced. Instream habitat would continue to be limited for juvenile salmonids without restoring habitat connectivity and enhancing instream habitat complexity. Ponds and riparian areas would not have invasive species removed nor would improvements occur for western pond turtles. No long-term beneficial actions would occur.

With no ground-disturbing aquatic restoration actions occurring, soil and vegetation would not be disturbed across the watersheds. Therefore, the No Action alternative poses no direct effects (within either the short two-year, or long twenty-year timeframe) to water resources. The No Action alternative would have slight indirect effects on water quality due to not treating bank stability or sediment input from recreation, livestock and existing failing structures, thus, sediment could continue to enter the stream network from current baseline.

Alternative 2 – Proposed Action (Modified)

The following is a summary of the analysis done in the WFRPBA for anadromous salmonids (Kenfield 2015). Since the Proposed Action within the WFRPBA, incorporated into this draft EA, are intended to result in positive changes aquatic species and their habitat, the analysis focused on the effects of programmatic activities on individual habitat indicators of stream habitat (i.e., water quality, LW, pool quality). These programmatic actions may result in some degree of short-term adverse effects to fish or their habitat given the results of the proximity, magnitude and probability of the project to impact ESA fish or their habitat.

For each habitat indicator, the following analysis was done, using the best available science on the relationship between the indicator and salmonids. For non-anadromous FSS species, additional science was pulled into the *Aquatic Restoration Project BE – Wildlife, Aquatic and Botanical Forest Service Sensitive Species* (2018) prepared for this draft EA.

Salmonids

Direct Effects to TES Salmonids

Direct effects to TES salmon and steelhead could occur through three (3) potential pathways:

1. Fish may be incidentally injured or killed by all activities involving heavy equipment within the stream channel.
    - These direct effects would be minimized though timing of the project to avoid sensitive life stages and, for intensive instream projects, moving individuals outside the area being worked on and screening to prevent reentry.
2. Projects that occur in occupied habitat may involve isolation, capture, handling, transport, and relocation of TEP salmonids when the potential impacts of the action outweigh the potential that fish handling has the potential to result in fish injury or death.
    - These direct effects would be minimized by implementing NMFS fish-handling guidelines (WFRPBA Appendix B-2).
3. Project results in sediment entering occupied habitat such that individual behavior is significantly altered, or harm[16] occurs. Increased turbidity during the summer and early fall may result in short-term behavioral changes of juvenile salmonids (Newcombe and Jensen 1996). Behavioral changes

[16] Harm under the ESA is defined as significant habitat modification that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding or sheltering.

include changes in feeding, predator detection, and avoidance of sediment plumes up to 1,500 feet downstream of the disturbance, such that juvenile salmonids would temporarily be displaced into different habitat.

- These effects would be minimized by timing of Proposed Action in relationship to flows/onset of wet weather and implementation of water quality BMPs (*Appendix B*) that focus of preventing sediment from entering the stream channel. Increases in turbidity and sedimentation from in-stream equipment use would be temporally and spatially staggered throughout the season and action area. During low flows, any sediment entering the stream would quickly settle out and not result in behavioral changes.

Indirect Effects on TES Salmonid Habitat

The following is a summary of the indirect effects analysis done in the WFRPBA for anadromous salmonids (2015). Since the Proposed Action within the WFRPBA, incorporated into this draft EA, is intended to result in positive changes aquatic species and their habitat, the analysis focused on the effects of programmatic activities on individual habitat indicators of stream habitat (i.e., water quality, LW, pool quality).

Beneficial Effects

The aquatic restoration activities proposed would improve or restore one or more of the following habitat indicators: stream structure/complexity, stream sinuosity and length, bank stability, floodplain connectivity, and riparian vegetation structure and diversity. Such results would promote conditions that maintain or decrease stream temperature, reduce turbidity (via stable banks, improved sediment retention through increased channel structure, riparian areas, and floodplains), and improved nutrient input (via improved riparian conditions) and retention (via increased channel structure, sinuosity, and floodplain areas).

Fish passage restoration through opening cool water refugia or the maintenance or removal old structures would movement of individuals at low flows. Removing or fixing these historic structures would allow for uninhibited stream access for migrating and rearing fish increasing accessible habitat. Riparian activities may not provide immediate benefits but would provide long-term benefits by managing invasive plants and encouraging confer growth.

Large wood and boulder placement would enhance habitat elements for rearing salmonids A literature review by Roni et al. (2014) reported that the vast majority of studies on wood placement have reported improvements in physical habitat (e.g., increased pool frequency, cover, habitat diversity) with most evaluations of fish response showing a positive response from salmonids. The resulting effect of LW on fish habitat is significant. Crispin et al. (1993) noted increased salmon spawning activity in an area where gravels accumulated behind LW. Bjornn and Reiser (1991) cited several studies that documented an increase in fish densities with higher levels of LW, and Fausch and Northcote (1992) documented that coho salmon and cutthroat trout production was greater in LW-dominated streams, where pools, sinuosity, and overhead cover were greatest. Developing side channels would increase adult and juvenile rearing habitat where low flows and cooler water temperatures would provide refugia from mainstem temperatures. Streambank restoration projects would decrease direct sediment inputs into the stream channel, thereby enhancing conditions for juvenile rearing within channel substrate.

Indirect Effects of Sediment/Turbidity on Habitat

Increased levels of sedimentation often have adverse effects on fish habitats and riparian ecosystems. Fine sediment deposited in spawning gravels can reduce egg survival and developing alevins (Everest et al. 1987; Hicks et al. 1991) by reducing the availability of dissolved oxygen in the gravel. Primary production, benthic invertebrate abundance, and thus, food availability for fish may be reduced as sediment levels increase (Cordone and Kelley 1961; Loyd et al. 1987) due to reductions in photosynthesis within murky waters. Social (Berg and Northcoate 1985) and feeding behavior (Noggle 1978) can be disrupted by increased levels of suspended sediment. Robichaud et al. (2010) documented that sediment influxes into streams, which create turbidity, were lower in natural (undisturbed) forests relative to disturbed sites created by land management activities.

Increases in suspended sediment and turbidity from most of the project types is expected to be minor and temporary due to the small footprint of most projects, the work season window, (dry season, low flow conditions). In-stream projects with equipment operations or other forms of disturbance within the wetted channel, and/or adjacent streambank are likely to cause small and short-term increases in turbidity at, and downstream of, instream project implementation sites. Suspended sediment and turbidity caused by disturbance in the channel would cause a short-term (i.e., a few hours or less) and small (i.e., less than one-half a channel width wide, extending for approximately a few hundred feet downstream) plume of turbidity during the summer or early fall months when the water in the action area would otherwise be clear.

Summer Effects

Even with minimization measures, in-stream equipment use may result in short-term turbidity and suspended sediment increases up to 1,500 feet downstream of the activity's location, based on observations of similar construction activities in other rivers (NMFS - Free *pers. comm.* 2009). Background levels of turbidity are low during the summer and early fall months, as is river flow that is required to transport fine sediment downstream and out of the action area. During instream activities, it is expected that small and short-term increases in turbidity would result in a decrease in the salmonid prey base up to 1,500 feet downstream of the source of input due to settling of fine sediment on substrates (NMFS 2010).

First Winter Storm Effects

The fall and winter storms of the water year (water year defined as October 1 to September 31 of each calendar year) may expose adult and juvenile steelhead, and adult and juvenile coho salmon, to increases in turbidity from both background and restoration activities. The first storms of the year typically have the highest relative turbidity because natural erosional and human related processes produce fresh material for transport during the drier summer and early fall months.

Minimization Measures and Limits to Proposed Action

Limits are imposed due to meeting TMDL requirements that limit the potential for cumulative effects. Limits on number of projects per watershed were also identified. Furthermore, SRNF would minimize impacts related to increases in suspended sediment and turbidity by implementing multiple erosion control, water quality protection, and sediment containment minimization measures and BMPs described above.

The effects of sediment entering the stream channel would be minimized by GACMs and design criteria (*Appendix A*), and water quality BMPs (*Appendix B*) which are considered to be SOPs for instream enhancement as defined by consultation with NMFS and CDFW salmonid restoration programs. These PDC and BMPs aimed to minimize the amount of fine sediment disturbance and associated turbidity would be included in all stages of the project, but even with minimization measures, in-stream disturbance may result in short-term turbidity and suspended sediment increases based on observations of similar construction activities in other rivers.

Cumulative Effects – Salmonids

Cumulative effects are the result of incremental impacts of the Proposed Action when added to other past, present, and reasonably foreseeable actions, both on NFS lands and adjacent federal, state, or private lands (40 CFR 1508.7). The baseline for cumulative effects analysis is the current condition as described previously in the affected environment section and in the WFRPBA (2015). The majority of past management activities have occurred outside of riparian reserves. The project was designed to minimize cumulative effects by limiting the number of projects occurring in a single 5th-field watershed (see p. 41) in a single year.

All restoration activity categories result in short-term negative impacts to the turbidity and substrate/sediment indicators in proximity to listed fish species, FSS salmonids and within designated CH. All restoration activities would also result in incremental, long-term improvements to instream and riparian habitat for TES salmonids.

Forest Service Sensitive Aquatic Species

Direct Effects to Forest Service Sensitive Aquatic Species

Direct effects to FSS aquatic species could occur, however, design features, mitigation measures would reduce the significance of each of the below pathways:

- Foothill yellow-legged frogs, northern red-legged frogs, lamprey, California mussels and western pond turtle may be incidentally injured or killed by all activities involving heavy equipment within the stream channel, and for species with a terrestrial life stage, within the riparian area.
- These direct effects would be minimized though timing of the project to avoid sensitive life stages and, for intensive instream projects, moving individuals (frogs and turtles) outside the area being worked on and screening to prevent reentry.
- Direct effects would be minimized, as all mussel beds would be avoided. It is unknown the number of California floaters that are in any mussel beds since it can be co-located with non-TES mussels. Mussels are relatively immobile; therefore avoiding mussel beds would protect them.
    - If avoidance is not possible, then follow salvage and relocation BMPs as described in publications such as Blevins et al. 2017.

Indirect Effects to Forest Service Sensitive Aquatic Species Habitat

Site-specific interdisciplinary planning would occur early on so surveys and site-specific design features could be identified based on the site and resource-specificity of the project location.

The majority of the proposed activities do not involve changes to stream morphology such that there would be a significant change in the types of habitat being impacted in any given watershed. Projects would typically occur over a short distance (i.e., an existing instream structure, a pool, a flat-water area) such that suitable habitat would be available.

- **Coastal Cutthroat Trout (***Oncorhynchus clarkia***):** Coastal cutthroat trout habitat in the Smith River would follow the same general effects as that of ESA-listed coho salmon as their habitat is similar. Overall, habitat would be improved though actions aimed at coho salmon where they overlap, and, for activities specifically aimed at improving cutthroat habitat. Potential negative impacts would be related to sediment and turbidity; however, the same planning, design criteria, mitigations, and BMPs would apply.
- **Lamprey Species:** Indirect effects to lamprey habitat could occur through changing of habitat and flow conditions. However, additional suitable habitat for lamprey could also be created as both salmon and lamprey use clean gravels for spawning. The insignificant amount of sediment delivered into lamprey habitat could impact spawning gravels, and, potentially settle out in backwater conditions for ammocoetes habitat. Early consideration of lamprey in the project design, including USFSW BMPs for lamprey, would minimize impacts to lamprey species by avoidance of spawning and backwater areas and including passage considerations for lamprey when designing or modifying structures.
- **California Floater Freshwater Mussel** (*Anodonta californiensis*): Indirect effects to California floater habitat could occur through changing of habitat and flow conditions. Early consideration of mussels in the project design would minimize impacts to lamprey species by avoidance of mussel beds. As mussels are filter feeders that live in soft substrate, minor amounts of sediment would not impact *Anodonta*.
- **Frogs**: Indirect effects to frog habitat could occur during instream restoration activities. Breeding habitat, the most likely to be affected by instream projects, occur in wide, shallow, slow flowing water with at least some pebble and cobble substrate often near confluences with tributaries (Hayes et al. 2016). Foothill yellow-legged frogs are common within the project areas whereas, northern red-legged frogs are incidental. Effects would be minimized for both species by implementing BMPs during planning and implementation (CDFW 2018, Hayes et al. 2016).
- **Western Pond Turtle** (*Clemmys marmorata*): Indirect effects would be positive when basking platforms are added within occupied streams and ponds. Management direction calls for maintaining habitat characteristics consistent with their habitat capability model within 300 feet (91 meters) of occupied pond and stream habitat. Heavy equipment would be on existing roads and access points and would not affect breeding habitat. Timing of instream work would be during lowest flows and would avoid breeding and egg-laying; choosing project location and

project type to minimize changes to maintain habitat characteristics (i.e., basking sites) and, consideration of moving individuals during heavy equipment use.

Cumulative Effects – Forest Service Sensitive Aquatic Species

Cumulative effects are the result of incremental impacts of the Proposed Action when added to other past, present, and reasonably foreseeable actions, both on NFS lands and adjacent federal, state, or private lands (40 CFR 1508.7). The baseline for cumulative effects analysis is the current condition as described previously in the affected environment section and in the biological evaluation prepared for this draft EA (*Sensitive Species BE* 2018). The majority of past management activities have occurred outside of riparian reserves.

All restoration activity categories result in short-term negative impacts to the turbidity and substrate/sediment indicators in proximity to sensitive species, management indicator species (MIS), listed fish species, and within designated CH. All restoration activities would also result in incremental, long-term improvements to instream and riparian habitat for aquatic FSS species.

Summary of Effects to Forest Service Sensitive Aquatic Species

The Proposed Action (modified) may result in minor affect individual aquatic sensitive species during instream restoration activities and site-specifically improve or reduce a portion of suitable habitat. Project planning and implementation of design features would minimize impacts. A biological evaluation for FSS species is located within the project file.

Water Quality

Direct and Indirect Effects to Water Quality

In the short-term (one to two years) timeframe, proposed instream habitat enhancement actions have the potential to increase sediment loads within downstream reaches of the analysis watersheds. While sediment is a natural and necessary part of every fluvial system, it is physically and ecologically important to avoid contributing excess sediment by anthropogenic means. Where soil and vegetation are disturbed by excavation (for example, side channel construct and log placement), water is more likely to mobilize sediment to a stream channel. In addition, excavation activities would occur in an area of moist soils immediately adjacent to and directly connected to the stream channel, which elevates sedimentation risk. Within the long-term timeframe, vegetation is expected to have fully stabilized any disturbed soil associated with the actions.

Although impacts to water quality within both the short and long term is possible, should any occur, they would be short-lived, very localized and insignificant (see WFRPBA). When one considers the small areas of actual disturbance in comparison to the expected benefits of restoration actions, it is clear the overall potential effects on the sediment regime should be very small (insignificant), if not imperceptible, within the short-term and absent during the long-term.

Watershed Cumulative Effects

The proposed activities would occur within 21 5th-field watersheds to improve aquatic habitat and protect beneficial uses of water quality. The upper limits of actions to be imposed by 5th-field watersheds would constrain the affected area to less than 4 percent of the total watershed acres (Table 3-3) to ensure the

intensity of actions would not contribute to adverse cumulative effects. Detailed PDFs that employ tested BMPs, provides implementers with the tools mitigate and avoid undesired outcomes. Because the anticipated direct and indirect effects are not expected to adversely affect water quality and its beneficial uses; therefore, the proposed actions are unlikely to significantly contribute to adverse CWE.

Determinations

For sensitive aquatic species (i.e., non-anadromous salmonids, invertebrates and herpetofauna), based on the size, nature and duration of these road maintenance activities, it is the determination of the fisheries biologist that the Proposed Action may impact individuals but would not result in a trend towards federal listing or loss of viability.

Table 3-4 displays threatened, endangered, sensitive and proposed species (TESP), their status, and the effects determination.

Table 3-4. Threatened, endangered, sensitive and proposed species, their status, and effects determination.

Species / Scientific Name	Status (F=Federal, S=State)	Determination
ESA Federally Listed		
Southern Oregon/Northern California Coho Salmon (*Oncorhynchus kisutch)* – designated CH	Threatened (F, S)	MALAA for the potential for individuals to be harmed, including mortality, due to instream restoration activities. Sediment input are not expected to rise to the level of significant impacts to species or their habitat.
Northern California Steelhead (*Oncorhynchus mykiss)* – both summer and winter runs; designated CH	Threatened; SSC[17]	MALAA for the potential for individuals to be harmed, including mortality, due to instream restoration activities. Sediment input are not expected to rise to the level of significant impacts to species or their habitat.
California Coastal Chinook salmon (*Oncorhynchus tshawytscha)* – *d*esignated CH	Threatened	No Effect as species is located downstream of SRNF in the Mad, Van Duzen and Eel rivers and any sediment generated by the project would be minimal due to limited ground-disturbing actions in these watersheds and the application of BMPs.
Eulachon (*Thaleicthys pacificus*)	Threatened; SSC	No Effect as the species is only located in the lower Klamath River and does not migrate up in High Prairie Creek in the Yurok Experimental Forest.
Tidewater Goby (*Eucyclogobius newberryi*)	Endangered (F, S)	No Effect as the tidewater goby is restricted to low-salinity water in the Smith River and Redwood Creek estuaries.
Forest Service Sensitive / CESA Anadromous Salmonid Species		
Upper Klamath and Trinity Rivers ESU Chinook salmon (*Oncorhynchus tshawytscha)*	FS Sensitive; Spring Run Petitioned at F and S; SSC	May impact individuals, not likely to lead to trend for federal listing.
Southern Oregon/California Coasts ESU Chinook salmon (*Oncorhynchus tshawytscha)*	FS Sensitive	May impact individuals, not likely to lead to trend for federal listing.
Klamath Province DPS Steelhead (*Oncorhynchus mykiss)* – both summer and winter runs	FS Sensitive; SSC	May impact individuals, not likely to lead to trend for federal listing.
Cutthroat Trout (*Oncorhynchus clarkia)* – resident and anadromous populations	FS Sensitive; SSC	May impact individuals, not likely to lead to trend for federal listing.
Pacific lamprey (*Entosphenus tridentatus*) / Western brook lamprey (*Lampetra richardsoni)*	FS Sensitive	May impact individuals, not likely to lead to trend for federal listing.

[17] Species of Conservation Concern identified in SWAP (CDFW 2015).

Species / Scientific Name	Status (F=Federal, S=State)	Determination
Klamath River lamprey (*Entosphenus similis*)	FS Sensitive – Ukonom RD; SSC	May impact individuals, not likely to lead to trend for federal listing.
California Floater (*Anodonta californiensis*)	FS Sensitive	May impact individuals, not likely to lead to trend for federal listing.
Chace Juga (*Juga chacei)*	FS Sensitive; S1	May impact individuals, not likely to lead to trend for federal listing.
Pristine Spring snail *(Pristinicola hemphilli)*	FS Sensitive; S1	May impact individuals, not likely to lead to trend for federal listing.
Western Pond Turtle (*Clemmys marmorata*)	FS Sensitive; SSC	May impact individuals, not likely to lead to trend for federal listing.
Southern Torrent Salamander (*Rhyacotriton variegatus*)	FS Sensitive; SSC	May impact individuals, not likely to lead to trend for federal listing.
Foothill Yellow-Legged (FYL) Frog (*Rana boylii*)	FS Sensitive; SSC; Candidate CESA	May impact individuals, not likely to lead to trend for federal listing.
Northern Red-Legged (NRL) Frog (*Rana aurora aurora*)	FS Sensitive; SSC	May impact individuals, not likely to lead to trend for federal listing.
Cascade Frog (*Rana cascadae)*	FS Sensitive; SSC	May impact individuals, not likely to lead to trend for federal listing.

Regulatory Framework

Land and Resource Management Plans

All proposed activity categories comply with the land and resource management plans (LRMPs or forest plans) including implementation of the Aquatic Conservation Strategy (ACS).

National Forest Management Act

Use of water quality and other resource protection BMPs in national forests are required by the National Forest Management Act (NFMA), and prescribed in the LRMPs. Consequently, all land management activities, must be implemented using BMPs for control of non-point source water pollution (USDA Forest Service 2011).

Federal and State Laws, Consultation

Endangered Species Act of 1973

The *Watershed and Fisheries Restoration Program BA* (WFRPBA 2015), along with the site-specific review process in this draft EA (*Appendix C*), and corresponding NMFS BO (NMFS 2015) satisfies §7 consultation requirements for ESA-listed anadromous fish.

Currently no salmonids are listed as endangered or proposed for listing. In the event anadromous salmonids are proposed for listing under the ESA, SRNF would re-initiate consultation with NMFS.

Anti-degradation Environmental Protection Agency policy 40 CFR 131.12

This policy states that existing water quality, even when it exceeds required levels for stated beneficial uses, would be maintained.

California Environmental Quality Act and California Endangered Species Act

The California Endangered Species Act (CESA) was enacted in 1984 to parallel the federal ESA and allows the California Fish and Game Commission (CFGC) to designate species, including plants, as threatened or endangered. The CESA makes it illegal to import, export, *take*, possess, purchase, sell, or attempt to do any of those actions to species that are designated as threatened, endangered, or candidates for listing, unless permitted by CDFW. *Take* is defined as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." There are 156 species, subspecies, and varieties of plants that are protected as threatened or endangered under CESA. Under CESA, CDFW may permit take or possession of threatened, endangered, or candidate species for scientific, educational, or management purposes, and may also permit take of these species that is incidental to otherwise lawful activities if certain conditions are met. Some of the conditions for incidental take are that the take is minimized and fully mitigated, adequate funding is ensured for this mitigation, and that the activity would not jeopardize the continued existence of the species.

Clean Water Act and the Water Quality Act

This project is also consistent and compliant with the CWA of 1977 and the Water Quality Act of 1987. Potential effects of the Proposed Action do not constitute a significant degradation of quality or impair existing beneficial uses through surface runoff of sediment and chemicals or chemicals entering water bodies through groundwater sources.

Invasive Species

Introduction

This section presents the scientific and analytical basis for assessing the risk of introduction or spread of invasive plant species based upon the direct, indirect and cumulative effects of the Alternative 1 (No Action alternative), as compared to Alternative 2 (modified Proposed Action) (40 CFR §§1502.16 and 1502.24; CEQA §21002.1(d)). The discussion below focuses on the current conditions under the No Action alternative, demonstrating the agency recognizes risk of seed introduction and dispersal vectors are a complex function of activities occurring within and outside the jurisdiction of Forest Service. Under the modified Proposed Action, the presentation targets an evaluation of the restoration effectiveness to control, contain and eradicate invasive plants within the project area, as invasive species are not native to the ecosystem under consideration, and once introduced are likely to result in environmental harm to riparian habitats. It also provides the rationale for how the project's design achieves restoration benefits while avoiding significant impacts, along with feasible mitigations incorporated to minimize potential for introduction and spread in sensitive botanical habitats.

Each restoration project would be subject to the interdisciplinary development, review and compliance process, prior to implementing ground-disturbance operations specified in *Appendix C*, to assure design (methods, placement and timing) and mitigations are relevant to aquatic species and their life cycles, considering changing conditions and new information.

Invasive species are those that have been introduced or spread to an ecosystem in which it did not evolve and thus, once introduced, are likely to result in alteration of community structure and associated ecosystem processes leading to ecological damage (Mack et al. 1996). This ecological damage includes a) displacing native species, b) reducing biodiversity, c) altering the food web for various species from aquatic and terrestrial mammals to insects that have in turn co-evolved with native species, d) altering plant composition and this habitat structure (e.g., homogenizing canopy structure to a single layer, out-competing species that provide the shade to the riparian area) and specific to riparian settings, and e) potentially altering the eco-hydrologic processes (e.g., rates of water use by invasive plants) (Hultine and Bush 2011), and altering instream ecology (e.g., litter decomposition for stream invertebrate species) (Lecerf et al. 2007).

The Noxious Weed Act of 1974 (7 USC §2814) requires each federal agency to provide for noxious weed management on lands under its jurisdiction. The provision, introduced in the 1990 farm bill (PL 101-624, Title XIV (amending the original law, PL 93-629), amended the Noxious Weed Act to require federal agencies to establish and fund noxious weed management programs. It also encourages the agencies to cooperate with state agencies regarding the management of undesirable plant species on and in areas adjacent to federal lands. Each federal agency is mandated to: (1) identify actions that may affect status of an invasive species; (2)(a) prevent introduction of such species; (b) detect and control such species; (c) monitor population of such species, and (d) provide for restoration of native species … (FSM 2901.03; EO 13112 (USDA Forest Service 2011); CEQA §21000(a)(b)).

Forest Service manual direction is compatible with CDFW's Invasive Species Program, which is to reduce the negative effects of non-native invasive species on the wildlands and waterways of California. CDFW is involved in efforts to prevent the introduction of these species into the state, detect and respond to introductions when they occur, and prevent the spread of invasive species that have become established. Studies show that preventing introductions is the most effective and cost-efficient way to manage invasive species. The below analysis facilitates CEQA Guidelines at §15063: 1) identification of environmental impacts; 2) an assessment of environmental impact early in project design; 3) project modifications to avoid or mitigate adverse impacts; and 4) factual documentation for a finding, if appropriate, that the project would not have a significant adverse effect on the environment.

Analysis Methodology

Spatially, invasive species introduction and spread are a by-product of activities occurring within and outside the jurisdiction of Forest Service, and as such, the geographic scope associated with invasive plant introduction is broad and beyond the scope of this analysis. Furthermore, due to the relative ease of invasive plant dispersal, the geographic scope is not a fixed landscape or watershed. What the landscape across the forest has in common is six (6) rivers flowing east to west, three east-west state highways, county and NFTS roads, and private property inholdings. Given that invasive plant inventories are infrequent, spread and introductions can happen over a short amount of time, vectors of spread are many, and only preliminary field review has occurred to date, the cumulative effects analysis would be general.

The baseline for defining the temporal scale for past cumulative effects is the current condition; the context for the current condition is in keeping with FSM direction (USDA Forest Service 2011), and SRNF and KNF LRMPs related to invasive plant species (USDA/USFS 1995). In addition, definitions and risk rankings of invasive plant species is a relatively recent development; therefore, cumulative effects analysis of invasive plant species in the proposed project would focus on approaches to reduce introduction and spread of invasive plants for current and future projects.

In the context described above and given the array of species, their ecology and their geographic distribution across the forest, the indicators of risk include:

- Presence or absence of invasive species, the species, and the extent of cover;
- Operating or staging heavy equipment in areas with a high cover of invasive species, where invasive plant occurrences cannot be avoided, and then using that same equipment where invasive species do not currently exist;
- Importing material such as rock, boulders, or wood products from a non-local source; and
- Use of in-stream gear that has been in contact with invasive plants.

Affected Environment

Relative to the project, the more remote the reaches of streams from roads, rivers, or private developments, the less likely are invasive plants to be present. River bars, for example, are settings that are chronically disturbed by seasonal flooding, are subject to deposition of plant material/seed from many miles upstream, and are open, exposed settings—all of which make river bars vulnerable to invasive plant introductions. Other vulnerable riparian settings are those in the lower reaches where streams intersect with the riverine system. This setting is often associated with state highways, county roads, or NFTS roads and their habitat (little shade, bare ground), their use, and their maintenance are vectors for the spread and introduction of invasive plant species (Christen and Matlack 2006, Der Lippe and Kowarik 2007). In the project area, examples of typical invasive species that are known to occur in river bar settings include scotch or French broom, tree-of-heaven, black locust, Himalayan blackberry, butterfly bush, yellow star thistle, Dalmatian toadflax and dyer's woad. A majority of the invasive plants in the project area are relatively shade intolerant and thus can readily occupy river bar; however, the project area does include species that tolerate both shade and sun—English ivy and Himalayan blackberry.

Invasive plant species, once introduced, can rapidly spread into disturbed settings like river bars. These species would in general be considered shade intolerant. This occupancy can alter the scour and deposition actions of a river (e.g., stabilizing an area where under natural conditions, would allow for scour; Smale 1990). Shade tolerant, invasive plant species are those that can spread into those intact (from a native plant perspective), upper riparian reaches and in time, displace the native species associated with riparian areas—conifers (e.g., Port-Orford-cedar (POC), Douglas-fir), hardwoods (e.g., big-leaf maple, dogwood, white alder), shrubs (e.g., red elderberry, red huckleberry) and perennial forbs (e.g., coltsfoot). In displacing the native species, the invasive plant also displaces the role of that species in the ecological

function of riparian habitats—shade to the streams, which regulates water temperature, leaf or needle litter for invertebrates to feed upon, and woody debris for stream structure.

Preliminary field review was undertaken during the summer of 2018. Focus was on surveying those portions of the streams that may be subject to the use of heavy equipment. Of the 35 locations, 21 were visited in completely or in part. Himalayan blackberry was present on all the stream reaches surveyed. Of those, 14 had extensive occurrences of the blackberry (i.e., all the stream reaches on the Lower Trinity RD had stretches that were dominated by Himalayan blackberry). River bar settings such as Aikens Creek on the Orleans RD had a high diversity of invasive species (Scotch broom, yellow star thistle, Dalmatian toadflax, Himalayan blackberry and black locust) and high cover of the scotch broom in particular. The invasive plant diversity and cover correlates to the following factors: the river bar includes a few dispersed gravel roads likely used to launch boats, is adjacent to a Forest Service campground, which in turn, is adjacent to State Highway 96.

The species of greatest concern is Himalayan blackberry due to its high cover in riparian areas particularly on the Lower Trinity and Orleans/Ukonom RDs. Given its tolerance to shade and high reproductive capacity via sexual means (berry production consumed and thus spread by birds and mammals (Hoshovsky 2015) and asexual means (development of fast growing stems called *canes* that can produce a thicket up to 15 feet in diameter in less than two years (Soll 2004) and climb trees), this species above all others has the capacity to spread into previously uninfested reaches of the stream. Unfortunately, in many of the settings subject to preliminary field review, it appears there is little to nothing that can be done regarding its control or its management with the tools available. Exceptions may be the potential use of heavy equipment used in channel-related projects to remove blackberry off site at Knopki Creek on the Smith River NRA or the use of equipment at Aikens Creek on the Orleans RD where black locust is relatively limited. Where invasive plants do occur as localized or discrete occurrences, an aquatic restoration priority should include a combination of non-native invasive plant control activities and riparian vegetation treatments, before the occurrence expands and to implement control treatments consistently over multiple years until eradicated.

Underlying this project is the site-specific project implementation process (*Appendix C*) which relies on the continued coordination with resources, including the need for and timing of surveys. Botanists or botany technicians (as well as other specialists) would conduct any necessary streambank or river bar surveys to determine if invasive plant species are present. Based upon the field review and in coordination with a fisheries biologist, proposed activities relative to invasive species management would be developed (e.g., hand removal of discrete, invasive plant sites) and PDFs to reduce the risk of introduction and spread of invasive plants would be developed. One such design feature is cleaning equipment and gear before and after entering a site and it should be done in conjunction with techniques for aquatic invasive species and potential spread of risk of spread of the non-native pathogen *Phytophthora lateralis* (PL; see *Port-Orford-Cedar section* below).

Environmental Consequences

Alternative 1 – No Action

Direct Effects

There are no direct effects of choosing the No Action alternative.

Indirect Effects

Given the baseline conditions relative to the current distribution of invasive plants, the indirect effects of no action would occur where invasive plants are localized, limited, and occur as a few plants. No action would lead to the likely spread of the invasive plant species, which in turn would compromise the ecological values of the native plant dominated riparian system to the aquatic resources.

Cumulative Effects

Past actions on public and private lands involving heavy equipment, introduction of foreign material, and road-related development as well as vectors for spread such as rivers, highways and roads, established a baseline for invasive plant distribution in the project area. Present and foreseeable future actions include measures to reduce the risk of introduction and spread of invasive plants in accordance with FSM direction (USDA Forest Service 2011) and invasive species BMPs (SRNF only; USDA Forest Service 2014). Best management practices associated with Forest Service actions aim to reduce the risk of invasive species introduction and spread, yet variables (e.g., heavy equipment operations during season when a fruits of invasive plants can more readily attach to equipment) may reduce the efficacy of BMPs. Given the array of vectors described throughout this section, invasive species will continue to be introduced to vulnerable settings and spread under the No Action alternative.

Alternative 2 – Proposed Action (Modified)

Direct Effects

The direct effects pertaining to invasive plant species are the inadvertent introduction and spread of invasive plants associated with a) heavy equipment (e.g., excavators, dump trucks, front-end loaders, full-suspension yarders) used in aquatic restoration projects, b) importing gravel or large wood debris from an off-site source, or c) infected gear used in conducting surveys. The potential positive direct effects of the project are related to the management of invasive plant species to reduce the potential for spread or in some settings to control and eradicate occurrences (e.g., planned activity #9).

Mitigations for this project that aim to reduce the negative direct effects associated with invasive plant introduction and spread are:

- Cleaning of heavy equipment prior to operating on the forest;
- Cleaning heavy equipment that is exposed to invasive plants before locating elsewhere;
- Avoid staging heavy equipment where there is a risk of contact with invasive plants;
- Ensuring sources of gravel or wood material originate from an invasive-plant free setting; and,

- Inspecting gear used in riparian area surveys and other work for the presence of invasive plant seed.

The approach to management of invasive plant occurrences is site/setting specific. Selection of stream reaches to manage would need to consider the extent of the invasive plant (e.g., is it isolated or is there a patch upstream), the species, the expected life span of the seed bank, and thus the commitment over multiple years and the associated cost.

Indirect Effects

Indirect effects are associated with habitat alteration associated with project implementation, including attempts to remove invasive plant species. As discussed under the Affected Environment section, most of the invasive plant species on the forest are shade-intolerant and readily exploit disturbed settings. Where invasive plant species are growing along a *limited section* of the streambank or proximal, cutting of streambank trees to create large woody debris may create openings, remove native shrubs and create ground disturbance—all of which providing a setting for invasive plant spread. In the case of Himalayan blackberry, berry production would be promoted by more solar radiation to the streambank and blackberry cane growth would respond to the additional light as well. It is important to point out that where invasive species dominant the riparian setting, there may be short-term indirect effects associated with the Proposed Action (e.g., increased sprouting and fruit production of some invasive species) but given the already compromised baseline setting, conditions relative to invasive plant spread and dominance are not likely to differ before or after implementation.

In regards to controlling invasive plants, use of heavy equipment in some settings may only exacerbate the problem. Effective removal must include the root system of any invasive plant species; otherwise, plants would re-sprout from root material retained in the ground. Furthermore, the equipment may create newly disturbed sites that are conducive to invasive plant spread. Effective removal must include monitoring and anticipated retreatment to address the seed bank or re-sprouts.

There are elements of project activities that could indirectly lead to the spread of invasive plants beyond their current distribution in the manual methods areas and primarily include introduction of invasive seeds via clothes and hand equipment like chainsaws. Light to the riparian area may increase slightly where trees are cut and felled, however, wildlife PDFs limit the number and size of tree such that little change to the habitat would occur after felling trees to serve as LW in the stream.

Where invasive plants already occur as a *leading edge*, PDFs to reduce the risk of spread of invasive plants from its current area of occupancy into uninfected areas include:

- Avoid any heavy equipment use that would result in changes in canopy structure or ground disturbing activities.

Where invasive plant management is planned and prioritized (small, discrete sites):

- Utilize hand tools such as weed wrenches or Pulaskis to ensure removal of the root system; do not use weed whackers (this would only result in multiple branched sprouting, thus more seeds);
- Treat early in the growing season for most invasive species, before flowering,

- If the removed plants are mature shrubs with fruits (e.g., Scotch broom or Himalayan blackberry), locate removed plants/stems or canes to a suitable location (e.g., burn pile, area already dominated by the respective species), do not leave on site,
- Monitor at least annually and repeat treatment until eradicated or controlled (e.g., likely to be out-competed by native vegetation), adapt schedule as needed, and,
- During the early phases of treatment, actively revegetate if suitable with relatively fast-growing native trees or shrubs to provide competition to invasive plants and canopy cover to reduce productivity (Bennett 2007).

Where implementation of invasive plant control measures are undertaken, conditions are expected to improve. With the mitigations and PDFs in place, implementing the Alternative 2 the risk of invasive plant introduction and spread is considered a low risk.

Cumulative Effects

As was mentioned above under the Cumulative Effects section for the No Action alternative, the past, present and foreseeable future conditions apply to the Proposed Action as well. The difference is that use of heavy equipment and habitat alterations in the Proposed Action present inherent risks relative to the introduction and spread of invasive plants where they currently do not dominate or even occur.

The risk of introduction and spread of invasive plants pertaining to Alternative 2 varies by riparian setting and current invasive plant conditions. With the mitigations and PDFs in place, the risk of spread, where invasive plant cover is high to areas that are not currently affected, would be considered moderate. Where invasive plants are restricted to small patches or individuals, and mitigations and PDFs are implemented, the risk of introduction and spread of invasive plants is considered low and implementation of invasive plant control measures are expected to improve riparian conditions.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

In addition to the FSM direction for invasive species mentioned in the introduction (USDA 2011), the following outlines the applicable guidelines associated with invasive species management. The SRNF's LRMP includes the following applicable standards and guidelines (S&G; USDA 1995):

- Sites for which ground-disturbing activities are planned shall be evaluated for the presence of invasive exotic plant species. (20-16)
- Practices that prevent the introduction or spread of invasive exotic plant species shall be incorporated into planning and analysis for all management activities that have the potential to introduce or spread these species. (20-18)
- Off-site material (i.e., mulch, imported soil) shall be screened for the presence of invasive exotic plant materials. (20-19)
- Sites treated to eradicate invasive exotic plant species shall receive follow-up monitoring. (20-20)

The forest also developed Invasive Species BMPs that are to be incorporated as forest-wide SOPs (USDA 2014 and *Appendix B*).

The Klamath National Forest's (KNF) LRMP includes the following S&G related to introducing invasive plants in the context of vegetation management:

- All silvicultural practices shall consider how to best prevent introducing noxious or alien weeds, insects, and disease. Certify, by the County Agricultural Department, all straw, hay, and seeds used in mulching activities as free of noxious weeds (USDA 2010). (21-53)

In keeping with the aforementioned FSM direction, and S&Gs, a risk assessment would be developed at the Forest level by the respective alternative. When a site-specific project has been identified (*Appendix C*), a field review would be conducted if there is a potential risk. Project design features and invasive BMPs (*Appendix B*) would be implemented if the risk of introduction and spread is moderate to high. Risk is evaluated based upon five indicators: 1) presence of known invasive plant species in the project area, 2) habitat vulnerability, 3) non-project-dependent vectors such as existing roads or trails, adjacent private property, 4) habitat alteration expected as a result of project implementation, and 5) increased vectors as a result of project implementation.

Botany: Forest Service Sensitive Vascular & Non-Vascular Species

This section presents the scientific and analytical basis for the assessment methodology and predicted direct, indirect and cumulative effects of the No Action alternative, compared to the Proposed Action (modified) (40 CFR §§1502.16 and 1502.24; CEQA §21002.1(d)). Under the No Action alternative, the discussion below focuses on the current conditions relative to known Forest Service listed sensitive vascular and non-vascular species that occur or have the potential to occur within riparian habitats.

As there are no federally threatened or endangered plant species associated with riparian habitats in the project area, listed species whether federal or state, were not considered further for this analysis. The one (1) endangered plant species, *Arabis macdonaldiana*, occurs on ultramafic rock outcrops on the Smith River NRA outside of the project area. Spatial review of the CDFW list of threatened, endangered, candidate and rare species (CDFW 2018) that overlapped with the project area indicated that none of the CDFW species on the list were associated with the riparian habitats considered in this project.

Under the modified Proposed Action, the analysis targets how Sensitive plant habitats/substrate alterations, ground disturbance, and risk of introduction and spread of invasive plant species could affect the viability and existing distribution of Forest Service-listed sensitive vascular plants, bryophytes and lichens (USDA Forest Service 2005). Forest Service actions are to be designed and implemented in such a way as to not lead toward a loss of viability or a trend toward federal listing. It also provides the rationale for how the project's design achieves restoration benefits while avoiding significant impacts, along with feasible mitigations incorporated to minimize potential for minor impacts to known and new populations identified by pending field surveys.

Each restoration project would be subject to the interdisciplinary development, review and compliance process, prior to implementing ground-disturbance operations specified in *Appendix C*, to assure design (methods, placement and timing) and mitigations are unique to botanical species and habitat functionality, considering changing conditions and new information.

Table 3-5 displays the Sensitive species documented or having the potential to occur in riparian habitats on one or more districts, where particular activities could affect an occurrence of the species or its habitat. The species considered in this project include vascular plants, bryophytes and lichens of which most occupy particular niches in the forest with one (1) lichen, *Peltigera gowardii* and one (1) bryophyte, *Fissidens pauperculus,* occurring within the stream channel.

Table 3-5. Known Sensitive vascular and non-vascular species that occur or have the potential to occur within riparian habitats.

Scientific Name	Habit	Ranger District (known or potential)	Aquatic Habitat Setting/Substrate
Buxbaumia viridis – bryophyte	Non-Vascular Bryophyte	All Districts	Riparian zone / downed logs
Cypripedium fasciculatum – vascular plant	Vascular Plant	All Districts	Riparian zone, lower slope / forest floor
Cypripedium montanum – vascular plant	Vascular Plant	All Districts	Riparian zone, lower slope / forest floor
Fissidens pauperculus – bryophyte	Non-Vascular Bryophyte	Smith River NRA	Riparian channel / soil, rock
Peltigera gowardii – lichen	Non-Vascular Lichen	OR, UK, LT, MR	Riparian channel / rock
Ramalina thrausta – lichen	Non-Vascular Lichen	Smith River NRA	Riparian zone / tree, shrub
Sulcaria badia – lichen	Non-Vascular Lichen	OR, UK, LT, MR	Riparian zone, lower slope / tree, shrub

Analysis Methodology

The spatial context for analyzing direct and indirect effects on FSS species is at the local/occurrence scale coinciding with the project activity where the effects to a given population are most readily detected. Cumulatively, the spatial scale is somewhat species-dependent and may be at the site scale for species with very specific habitat requirements (e.g., *Buxbaumia viridis* needs access to well-rotted logs to persist and dispersal is limited) or, at the local population scale for species that have relatively less specific habitat requirements (e.g., mycorrhizal relationships with the surrounding plant community) or seed dispersal capabilities (e.g., *Cypripedium fasciculatum* seed is capable of relatively long-distance dispersal (Kaye and Cramer 2005). Analysis of effects for Sensitive species beyond the site or local population scale is not often biologically meaningful. This is due to variables associated with plant species dispersal capabilities (typically short-range), specificity in habitat requirements (e.g., presence/availability of host species for mycorrhizal relationships), variables associated with a given activity (e.g., tree felling) and varying (and often unknown) thresholds of a species to disturbance.

The baseline for temporal context for assessing past activities would coincide generally with the current condition. Given the affiliation with riparian settings, it can be assumed that prior to the knowledge of rare species, past logging on public (and private lands), involving upslope clearcuts or related prescriptions and road building, negatively affected riparian areas that may have supported Sensitive plant species covered in this document. The scale and intensity of those actions occurred before there was information about rare plant distribution and subsequent management. As an example, documentation of Sensitive species such as *Cypripedium fasciculatum* began in the 1980s, whereas information on *Sulcaria badia* on the forest was in 2004 at the earliest. Since our expanded knowledge of

Sensitive plant distribution, standards and guidelines and as applicable, project design features (e.g., no disturbance buffers) have applied and would apply to foreseeable future actions to eliminate or reduce potential negative effects on the species or its habitat.

Furthermore, given the management priority for riparian reserves to maintain and restore riparian areas and enhance habitat conservation for streams (LRMP IV-26), present and foreseeable future actions whether upslope or within the riparian areas would aim to reduce negative impacts to the ecology of the riparian system (e.g., establishment of a 300-foot no-disturbance buffer for timber projects). Proposed activities associated with this project would be minimal in size and duration. The majority of the activities planned are through manual, non-mechanical means with only 28 of the approximate 927 stream miles potentially subject to heavy equipment or ground disturbance.

Indicators used to compare potential direct, indirect, or cumulative effects of the No Action and modified Proposed Action to Sensitive species includes the degree or extent of change related to:

- Cutting of mature trees or under-canopy vegetation, habitat/substrate for Sensitive lichen species and habitat for Sensitive vascular species;
- Movement of logs, habitat/substrate for a Sensitive bryophyte and associated ground disturbance that may overlap with Sensitive vascular species;
- In-channel installations (e.g., boulders, logs, wiers) that may coincide with those lichen species that occur on rocks within the channel; and
- Introduction and spread of invasive plant species into Sensitive plant habitat.

Affected Environment

The following provides information about the known distribution, habitat and any applicable ecological factors associated with the species in Table 3-5 potentially affected by the proposed activities.

Buxbaumia viridis (BUVI) is documented at two (2) sites on the Orleans and Ukonom RDs and one site on the Lower Trinity RD. *Buxbaumia viridis* is associated with mature forests, its substrate being humus or advanced decay class logs under relatively high canopy, the later facilitating moisture retention. On the forest, BUVI has been detected on advanced decay class logs within riparian areas. Access to wood in a late stage of decay is critical to plant colonization and survival of this species (Wiklund 2002).

Cypripedium fasciculatum (CYFA) and *C. montanum* (CYMO), both orchids, occur across the forest, yet the latter species has not yet been detected on the Smith River NRA. Habitat for these can span from relatively dry slopes under moderate canopy to riparian areas in shaded forest (Kaye and Cramer 2005). On the forest, these species are associated with mature, Douglas-fir or mixed conifer forest with a relatively high canopy. Occurrences have been documented in these forest types that also coincide with riparian areas. Stages in the orchid's development are dependent upon mycorrhizal fungi; therefore, conditions that support fungi (e.g., adequate cover of organic material, moisture, shade, host species) also support these orchids.

Fissidens paupercaulus (FIPA) has been documented to date only on the Yurok Experimental Forest, which is geographically distinct from the rest of SRNF, by about 10 miles to the west in coastal redwood

forest. It is likely there are more occurrences of this species given this broad distribution. On the Yurok Experimental Forest, FIPA is attached to rocks or rocky surfaces on the side of the creek channel under moderately high to high canopy cover. Dispersal is likely via water transport of spores downstream. The species persistence and dispersal is related to suitable substrate; moist to wet, shady channel conditions; and flowing creeks.

Peltigera gowardii (PEGO) has been documented at three (3) occurrences on the Mad River RD above approximately 3,500 feet elevation. The occurrences on the forest are on rocks within the creek channel associated with relatively cold, perennial streams, typically submerged for much of the year. The primary form of dispersal is fragmentation, whereby the tissue fragments and is transported downstream. Habitat conditions that support this species relate to cool water temperatures and associated shading, as well as water quality conditions that are low in nitrate deposits and sedimentation (Peterson 2010).

Ramalina thrausta (RATH) habitat is associated primarily with mature forests within riparian settings on the Smith River NRA. The substrates for this species are the twigs, branches or boles of conifer and sometimes hardwood trees. Reproduction is primarily through dispersal of soredia (i.e., asexual propagules) by wind, rain or animals or fragmentation of the thallus, the body of the lichen. Forest management actions that remove occupied host trees or shrubs, or treatments that markedly alter microclimate by changes in amount of light, humidity and temperature at occupied sites, may threaten local persistence of small populations (Dewey 2016).

Sulcaria badia (SUBA) habitat has been documented on all ranger districts except the Smith River NRA. On the forests, the species occurs in mature Douglas-fir forest, typically with a hardwood component that can include humid settings associated with riparian areas. The thallus attaches to the twigs, branches or boles of trees or understory shrubs. It disperses via thallus fragmentation, likely from the canopy of the occupied tree or a nearby tree to the understory environment. Likewise, its dispersal range is limited to the species presence in the canopy of nearby trees and factors such as wind transport. Activities that result in the removal of mature trees proximal to a known site or alter the light, moisture, temperature conditions could negatively impact the species (Toren and Nilles 2003).

The majority of the species discussed above are non-vascular species that have in common limited dispersal capabilities, very specific habitat settings (i.e., within the stream channel) and associated micro-climate conditions pertaining to humidity levels, water and air quality. These habitat settings are directly and indirectly influenced by the immediate and ambient canopy cover, providing shade to the substrate and species. The lady's slipper orchids while not as habitat specific as the non-vascular species, do rely on a set of conditions that support their mycorrhizal relationships on which the species is dependent. The presence of host tree and shrub species, amount and extent of coarse woody debris and organic material, and mesic moisture conditions all play a role in sustaining the mycorrhizal network of the orchid species. Akin to the non-vascular species, suitable habitat for these species is directly and indirectly influenced by the immediate and ambient canopy cover and forest structure, which in turn provide shade and associated moisture conditions. Relative habitat stability associated with late-successional forest allows for development of suitable conditions for orchid growth and reproduction.

Environmental Consequences

Alternative 1 – No Action

Direct Effects

There are no direct effects of the No Action alternative.

Indirect Effects

The majority of the Sensitive species covered in this document are associated with relatively late-successional, stable habitat settings. This setting has much to do with the ecology of the species, which relies on particular microclimatic conditions, substrates, and in the case of the *Cypripedium* orchids, mycorrhizal conditions (Shefferson et al. 2005). Relatively stable habitat settings also accommodate inherent dispersal limitations of some of the riparian Sensitive species. Essentially, the No Action alternative would have no indirect effects on Sensitive species relative to the indicators: cutting of trees, movement of logs or riparian installations.

The one (1) indirect effect of the No Action alternative on Sensitive species would be that management of invasive plant species, where their cover and extent is limited, would not likely occur within the project area. Discussion of invasive plant species and their effects is addressed more fully in its own section above.

In general, invasive plant species not only outcompete native species due to their high reproductive potential (i.e., often asexual and sexual means, high seed production, long seed bank, dispersal capacity), relatively fast growth, but also by suppressing native plant growth by disrupting the underground mycorrhizal connections upon which the native species depend (Stinson et al. 2006). Without invasive species management addressed in the action alternative, invasive species are likely to spread from areas of high cover to areas, typically upstream, where their extent may be limited to non-existent. These upstream areas are those that could support Sensitive species compared to settings in the lower watershed reaches, which are commonly associated with the intersection of streams with rivers, and in the case of the SRNF, including the Ukonom RD, these rivers are often aligned with state highways (e.g., Highway 96 is aligned with the Klamath River). Given their geographic extent, riverine systems and roads/highways are considered vectors for invasive plant introduction and spread (Christen and Matlack 2006, Der Lippe and Kowarik 2007). Related to non-native invasive plant species, specifically their introduction and spread, the No Action alternative would also not provide for the reduction/relocation of recreation impacts associated with the Proposed Action. Recreationists entering and crossing the riparian areas are vectors of invasive plant spread.

Indirect effects of the No Action alternative, specifically, that no invasive plant management would likely occur in sites or sections of riparian areas that support a Sensitive species, could jeopardize an occurrence of a Sensitive species.

Cumulative Effects

Due to the many vectors for introduction and spread, the introduction and spread of invasive plant species is the one indicator that may constitute a cumulative effect to Sensitive species under the no-action

alternative. Cumulative effects are those primarily related to invasive plant species introduction and spread into riverine and riparian settings due to highway and road related activities (e.g., import of potentially infected materials such as gravel, use of heavy equipment, frequency of vehicular use) or other developments (e.g., private land clearings). While the setting of potential introduction (e.g., along state highways) is not suitable habitat for Sensitive species, once introduced, invasive plants can spread beyond the point of introduction. Vectors of long-distance spread are primarily vehicles and equipment but also may include small mammals and birds (Bennett 2007). The spread of species like the shade tolerant Himalayan blackberry into upper reaches of stream channels may cumulatively affect Sensitive species if present by displacement or restricting dispersal. The no-action alternative would preclude efforts under the action alternative to manage invasive plant species where there is a risk of spread into potential Sensitive species habitat.

Alternative 2 – Proposed Action (Modified)

Direct Effects

Proposed actions that could directly negatively affect Sensitive species relate to the following indicators: cutting of trees, movement of logs with grip hoist, blocks and cables; and in channel installations (e.g., boulder placement). Dragging of logs or obstructions that scarify the ground could remove Sensitive plant individuals. For species like *Peligera gowardii* that can occupy the surface of rocks or boulders within the stream channel or *Buxbaumia viridis*, which grows on advanced decay class logs, boulder or log placement or relocation could impact these species. Sensitive lichens, such as *Ramalina thrausta*, which reside on the branches and twigs of riparian trees, could be removed with the felling of conifer trees to provide structure to the streams.

A key component of the Proposed Action is the requirement that site-specific proposed activities be reviewed by resource specialist and signed off by a line officer. *Appendix C* outlines the process that would be undertaken before project activities can occur. Review would first involve assessment of the spatial data coinciding with the project location to see if there are any recorded occurrences of species at the project site or proximal to the site. Habitat suitability would then be reviewed in advance of field surveys to stratify project sites according to such attributes as canopy cover (i.e., floodplain settings versus intact riparian areas). Based upon this review, surveys would be conducted to ascertain if a Sensitive species is present and if detected, either applicable project design features would be applied to ensure there is no potential negative effect to the species or its habitat or, the action would not proceed.

Indirect Effects

Indirect effects pertain to invasive plants and specific to the Proposed Action, active management of invasive plants including where Sensitive plant species would benefit by invasive plant control.

Non-native invasive plant control, specifically, where invasive plants are limited in cover may reduce the risk of invasive plant spread to uninfected areas. Other actions that complement invasive plant control include a) management of visitor access through riparian areas and keeping livestock out of the creeks reduces vectors for invasive species introduction and spread and b) planting of native riparian species

provides competition and ground cover to the preclusion of invasive species. Overall, the indirect effects of the Proposed Action (modified) would positively affect Sensitive species.

Cumulative Effects

While actions prior to our knowledge of Sensitive species has likely negatively affected Sensitive species associated with the riparian areas as represented in the current condition; present and future actions on Forest Service lands would incorporate project design features to reduce or eliminate the potential negative effects on Sensitive species, including those to reduce the risk of introduction and spread of invasive plants into occupied Sensitive plant habitat. Where cumulative effects of the No Action and the modified Proposed Action differ is the latter provides opportunities to manage invasive plants where there is a risk of spread into occupied Sensitive species habitat and the former does not.

Determination for Sensitive Botanical Species (Vascular and Non-Vascular)

Alternative 2 is minimal in size and duration and a majority of the actions would be implemented by manual methods. A key component of Alternative 2 is the requirement that site-specific projects be reviewed by resource specialist in accordance with a process outlined in *Appendix C* of this document. Based upon a spatial assessment, if it is determined that the action would occur in potentially suitable for Sensitive species associated with riparian habitats, surveys would be conducted to determine if the Sensitive species is present. If a Sensitive species is located and it is determined that the Proposed Action may affect a Sensitive species, either applicable project design features would be applied to ensure there is no negative effect to the species or its habitat or, the action would not proceed.

In light of the overall scale, intensity and implementation methods associated with a majority of the aquatic restoration actions, as well as the requirement for site-specific review by a botanist and application of project design features or no action, it is my determination that the *Aquatic Restoration Project* will have no effect on any Sensitive plant species.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

In keeping with FSM 2670 (USDA/USFS 2005), S&Gs from the SRNF's LRMP (USDA Forest Service 1995) state that:

> *Before the NEPA process is completed, projects will be assessed through a biological evaluation to determine if management activities are likely to adversely affect sensitive plant resources. After completion of .the evaluation, proposed actions will be prohibited if they are found likely to jeopardize the continued existence of the species or the maintenance of the viable populations throughout their existing range. Appropriate mitigation measures will be required if activities are not prohibited (pg. 83).*

The KNF LRMP (USDA Forest Service 2010) for Sensitive species considers that:

> *Management activities should imitate the natural ecological processes that created Sensitive habitat.*

Relative to potential impacts on Sensitive species from the spread of invasive plant species, FSM 2900 (USDA/USFS 2011) states that the forest shall:

> *... ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the National Forest System, or to adjacent areas…*

The modified Proposed Action, including project design features would be consistent with FSM and LRMP direction.

Port-Orford-Cedar

Introduction

This section presents the scientific and analytical basis for the Port-Orford-Cedar (POC; *Chamaecyparis lawsoniana*) risk assessment methodology and predicted direct, indirect and cumulative effects of the No Action alternative, compared to the Proposed Action (40 CFR §§1502.16 and 1502.24; CEQA §21002.1(d)). The discussion below focuses on the current conditions under the No Action alternative, demonstrating the agency recognizes risk of spread of the non-native pathogen *Phytophthora lateralis* (PL) are influenced by multiple human management and uses, as well as natural transport vectors (e.g., animals, flood events). Under the modified Proposed Action, the analysis focuses on design features that would reduce the spread of PL. It also provides the rationale for how the project's design achieves restoration benefits while avoiding significant impacts, along with feasible mitigations incorporated to minimize potential for spreading PL where POC forests are uninfected.

Each restoration project would be subject to the interdisciplinary development, review and compliance process, prior to implementing ground-disturbance operations as specified in *Appendix C*, to assure design (i.e., methods, placement and timing) and mitigations are relevant to reducing spread of PL considering changing conditions and new information.

Figure 3-2. Port-Orford-cedar tree group infested with *Phytophthora lateralis*.

In the early1950s, an exotic root disease was identified killing the cedar on the Smith River NRA/Gasquet RD (Figure 3-2). Since that time, the disease has spread across much of its range, killing POC and threatening to reduce its ecological function and product availability. Port-Orford-cedar program objectives are to maintain POC as an ecologically and economically significant species on NFS lands. The objective is to provide cost-effective mitigation for controllable activities creating appreciable additional risk to important uninfected POC, not to reduce all risk to all trees at all cost (USDA Forest Service/USDI Bureau of Land Management 2004). Management slows the spread of the non-native pathogen PL enough to maintain POC's significant ecological and economic functions, without the cost of the management strategy exceeding its effects on the value of these functions.

Analysis Methodology

A risk assessment was completed that followed the process established by *Management of Port-Orford-cedar in Southwest Oregon FEIS Record of Decision* (POC FEIS May 2004) for identifying a project's risk of spread of PL and provide management strategies for reducing risk of PL introduction and spread in the analysis area. This spatial analysis in relation to the POC was conducted at the 7th-field watershed scale (see *Six Rivers Aquatic Restoration Project POC Risk Assessment* 2018).

The area where project activities intersect with known POC PL infestations is approximately 6,370 acres; however, not all infestations are known. Some PL infestation already exists within this area, but infestation is scattered and varies in the contributing percentage of infested trees to the overall stand POC acreage and within the watershed that it grows. Approximately 1,310 acres, or 20%, are currently infested. The mechanisms for additional spread of PL are the use of heavy equipment to access streams, including the establishment of side channels, as well as the use of helicopters to place in-stream wood. The unit of measure is risk of spread of PL in addition to existing uncontrollable risk, such as along a primary access road.

Phytophthora lateralis is spread via water or soil. A typical spread scenario involves infested soil being transported into an un-infested area on a vehicle or piece of equipment or, potentially, in infested water being transported in the tanks of fire engines or helicopter buckets during fire suppression activities. The infested soil falls off the vehicle or spores are delivered via water and the pathogen first infects POC near the site of introduction. New spores from that infection are then washed downhill in surface water infecting additional hosts. This is especially lethal along drainages and creeks where infested water is channeled and flows near concentrations of healthy POC.

Port-Orford-Cedar Risk Key Analysis

- **Factors Affecting Pathogen Spread:** The following factors influence PL spread and establishment: site character, type of carrier, time of year of transport event, distance traveled and associated time elapsed.
- **Factors Affecting Risk of Infection:** Jules et al. (2002) showed that the incidence of new POC infection was positively associated with 1) distance to the nearest infested POC, 2) host abundance, and 3) catchment area.

  - **High-risk sites** are defined as streamside POC within 300 meters of a road and non-streamside POC within 50 feet of a road.
  - **Low-risk sites** are defined as streamside POC greater than 300 meters from a road and non-streamside POC greater than 50 feet from a road.

- **Uninfested 7th-field watersheds** are watersheds with greater than 50 percent federal ownership and with greater than one hundred federal acres in stands that include POC (not including plantations where POC did not previously occur), where at least the federal lands are uninfested or essentially uninfested with PL. These stands occur in Matrix as well as various Reserve land allocations. Uninfested POC stands within these watersheds are referred to as POC cores. Port-Orford-cedar cores are not necessarily contiguous acres. Analysis done using existing GIS stand mapping indicates there were 102 7th-field watersheds on the forest containing mapped POC. Of these, 52 were completely uninfested.

  Watersheds no longer qualify for POC cores if 5 percent or more of the POC core area becomes infested with PL. Because these watersheds sometimes empty into larger streams that are infested, infestations within the lowest 2 acres of the watershed (and lowest 200 feet of stream) do not count against the current uninfested status or the 5 percent rule (USDA Forest Service 2004).

Affected Environment

Port-Orford-cedar is a unique conifer growing only in northwestern California and southwestern Oregon. For a variety of reasons, including its ability to tolerate ultramafic (serpentine) soils and live along streams and other wet sites, it plays a significant ecological role in some forest communities. Port-Orford-cedar also plays an important role in fish-bearing streams by providing shade, keeping water cool during hot summers, and by eventually falling into streams to provide structure and EFH. Port-Orford-cedar also supplies unique forest products, including wooden arrow stock, wood for Japanese soaking tubs and temples, aromatic storage boxes for Native American ceremonial materials, and long-lasting cedar boughs. Port-Orford-cedar is native to a limited area along the Pacific coast from Coos Bay, Oregon, to the south of the Horse Mountain Botanical Area on the Lower Trinity RD, in California. Its range extends from the coast to about 50 miles inland. There is also a small disjunct population in the Scott Mountains of California. On the SRNF, updated inventory data shows POC occurs on approximately 31,425 acres on four (4) ranger districts: Smith River NRA/Gasquet, Orleans/Ukonom and Lower Trinity. About 3,300 acres (10.2%) are infested with PL. Generally, POC is within 100 feet of the stream; however, small groves of POC can be found on alluvial fans and benches along these streams. Crown closure in the streamside areas are from 10 to 50 percent (USDA Forest Service 2004).

Phytophthora lateralis is spread via water or soil. A typical spread scenario involves infested soil being transported into an un-infested area on a vehicle or piece of equipment or, potentially, in infested water being transported in the tanks of fire engines or helicopter buckets during fire suppression activities. The infested soil falls off the vehicle or spores are delivered via water and the pathogen first infects POC near the site of introduction. New spores from that infection are then washed downhill in surface water

infecting additional hosts. This is especially lethal along drainages and creeks where infested water is channeled and flows near concentrations of healthy POC.

Of the 31,425 POC acres on the SRNF, 35 percent are considered high risk (11,992 acres). At this time, approximately 14 percent of the high-risk sites on the forest are considered infested (1,680 acres). Within the *Aquatic Restoration Project* footprint, by the nature that project activity would be adjacent to and within streams and riparian areas, almost all POC within the project footprint are considered high risk (ranking solely on plant association proximity to flowing water, and not including a road access). Approximately 20 percent of the POC within the *Aquatic Restoration Project* footprint is currently infested (1,310 acres). With standard mitigations in place and PDFs, risk of spreading of the disease would be greatly reduced. The greatest risk of spreading the disease would be allowing access to project areas that are currently not accessible by vehicles or equipment.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects

There are no direct effects of choosing the no-action alternative. There would be no additional risk of spread of PL under the No Action alternative because no project activities would occur within the analysis area. Acres of PL infestation would continue to increase over time because of the presence of PL within upper portions of watersheds. Over the next 5 to 20 years, 4 to 5 new acres of root disease would be estimated to occur along streams that flow through areas of measurably contributing POC. Less than one new acre of root disease is expected annually where PL areas and healthy POC are adjacent to each other.

Alternative 2 – Proposed Action (Modified)

The project area contained about 31,345 acres of POC and approximately 3,300 acres (10.5 percent) of PL infestation. The analysis area contained 103 7th-field watersheds that contain at least 5 acres of POC within the watershed. There were 79 high-risk roads that access proposed restoration areas within 46 infested 7th-field watersheds (Table 3-6). Several of the primary road systems that pass through more than one (1) watershed are listed in **bold** type.

Table 3-6. Infested 7th-field watersheds and NFTS roads within the project area proposed activities within 7th-field watersheds.

7th-Field Watershed	Road Number	7th-Field Watershed	Road Number	7th-Field Watershed	Road Number
Aikens Creek	13N01	Gasquet	17N62	Lower Siskiyou Fork Smith River	17N01
Bee-Big Foot	13N01		17N62A		**17N05**
Blackhawk-Yellowjacket	**15N01**	Gordon Creek	16N34		18N08

7th-Field Watershed	Road Number	7th-Field Watershed	Road Number	7th-Field Watershed	Road Number
Boulder-Deer	**15N02**	Griffin Creek	18N07	Lower Willow Creek	**06N21**
	16N23		18N11	Middle Bluff Creek	13N01
Cant Hook-Rattlesnake	15N01		18N17	Monkey Creek	17N18
	15N02	Hardscrabble Creek	17N22		17N18C
Cavanaugh-Indian	13N01	Headwaters Bluff Creek	**12N10**		18N17
Coon Creek-South Fork Smith River	16N19	Idlewild-Packsaddle	18N07	Myrtle Creek	17N22
	16N34		18N08	Packsaddle Creek	18N08
Cooper Flat-Peacock Bridge	16N04	Knopki Creek	18N07		18N08F
Copper Creek	**14N03**		18N11	Shelly Creek	18N17
	14N31	Little Jones Creek	17N05		18N56
	15N01		17N08	Upper Bluff Creek	12N10
Dead Horse Gulch-Eighteenmile	17N05	Lower Bluff Creek	10N12		**12N10I**
	17N08		**13N01**	Upper Craigs Creek	16N19
	17N53	Lower Rock Creek	15N02	Upper Hurdygurdy Creek	16N33
	17N63		**16N23**		17N05
	17N64A			Upper Tributaries Upper Middle Fork Smith	18N07
	17N64B				

Direct and Indirect Effects

Under the Proposed Action, there would be a very low probability of additional risk of spread of PL (0 to 2% probability of occurring). Without mitigation, the relative probability would be very high (50.1 to 100% probability of occurring).

The Proposed Action would reduce the risk of PL by following the management recommendations outlined in this report. Use of uninfested trees with attached root balls coupled with placement of helicopter landing locations to fall within uninfested sites would also reduce risk of spread. This reduction of risk would help preserve POC cores in the watersheds.

Cumulative Effects – Spread of P. lateralis

Other projects considered in cumulative effects analysis are vegetation activities as part of the Little Jones Decision Memo (DM; 2017), the Gordon Hill DN (2015), and Knopki Creek (DM pending). All of these projects utilize an integrated approach to management practices regarding reduction of risk of spread of PL and use standard POC mitigation measures similar to those proposed for the current project, further reducing the risk of spreading PL into uninfested stands of POC.

Application of the risk key and the resultant management practices makes the action alternative for this project consistent with the mid- and large-scale geographic and temporal-scale effects described by the analysis in the POC FEIS. These estimates cover all management activity for the Forest Service. A more complete discussion of risk and rate of spread can be found in the POC FEIS (USDA Forest Service/USDI Bureau of Land Management 2004).

Conclusion or Summary

When comparing potential effects to POC at the project level, compared to the distribution of the species as a whole, the native range of POC is from coastal southwest Oregon, and inland Curry County, southward to east of Eureka, California, with a disjunct population near the Sacramento River, north of Redding, California. Approximately 137,545 acres of POC have been mapped within this area. Port-Orford-cedar root disease is found throughout most of the range of POC, approximately 9 percent of mapped populations. Within the project analysis area, 6,370 acres of POC would have the greatest potential risk of PL infection without PDFs and mitigations in place. If these acres were to become infected it would increase the amount of infested acres on the forest from 12 to 30 percent, which would be a 250 percent increase. However, at the range of POC, the increase in infestation would be from 8 to 15 percent.

Even though the disease often kills most POC growing near an infested watercourse and adjacent POC trees, mortality upslope and within a stand is highly dependent on POC density and outside disease vectors. The disease has been on the forest since the 1960s. Even so, many of the earliest infested stream courses still have living trees growing up above the water line.

The *Aquatic Restoration Project* area would utilize an integrated management approach to mitigate the spread of PL. The combination of project scheduling, unit scheduling, washing, utilizing uninfested water or treated water for operations, and applying restrictions during summer rain events incorporates key recommendations to reduce the risk of PL spread or introduction of new infestations. This integrated management approach would reduce the risk of spread of PL to 0 to 2 percent (USDA Forest Service 2004).

Terrestrial Wildlife

Introduction

This section presents the scientific and analytical basis for the assessment methodology and predicted direct, indirect and cumulative effects to wildlife species and their habitats under the No Action alternative, compared to the Proposed Action (modified; 40 CFR §§1502.16 and 1502.24; CEQA §21002.1(d)). Under the No Action alternative, the discussion focuses on the current amount and quality of habitat conditions for endangered, threatened, and proposed federally-listed wildlife species under the ESA; designated Critical Habitat (CH); Forest Service Region 5 Sensitive Species; Survey and Manage species (SM; under current consideration), management indicator species (MIS), and migratory birds species (MBS; MOU 2008). Under the modified Proposed Action, the presentation targets an evaluation of the habitat alterations, noise disturbance and potential impacts to habitat quality, as well as those physical and biological features that support nesting, roosting, foraging, and dispersal for the northern spotted owl (NSO; USDI Fish and Wildlife Service 2012). It also provides the rationale for how the project's design achieves restoration benefits while avoiding significant impacts, along with feasible mitigations incorporated to minimize harassment, extent of habitat alternations and loss of functionality and risk to late-successional and old-growth associated species such as the fisher, marbled murrelet (MAMU) and NSO.

Each restoration project would be subject to the interdisciplinary development, review and compliance process, prior to implementing ground-disturbance operations specified in *Appendix C*, to assure design (methods, placement and timing) and mitigations are unique to wildlife species and habitat functionality, considering changing conditions and new information.

Forest Plan Guidance

One of the primary purposes of a forest plan is to guide land management through the adherence to the forest-wide and management area (MA) S&Gs. The desired condition represents the general goal for which the project would strive. Forest plan S&Gs (both forest-wide and specific to management areas) were developed to assure compliance with law, regulation and policy and to minimize impacts during forest plan implementation.

Information from both forests plans pertinent to terrestrial threatened, endangered, proposed and candidate species as well as Forest Service Sensitive species (TES species) occurring in the *Aquatic Restoration Project* is displayed below by species. This information, in addition to recovery plans was used in developing analysis indicators. The modified Proposed Action and the project is in accordance with guidance and direction from the KNF and SRNF LRMPs.

Special Habitat

Direction from both LRMPs on this MA consists of special provisions for peregrine falcon, bald eagle and late-successional reserves (LSR). The KNF LRMP includes a provision for the Special Habitat MA around peregrine falcon eyries. The project proposes aquatic restoration activities that occur within the Special Habitat area. However, no known peregrine falcon eyries are located within 0.5 miles of areas where activities may occur. If a site-specific project is identified to occur within 0.5 miles of a known peregrine eyrie surveys would be conducted. Proposed projects would not impact suitability of nesting habitat for peregrine falcon; therefore, the Proposed Action is consistent with the management of this area.

Bald eagles were also delisted under ESA, but the eagle is included in the FSS species list. Forest plan provisions for the Special Habitat MA around bald eagle nests would be followed. Effects of the project on bald eagles are disclosed under discussions of FSS species.

Proposed Activities within Late-Successional Reserves

The full suite of proposed activities have the potential to occur within the LSR. Design features were developed to limit the impacts of cutting and felling trees along riparian corridors for instream aquatic restoration wood enhancement (see details of acres and specific LSRs in the BA). A diameter limit of less than 20-inch dbh (diameter at breast height) was set for LSRs, Zone 1 high quality MAMU habitat and wilderness. Site-specific projects would be developed and reviewed with wildlife biologists to determine whether habitat would allow for cutting and falling trees into the streams. Without the review and approval (*Appendix C*), trees greater than 9-inches would not be cut.

The following treatments and acres are proposed within LSRs:

- Potential use of heavy equipment up to 265 acres;

- Potential areas using manual methods up to 12,284 acres; and
- Potential lakes and ponds up to 283 acres.

In the July 9, 1999 letter, the Regional Ecosystem Office (REO) allows "Individual trees … exceeding 20-inches dbh in any province, shall not be harvested except for the purpose of creating openings, providing other habitat structure such as downed logs, elimination of a hazard from a standing danger tree, or cutting minimal yarding corridors." The *Aquatic Restoration Project* meets LSR objectives for habitat protection and restoration, and would not need the exemption. The project would not cut trees over 20-inch dbh within LSRs and would retain predominant and dominant trees.

Methodology

A determination is made of whether the species range overlaps the project area and whether habitat is likely to exist in the project area (if both are true, then the species is analyzed for the project). In addition, listed below are assumptions common to all species based on design features and mitigations. The analysis below incorporates by reference the following reports: BA for ESA-listed wildlife species (*Wildlife BA/BE* 2018), BE for Forest Service Sensitive wildlife species (*Sensitive Species BE* 2018), Management Indicator Species (*MIS Report* 2018), Survey and Manage species (*SM Report* 2018), and MBS (Yost 2018) that document the affected environment and environmental consequences.

The analyses conducted are based on the best scientific and commercial data available at the time this document was written. Information such as data collected from Forest databases, remote sensing vegetation analysis, the forest existing vegetation (EVEG), direct field assessments, California Natural Diversity Database, and the most recent and appropriate scientific research and species information, was all used for the consideration of direct, indirect and cumulative effects.

Species Overlap

- Threatened, endangered, proposed and candidate terrestrial species in the project area are identified using the USFWS's Threatened, Endangered, Proposed or Candidate Species list website (IPaC) dated August 08, 2018 (Consultation Code: 08EACT00-2018-SLI-0364 – AFWO; see *Wildlife BA/BE* 2018);
- The Forest Service (Pacific Southwest Region (Region 5)) Sensitive Species list (revised July 3, 2013) identifies the species to consider for this analysis; and
- Survey and Manage species list as identified in Record of Decision (ROD; 2001) as adjusted in 2014 and interpreted by Forest Service, Region 5 guidance (2014).

Species and Habitat Assumptions Common to All

- Occupancy and reproductive success is based on the amount and quality of habitat on the forest.
- All equipment used to access locations where heavy equipment is allowed would use existing roads and would not result in loss of habitat.

- Heavy equipment, manual and pond/lake project sites would not remove overstory vegetation (predominate or dominate trees) and stand structure would be modified but would maintain current habitat function, including no change in canopy closure.
- All proposed projects in TES habitat would result in maintaining habitat thus habitat would remain functioning at the current habitat type post-treatment. Exceptions to this assumption include:
    - Locations where habitat burned during the 2015 and 2017 fires at low (<50 percent basal area removed per RAVG data) severity in the action area would still function as it did pre-fire; and
    - Projects involving noise would have limited operating periods (LOP) would be applied unless surveys to protocol occur or habitat is not suitable.
- All projects would be site specifically reviewed by a wildlife biologist (*Appendix C*).

Spatial and Temporal Bounds

The project area reflects the physical footprint, where proposed aquatic restoration activities, and therefore, potential direct effects have the potential to occur. The action area is defined for ESA purposes as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402). For species with larger home ranges such as NSO, or fisher, the wildlife action area consists of the project area plus a distance representing a median home range for that species.

The action area includes the 21 5th-field watersheds clipped to the forest boundary (1,146,253 acres): Smith River, North Fork Smith River, Middle Fork Smith River, South Fork Smith River, Ukonom Creek-Klamath River, Rock Creek-Klamath River, Bluff Creek-Klamath River, Dillon Creek, Wooley Creek, Salmon River, Blue Creek, Turwur Creek-Klamath River, Big French Creek-Trinity River, Horse Linto Creek-Trinity River, Lower South Fork Trinity River, Upper Mad River, Middle Mad River, North Fork Eel River, Dobbyn Creek, Upper Van Duzen River, and Lower Van Duzen River). For smaller ranging species, the action area is defined by species.

Temporal bounding for the analysis is both short term and long term. Short term consists of the project implementation and the time in which the streams begins to respond to treatments. These are normally the stream reaches where the use of heavy equipment is allowed and that would occur within 1 to 5 years. Long-term boundaries to watershed changes would occur as the implementation of the actions are finalizing.

Species List and Analysis Indicators

Based on the wildlife reports prepared for this project, Table 3-7 lists the TES species carried forward in this analysis based on recent observations and suitable habitat presence within the project area. The Siskiyou Mountain salamander, Tehama chaparral snail, great gray owl, greater sandhill crane, and Mardon skipper were determined to be: not likely to occur in the project area, activities would not occur within suitable habitat; or the project area is outside the species range. Therefore, this project would have no effect on these species (*Sensitive Species BE* 2018).

Table 3-7. Species, action area and indicators that were developed using the forest plan S&Gs and the best available science to estimate direct, indirect, and cumulative effects for TES species.

Species	Action Area	Analysis Indicators
Northern spotted owl	The action area includes 21 5th-field watersheds and the suitable NSO habitat and CH within these watersheds.	Likelihood that project implementation would lead to a change in NSO habitat suitability that could lead to mortality, harm, failed breeding attempts, habitat connectivity or displacement for NSO. Change in CH.
Marbled murrelet	The action area includes 13 5th-field watersheds in MAMU Zone 1 within these watersheds.	Likelihood that project implementation would lead to a change in MAMU habitat suitability that could lead to mortality, harm, failed breeding attempts, habitat connectivity or displacement. Change in CH.
Bald eagle	The action area includes 21 5th-field watersheds and the suitable habitat within these watersheds	Likelihood that project implementation would lead to mortality, harm, failed breeding attempts, habitat connectivity or displacement for this species.
Northern goshawk	The action area includes 21 5th-field watersheds and the suitable habitat within these watersheds.	Likelihood that project implementation would lead to mortality, harm, failed breeding attempts, habitat connectivity or displacement for this species.
Fisher, marten, and wolverine (marten is a state listed species)	The action area includes 21 5th-field watersheds and the suitable habitat within these watersheds. Fisher and marten have been detected within the project areas. No confirmed detections of wolverine. Since the fisher, marten, and wolverine have an overlap in general habitat use, one habitat layer would be used for this analysis. The desired condition maintains all potential suitable habitat for these species within a 5th-field watershed.	Likelihood that project implementation would lead to mortality, harm, failed breeding attempts, habitat connectivity or displacement for these wildlife species. NSO habitat is used as a proxy for suitable fisher, marten, and wolverine habitat.
Pallid bat, Townsend's big eared bat, and fringed myotis	The project area has no known bat hibernaculum or maternity sites. However, riparian areas may provide foraging habitat.	Likelihood that project implementation would lead to mortality, harm, failed breeding attempts, habitat connectivity or displacement for these species.
Willow flycatcher (a state-listed species)	Surveys have not been conducted within the project area. No nest-site locations are known within the SRNF. However, an adult female with a brood patch was found on the KNF near Seiad Valley, CA. Reproduction is most likely to occur in riparian areas primarily in the low gradient, willow or brushy vegetation and along larger waterways.	Likelihood that project implementation would lead to mortality, harm, failed breeding attempts, habitat connectivity or displacement for this species.
Western bumblebee	The actual location and distribution of bumblebee colonies is not known. This analysis is assuming that riparian areas could contain a colony.	Likelihood that project implementation would lead to mortality, harm, failed breeding attempts, habitat connectivity or displacement for this species.

Affected Environment and Environmental Consequences

The forest and riparian conditions of the *Aquatic Restoration Project* area is representative forest and stream conditions resulting from natural ecological processes (i.e., fires, floods), and management activities like timber harvest. Natural ("minimally-managed") stands commonly have scattered trees exceeding 30 inches dbh, that contain a mix of size classes, large logs and snags, and conifer and hardwood species. The ecological diversity found throughout the SRNF and the Ukonom RD is reflected in the diversity of vegetation types, plant, fish, and wildlife species found in the project area. Forest stands and riparian areas occur as a result of soil type, aspect, disturbance history, and slope position. Currently vegetation and riparian diversity is high but the structural diversity is lacking in many areas. This lack of structural diversity in uplands is primarily due to past management, high severity fires and the absence of mixed severity fires and the stand complexity resulting from this type of disturbance. Within riparian areas, floods and landslides are the major drivers that resulted in the current instream

habitat and riparian vegetation. Large residual conifer and hardwood trees are scattered through the stands that are dominated by mid-successional trees, the majority of which are surrounded by small and mid-sized Douglas-firs. Young dense conifer plantations (1960s through early 1990s) have not yet been thinned and are scattered throughout the project area. As these stands age they would fall and contribute wood to the riparian systems.

The area available for restoration activities includes up to 923 acres (35.2 miles) of heavy equipment, 35,274 acres (1,234 miles) of manual, and 1,165 acres of lake/pond projects. Within the 1,234 miles, cutting and felling trees would be limited to anadromous fish stream reaches for up to a total of 520 miles.

Threatened, Endangered and Proposed Wildlife Species

Northern Spotted Owl (*Strix occidentalis caurina*)

Federally Threatened, State Candidate for listing under CESA.

NSO Recovery Plan

On June 28, 2011, the USFWS released the Revised Recovery Plan for the NSO. The purpose of recovery plans is to describe reasonable actions and criteria that are considered necessary to recover a listed species. The 2011 Revised Recovery Plan (Recovery Plan) for NSO represents the "best available science." The Recovery Plan recognizes the importance of maintaining, and restoring, habitat for the recovery and long-term survival of the spotted owl. The Recovery Plan also relies on federal lands to provide the major contribution for recovery (USDI Fish and Wildlife Service 2011).

The Recovery Plan also states due to "The continued decline of the spotted owl populations and low occupancy rates in large habitat reserves, and the growing negative impact from barred owl invasions of spotted owl habitats (Forsman et al. 2011, Dugger et al. 2011 and 2016), which is greater than anticipated in the NWFP".

The *Aquatic Restoration Project* was designed to meet the Recovery Plan as follows:

- "Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl population." (Recovery Action (RA) 10)
- "When planning management activities, Federal and non-federal land managers should work with the Service to prioritize known and historic spotted owl sites for conservation and/or maintenance of existing levels of habitat." (RA 10)
- "Maintaining or restoring forests with high-quality habitat would provide additional support for reducing key threats faced by spotted owls" and "Protecting these forests should provide spotted owls high-quality refugia habitat from the negative competitive interactions with barred owls that are likely occurring where the two species' home ranges overlap. Maintaining or restoring these forests should allow time to determine both the competitive effects of barred owls on spotted owls and the effectiveness of barred owl removal measures." (RA 32)

Because the SRNF strives towards recovery of the spotted owl, all NSO activity centers (AC) receive the highest level of protection. This goes beyond the requirement of RA 10. There are multiple known

NSO ACs included in the analysis area for the *Aquatic Restoration Project*. Northern spotted owl ACs would be not taken (indirect or direct) as a result of site-specific projects. Proposed projects would not remove or downgrade suitable nesting/roosting or foraging habitat. All NSO nesting/roosting/foraging and dispersal habitat would be maintained during the implementation of this project. Habitat would not be downgraded or removed during implementation.

Barred Owls

This project meets the intent of RA 32 and the need to reduce inter-specific competition between spotted and barred owls. The project is designed to improve aquatic instream complexity while maintaining habitat suitability for NSO. Such long-term protection of owl habitat is consistent with the recommendations in the Recovery Plan. Maintaining these riparian forests should provide spotted owls high-quality refugia habitat from the negative interactions with barred owls that are likely occurring where the two species' home ranges overlap. The *Aquatic Restoration Project* would not exacerbate competitive interactions between the two (2) species. Implementation of the *Aquatic Restoration Project* activities as explained in the modified Proposed Action (Alternative 2) would neither promote nor prevent the achievement of either species Recovery Plan objectives or associated critical habitat (BA).

Prey Species

In this portion of the northern spotted owls range (below about 4,100 feet in southern Oregon and northern California), dusky-footed wood rats (*Neotoma fuscipes*), are the most important prey species of spotted owls, both in frequency and biomass followed by flying squirrels *(Glaucomys oregonensis)*. In northwestern California, flying squirrels constitute only 9.3 percent of the biomass of NSO diet, while dusky-footed woodrats constitute 70.9 percent of the biomass of NSO diet (Ward et al. 1998).

In a study conducted on the SRNF, Sakai and Noon (1993) found the highest abundance of woodrats occurred in 15- to 30-year-old plantations resulting from past clearcut timber harvest. Ward et al. (1998) found that owls foraged along late-seral forest edges where dusky-footed woodrats were more abundant. The northern flying squirrel is a smaller component of the biomass collected by the spotted owl in this portion of the province. Forsman et al. (1984) described potential negative impacts to flying squirrels through timber harvest; however, the conditions described by Forsman occurred in heavily thinned mature and old growth stands.

All suitable NSO habitat foraging and dispersal habitat would retain its current habitat function and would not be downgraded or removed during implementation of the *Aquatic Restoration Project*. In addition felling trees would provide additional structural diversity and ground cover for NSO prey species. All deformed trees and snags would be retained during project implementation. This would be a short-term effect and in the long term, the project would protect these important habitat components.

Action Area for Northern Spotted Owl

The action area for the NSO is NFS lands within the 21 5th-field watersheds on the SRNF (1,146,253 acres). This area contains approximately 315 known NSO ACs. These ACs are not all currently active but have been active at some point since the early 1980s. The action area contains 270,152 acres of

nesting/roosting, 157,537 acres of foraging, and 163,900 acres of dispersal habitat (Table 3-8). The *Aquatic Restoration Project* would authorize restoration activities to occur on a total of 35,274 acres.

Aquatic restoration activities may occur in and within 0.25 miles of known ACs, nesting/roosting habitat, or CH. Mitigations described in *Chapter 2* of the EA (PDFs) would be applied to prevent adverse impacts to habitat, including nesting/roosting, foraging, and dispersal habitat primary constituent elements, and application of LOPS as needed to prevent noise disturbance during the breeding season.

Table 3-8. Amount of suitable NSO habitat within the 21 5th-field watersheds (NFS lands only).

Watershed	Action Area Acres	Nesting / Roosting Acres	Foraging Acres	Dispersal Acres
Smith River	25,076	4,480	2,938	4,892
North Fork Smith River	43,409	341	315	3,751
Middle Fork Smith River	80,593	17,875	11,632	12,509
South Fork Smith River	172,629	44,850	26,080	24,507
Ukonom Creek-Klamath River	17,484	6,976	2,921	2,116
Rock Creek-Klamath River	68,077	25,481	8,635	13,569
Bluff Creek-Klamath River	160,780	62,103	15,712	21,256
Dillon Creek	23,809	7,834	3,522	4,211
Wooley Creek	48,355	18,250	6,327	8,569
Salmon River	30,863	8,303	2,146	6,702
Blue Creek	64,790	30,005	8,276	8,611
Turwar Creek-Klamath River	2,713	624	223	672
Big French Creek-Trinity River	15,292	4,279	1,009	3,300
Horse Linto Creek-Trinity River	92,940	22,449	10,130	14,760
Lower South Fork Trinity River	64,357	20,091	8,758	7,882
Upper Mad River	67,580	19,602	14,344	7,813
Middle Mad River	36,780	13,341	6,548	2,372
North Fork Eel River	71,587	11,570	13,818	5,878
Dobbyn Creek	12,041	4,321	3,601	933
Upper Van Duzen River	37,674	9,557	9,306	8,569
Lower Van Duzen River	9,424	4,166	1,296	1,028
Totals	***1,146,253***	***336,498[18]***	***157,53718[18]***	***163,900[18]***

Critical Habitat: Forest wide 543,739 acres of NSO critical habitat occurs within the critical habitat subunits. Up to 746 acres where heavy equipment would be allowed would occur within five (5) CH subunits and, 15,031 acres of projects using manual methods within seven (7) subunits and 213 acres of lake/pond projects within five (5) subunits (*Wildlife BA/BE* 2018).

Late-Successional Reserves: There are up to 265 acres of where heavy equipment could be used, 2,284 acres of manual projects and 283 acres of lake/pond potential manual projects within LSRs. All projects proposed in LSR would not fell trees greater than 20-inch dbh. The *Aquatic Restoration Project*

[18] Northern spotted owl (NSO) habitat adjusted for recent fires: 270,152 acres nesting/roosting habitat; 157,537 acres foraging habitat; and 163,900 acres dispersal habitat.

area has a component of dense early- and mid-successional habitats (28 percent), with late-successional habitats comprising approximately 21 percent of the area.

Northern Spotted Owl Habitat

Suitable NSO habitat is commonly separated into nesting/roosting, foraging, and dispersal habitat; these habitat types are described in detail in the NSO Recovery Plan (USDI Fish and Wildlife Service 2011). Nesting/roosting is generally described as mid- to late-seral forests that contain stands of large trees with high canopy cover, multilayered canopies, and nesting platforms. Foraging habitat can be described as slightly reduced canopy cover, fewer large trees, and enough space for NSO to maneuver through the trees for hunting prey when compared to nesting/roosting habitat. Dispersal habitat contains a moderate level of canopy closure and trees large enough to provide shelter and potential foraging opportunities for traveling NSO, but does not contain adequate amounts of other essential habitat components for long-term NSO occupation, reproduction or survival.

Indicator 1. Likelihood that project implementation would lead to change in NSO habitat suitability.

This analysis would calculate the change in NSO habitat suitability (nesting/roosting, foraging, or dispersal habitat) pre- and post-project within the action area, and the 5th-field watersheds from the implementation of the action alternative (Alternative 2). The changes in NSO habitat would be presented in pre- and post-implementation table by 5th-field watershed with a risk assessment.

- **Criteria for Assessing Risk to NSO Suitability:** The desired condition for this analysis indicator is to minimize the amount of NSO habitat affected by the project actions. The amount of suitable NSO habitat would be calculated pre- and post-implementation of the proposed activities using the existing habitat baseline within the 5th-field watersheds and would be interpreted into four (4) categories based on a risk assessment ranging from *Very Low* (less than 5% change post-implementation) to *High* (greater than 20% change post-implementation). A *High* risk of change means that harm, displacement, and failed breeding attempts could occur in the 5th-field watershed, because a reduced habitat suitability with a *Very Low*, represents the quality and distribution of habitat that has been associated with successful reproduction over the species range. The *Aquatic Restoration Project* strives for a *Very Low* change in NSO habitat suitability within the 5th-field watersheds post implementation.

Indicator 2. Changes to Critical Habitat

Critical habitat is generally described as the specific geographic area occupied by the species at the time of listing plus areas that contain the physical and biological features that are essential to the conservation of endangered and threatened species and may need special management or protection. Primary constituent elements (PCEs) are the physical and biological features that provide the essential life history requirements of the species. The 2011 CHU designation identifies the primary constituent elements for NSO as those physical and biological features that support nesting, roosting, foraging, and dispersal (USDI Fish and Wildlife Service 2012):

- **Criteria for Assessing NSO Critical Habitat Analysis:** The desired condition for this analysis indicator is to minimize the effects to NSO critical habitat. The analysis estimates the number of critical habitat acres affected by the action alternative. Given the types of projects proposed for this project, we focus on the reporting of effects on habitat as degrade (maintain), downgrade, or remove. Degrade (maintain) means the effects on the habitat are minimal and the habitat remains functional at the same level prior to implementing projects. Downgrade means the habitat has been affected to the point where it would not continue to function at its initial level and it would drop down one level in habitat type. For example, foraging habitat receives treatments that results in removing canopy cover and structure to the point that the foraging habitat functions as dispersal habitat. Removal means the once functional habitat is not habitat after treatment.
- The acres of critical habitat downgraded or removed by the action alternative would be presented along with the proportion of the change in critical habitat within the portion of critical habitat subunit within the analysis area.

Environmental Consequences to Northern Spotted Owl

Direct and Indirect Effects – Alternative 1 (No Action)

No action would have no "direct effects" to NSO habitat or individuals. The *Aquatic Restoration Project* area would remain in the existing condition for an undetermined amount of time. The lack of aquatic restoration proposed activities would retain the habitat and important legacy structures (e.g., large trees/snags and woody debris) to aid in the development of NSO habitat by providing physical structure as the stand regenerates.

Since NSO and their prey are associated with large trees/snags and logs, Alternative 1 would maintain all large trees/snags and large woody debris. However, the lack of proposed treatment would not aid in improving conditions for aquatic species within the action area. Future trout, steelhead, and salmon restoration projects would be jeopardized with the projects intent of maintaining current NSO habitat function and suitability.

Direct and Indirect Effects – Alternative 2 (Modified Proposed Action)

The known NSO ACs within the action area could have some type of treatment in the home range and in the core. For Indicator 1 – NSO Habitat, a *Very Low* risk is the desired condition after implementation. Alternative 2 would not affect this 5th-field watershed risk level. None of the 5th-field watersheds would increase in risk level and all the 5th-field watersheds would remain in the "very low category". In other words, the NSO ACs in the project area would likely have a high likelihood of being reproductively successful and contain enough suitable habitat to reproduce successfully if occupied before and after project implementation.

Alternative 2 would not result in the removal of critical habitat or nesting/roosting/foraging/dispersal (NRFD) habitat. Heavy equipment and manual activities would include placement of large woody debris (logs and root wads), helicopters placing LW, felling trees, and manual treatments would occur within the proposed project sites.

Project activities would occur in and adjacent to suitable NSO habitat including within ACs and CH. The project would retain live overstory trees (predominate or dominate) and would maintain habitat suitability post-treatment. Habitat quality may increase as a result of diversification of the riparian areas at the project sites. In all proposed activities, habitat would still function as it is currently classified. Therefore, there would be no change to habitat quality or quantity.

In addition, 2012 USWFS NSO protocol surveys or seasonal restrictions (LOPs) would reduce the risk that project implementation would lead to mortality, harm, failed breeding attempts, or displacement to NSO. Noise disturbance would have the highest probable effects to individual or nesting NSO, and such disturbance is itself unlikely given that surveys within suitable habitat would occur prior to project implementation if implementation would occur within the LOP. If surveys are not conducted the LOP would apply within suitable habitat.

Cumulative Effects

Future actions are included in the *D-70 Project* planned on the Mad River RD, currently under development. The CAL FIRE website would be checked during project planning (*Appendix C*) if there are any timber harvest plans currently planned on private lands.

The direct and indirect effects of Alternative 2 plus cumulative effects resulting from other actions within the analysis area did not change the risk level for NSO habitat suitability in Indicator 1. For Indicator 2, the cumulative effects would not result in any additional acres of critical habitat being removed. The direct and indirect effect of this alternative (0 acres of NRFD habitat) plus the cumulative effect from other projects.

Marbled Murrelet (*Brachyramphus marmoratus*)

Federally Threatened and State Endangered.

Marbled Murrelet Recovery Plan and Critical Habitat

Management direction is contained in the FSEIS ROD and was incorporated into the LRMP land allocations and S&Gs. The Recovery Plan for the Marbled Murrelet (MAMU; *Brachyramphus marmoratus*) in Washington, Oregon, and California (USDI 1997) forms the basis for the management direction, in part. The Recovery Plan calls for the protection of habitat essential for recovery in larger contiguous, blocks; maintaining occupied habitat, and monitoring trends, productivity, and reproduction. In addition, the FEIS ROD contains standards and guidelines for management and protection of the MAMU, including the requirement for surveys to Regional protocol prior to any modification of potentially suitable MAMU habitat.

Marbled murrelet CH was revised in 2009 with a final rule published on October 5, 2011 (USDI 2011). A designation of CH identifies areas essential to conservation of a species. The USFWS has determined that the physical and biological habitat features (referred to as the primary constituent elements) associated with the terrestrial environment that support nesting other normal behaviors are essential to the conservation of the MAMU and require special management considerations. The USFWS used the best existing data to locate the forest areas most likely to contain the primary constituent

elements. The forest has three (3) MAMU critical habitat units within MAMU Zone 1. All 251,459 acres of CH are located within the boundaries of LSRs.

Action Area for Marbled Murrelet

The action area for the MAMU is 13 5th-field watersheds on the SRNF and KNF. The SRNF has detected MAMU on radar and audio-visual surveys on the forest. The action area contains 163,323 acres of nesting habitat (Table 3-9). Aquatic restoration activities may occur within 0.25 miles of an occupied site, suitable habitat or CH (Table 3-10). Mitigations described in *Chapter 2* of the EA would be applied to prevent adverse impacts to habitat and LOPs would be applied as needed to prevent noise disturbance during the breeding season.

Table 3-9. Amount of suitable MAMU nesting habitat within 13 5th-field watersheds (NFS lands only).

Watershed	Acres within Action Area	MAMU Nesting Habitat (Zone 1)
Smith River	25,076	4,480
North Fork Smith River	43,409	341
Middle Fork Smith River	80,593	17,875
South Fork Smith River	172,629	44,850
Ukonom Creek-Klamath River	53	17
Rock Creek-Klamath River	35,572	11,674
Bluff Creek-Klamath River	94,596	42,570
Dillon Creek	23,809	7,834
Blue Creek	64,790	30,005
Turwar Creek-Klamath River	2,713	624
Big French Creek-Trinity River	20	4
Horse Linto Creek-Trinity River	22,809	4,889
Lower South Fork Trinity River	32,253	10,279
Totals	***598,322***	***175,442***[19]

Table 3-10 displays the acres of CH within the 5th-field watersheds and the amount of potential acres within the project area that overlap the CH units.

Table 3-10. Acres of Critical Habitat in the action area and acres of project area overlapping Critical Habitat acres.

Critical Habitat Units	Critical Habitat Acres in Action Area	Acres within Project Area with Critical Habitat Acres
CA-01-a	5,267	84
CA-01-b	42,860	367
CA-01-c	130,596	1,823
CA-01-d	23,169	257
CA-01-e	3,821	94
CA-02-a	999	10
CA-11-b	34,083	445

[19] MAMU nesting habitat (Zone 1) adjusted for fire effects = 163,323 acres; MAMU nesting habitat (Zone 2) adjusted for fire effects = 99,144 acres.

Marbled Murrelet Habitat

Nesting habitat is characterized by stands of large trees (at least 19-inch dbh and 98 feet tall). Trees must have large branches or deformities (≥4 inches in diameter and ≥33 feet in height), usually covered with moss or lichen, for nest platforms. Nest platforms typically require moderate to high canopy closure (≥70%), which may come from the nest tree or surrounding trees (Hamer and Nelson 1995). Number of platforms, moss depth and vertical and horizontal cover of the nest appear to be key factors in MAMU nest site selection (Nelson et al. 2006). Other factors include distance to openings (for stall landings and jump-off departures), predator numbers and distance to human disturbance. Most observations are below 2000 feet (610 m) elevation, with some detections at 2,000 to 3,000 feet (610 to 914 m). Nesting usually occurs within the fog belt in this region but detections have occurred in the drier, Douglas-fir dominated forests immediately east of the belt. The farthest inland nest in California was located 18 miles (29 km) from the ocean (Hamer and Nelson 1995).

Spatial and Temporal Bounds for MAMU

The treatment area (project area) boundaries reflect the physical footprint, where proposed heavy equipment (923 acres), manual (35,274 acres) and lake/pond (1,165 acres) treatments, and therefore potential indirect/direct effects could occur. The action area includes 13 of 21 5th-field watersheds clipped to the forest boundary (598,322 acres)—Smith River, North Fork Smith River, Middle Fork Smith River, South Fork Smith River, Ukonom Creek-Klamath River, Rock Creek-Klamath River, Bluff Creek-Klamath River, Dillon Creek, Blue Creek, Turwur Creek-Klamath River, Big French Creek-Trinity River, Horse Linto Creek-Trinity River, and Lower South Fork Trinity River.

Indicator 1. Change in MAMU habitat suitability

Habitat suitability is one of the primary elements of a species existence. Altering the amount or function of habitat could effect a species ability to reproduce, and could lead to displacement, harm, and even mortality. Habitat removal could reduce habitat connectivity between patches of suitable habitat.

This analysis would calculate the change in MAMU habitat suitability (nesting/roosting, foraging, or dispersal habitat) pre- and post-treatment within the action area, and the 5th-field watersheds from the implementation of the action alternative (Alternative 2). The changes in MAMU habitat would be presented in pre- and post-implementation table by 5th-field watershed with a risk assessment.

- **Criteria for assessing risk to MAMU and the likelihood that project implementation would lead to change in MAMU habitat suitability:** The desired condition for this analysis indicator is to minimize the amount of MAMU habitat affected by the project actions. The amount of suitable MAMU habitat would be calculated pre- and post-implementation of the proposed activities using the existing habitat baseline within the 5th-field watersheds and would be interpreted into four categories based on the risk assessment ranging from *Very Low* (less than 5% change post-implementation) to *High* (greater than 20% change post-implementation). A *High* risk of change means that harm, displacement, and failed breeding attempts could occur in the 5th-field watershed because of reduced habitat suitability with a *Very Low* represents the quality and distribution of habitat that has been associated with successful reproduction over the species

range. The *Aquatic Restoration Project* strives for a very low change in MAMU habitat suitability within the 5th-field watersheds post implementation.

Indicator 2. Change to MAMU Critical Habitat

Critical habitat is generally described as the specific geographic area occupied by the species at the time of listing plus areas that contain the physical and biological features that are essential to the conservation of endangered and threatened species and may need special management or protection. For the MAMU, the *Aquatic Restoration Project* overlaps a portion of the Critical Habitat Units (CHU) CA-01-a-e, CA-02-a, and CA-11-b. These units are intended to enhance or protect existing essential biological or physical features, but the primary function for these units is to support the survival, and reproduction, of MAMU (USDI Fish and Wildlife Service 2011).

- **Criteria for assessing MAMU Critical Habitat analysis:** The desired condition for this analysis indicator is to minimize the effects to MAMU CHU. The analysis estimates the number of critical habitat acres affected by the action alternative. Given the types of treatment proposed for this project, we focus the reporting of effects on habitat as degrade, downgrade, or remove. Degrade (maintain) means the effects on the habitat are minimal and the habitat remains functional at the same level prior to treatment. Downgrade means the habitat has been affected to the point where it would not continue to function at its initial level and it would drop down one level in habitat type. For example, foraging habitat receives treatments that results in removing canopy cover and structure to the point that the foraging habitat functions as dispersal habitat. Removal means the once functional habitat is not habitat after treatment.
- The acres of critical habitat downgraded or removed by the modified Proposed Action would be presented along with the proportion of the change in critical habitat within the portion of critical habitat subunit within the analysis area.

Environmental Consequences

A total of 190 acres of heavy equipment treatment would occur within three (3) MAMU critical units, 8,088 acres of manual treatment would occur in seven (7) units, and a total of 265 acres of lake/pond treatment would occur in five (5) units:

- 265 acres of heavy equipment treatment would occur within LSR;
- 12,284 acres of manual treatment would occur within LSR;
- 283 acres of lake/pond manual treatments would occur within LSR, specifically within LSR L2679, RC303, RC304, RC307, RC306, and L2425;
- All treatments proposed in LSR, MAMU Zone 1 and wilderness would not fell trees greater than 20-inch dbh; and
- The *Aquatic Restoration Project* area has an estimated 163,323 acres of late-successional habitat within the 598,322-acre action area.

Direct and Indirect Effects – Alternative 1 (No Action)

No action would have no "direct effects" to MAMU habitat or individuals. The *Aquatic Restoration Project* area would remain in the existing condition for an undetermined amount of time. The lack of treatment would maintain all the remaining habitat and important legacy structures (e.g., large decadent trees) to aid in the development of MAMU habitat by providing physical structure as the stand regenerates.

Since MAMU are associated with large trees for nesting platforms, Alternative 1 would maintain all large trees within the project area. However, the lack of proposed treatment would not aid in improving conditions for aquatic species within the action area.

Direct and Indirect Effects – Alternative 2 (Modified Proposed Action)

The MAMU habitat within the action area could have some type of treatment in the suitable habitat in the project area, but the level of affects would vary. For Indicator 1, a *Very Low* risk is the desired condition after implementation. Alternative 2 would not affect this 5th-field watershed risk level. None of the 5th-field watersheds would increase in risk level and all the 5th-field watersheds would remain in the *Very Low* category. The goal of the *Aquatic Restoration Project* is to maintain habitat types at their current functioning level.

Alternative 2 would not result in the removal of critical habitat and specifically nesting habitat within units CA-01-a-e, CA-02-a, and CA-11-b. No new road construction would occur that would downgrade or remove habitat. Heavy equipment treatment polygons would be accessed on existing roads. Heavy equipment and manual activities would include placement of large woody debris (logs and root wads), helicopters placing LW, felling trees, and manual treatments would occur within the proposed project sites. Noise disturbance would have the highest probable effects to individual or nesting MAMU, and such disturbance is itself unlikely given that surveys within suitable habitat would occur prior to project implementation. If surveys are not conducted an LOP would apply within suitable habitat.

Project activities would occur in and adjacent to suitable MAMU habitat. The project would retain live overstory trees (predominant or dominant) and would maintain habitat suitability post-treatment. In all proposed activities, habitat would still function as it is currently classified. Therefore, there would be no change to habitat quality or quantity.

Indicator 1. Change in MAMU habitat suitability

Based on the availability of suitable habitat within each of the 5th-field watersheds and the fact the proposed activities would not downgrade or remove any suitable MAMU habitat. Marbled murrelet habitat within all the 5th-field watersheds has a very low risk of change while implementing the Proposed Action. In addition MAMU protocol surveys or seasonal restrictions (LOPs) would reduce the risk that project implementation would lead to mortality, harm, failed breeding attempts, or displacement of MAMU. In other words, the MAMU in the project area would likely have a high likelihood of being reproductively successful and contain enough suitable habitat to reproduce successfully if occupied before or after project implementation.

Indicator 2. Change in MAMU Critical Habitat

The project area and the action area overlap with multiple MAMU critical habitat units. No change is expected in these critical habitat units in terms of habitat suitability, quantity or quality post-implementation.

Cumulative Effects

Future actions are included in the *D-70 Project* planned on the Mad River RD, currently under development. The CAL FIRE website would be checked during site-specific project planning (*Appendix C*) if there are any timber harvest plans currently planned on private lands.

The direct and indirect effects of Alternative 2 plus cumulative effects resulting from other actions within the analysis area did not change the risk level for MAMU habitat suitability in Indicator 1.

For Indicator 2 the cumulative effects would not result in any additional acres of critical habitat being removed. The direct and indirect effect of this alternative (0 acres of nesting habitat) plus the cumulative effect (0 acres of nesting habitat).

Forest Service Sensitive Wildlife Species

Analysis of project impacts to FSS species is required by FSM 2670 through the preparation of a biological evaluation (BE). All FSS wildlife species known or thought to occur in the project area (based on habitat and range), were evaluated for this project. It was determined that the project would have no impact on certain Forest Service Sensitive species, based on either the lack of habitat, lack of detections during surveys, or the fact that habitat would not be impacted. In addition, surveys and LOPs could be used as a mitigation to reduce the risk that project actions would impair a species reproduction.

Species that would not be affected by this project include the greater sandhill crane (*Grus canadensis tabida*), great gray owl (*Strix nebulosa*), Siskiyou Mountains salamander (*Plethhodon stormii*), and Tehama chaparral snail (*Trilobopsis tehamana*).

The methodology and assumptions from above apply to the effects analysis of those FSS species and/or habitat that may be affected by this project. The BE prepared for this project contains the affected environment for each species, description of indicators to base effects on as well as the assumptions upon which the analysis was done. Aquatic restoration activities may occur within the primary disturbance zone or within line of site of a wildlife nest or den site and/or their suitable habitat. The following indicator is general to all FSS species:

- **Indicator 1:** The likelihood that project implementation would lead to mortality, harm, failed breeding attempts, habitat connectivity or displacement for wildlife species.

Bald Eagle (*Haliaeetus leucocephalus*)

Affected Environment

Bald eagles generally nest near rivers, large lakes or streams that support an abundant food source. Eagles have been recorded to nest in a variety of natural and manmade structures but most often nest in mature trees or snags. The nest tree or snag is typically the tallest tree with strong limbs that can support the heavy nest. Nest sites also include a perch that is near the nest but in sight of water where the eagles would forage.

Given the specific needs of an eagle, nest trees are a rare resource and would be conserved. Within the project area, foraging, roosting, wintering and nesting habitat is found up and down the riparian corridors of the SRNF and the KNF's Ukonom RD (e.g., Klamath River, Trinity River, and Ruth Reservoir).

Bald eagle LOPs are January 1 through August 31, unless surveys are done.

Environmental Consequences for Bald Eagles

No Action Alternative

The No Action alternative would have no direct, indirect, or cumulative effects to this species or its habitats. Primarily because if no action were taken the project area would continue to exhibit the same habitat characteristics as under current conditions. Future conditions as related to eagle habitat would naturally change, but continue to be available. Barring a loss of all mature potential nesting trees due to a natural event, nesting sites would continue to be present. So long as there are fish within riparian habitats, the primary food source for eagles, they would be present. The No Action alternative would have no effect bald eagle.

Direct and Indirect Effects – Proposed Action

Direct effects such as injury are unlikely to occur. Project activities would not occur in close proximity to any nesting sites during the breeding season. Known locations would be surveyed prior to operations commencing. Suitable habitat would be surveyed prior to timber felling or helicopter operations.

Noise from machinery may disturb nesting and roosting eagles at known locations; however, this effect would be minimized with LOPs if nesting birds are found. If eagles are roosting in other, closer sites, the effect of disturbance would be more intense. Thus, the effects of noise and the potential for disturbance are low and present a low risk for adverse impacts.

No suitable nesting or roosting trees would be removed (nest trees, pre-dominant or dominant). The project would have no effect on food resources. In the long term, increased salmon and trout survival may provide food for bald eagles in the project vicinity.

Determination for Bald Eagles

The Proposed Action of the project may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the bald eagle in the planning area. This determination is based on the following rationale: Potential effects stem from disturbance if an individual bald eagle was present in the project area during the short-term implementation period. Disturbance is unlikely given that known nests and suitable habitat would be surveyed for eagles. Site clearance prior to implementation would result in the avoidance of effects to bald eagle possibly occurring in the action area. Thus, implementation would not cause an adverse impact to an individual, breeding success, or populations.

In addition, the Proposed Action would not affect suitable nest trees, wintering roost trees, or foraging habitat.

Northern Goshawk (*Accipiter gentilis*)

Affected Environment

Within the project area, there are records of nesting goshawk on the forest. Foraging and nesting habitat for goshawk is found within or adjacent to riparian areas of SRNF and the KNF's Ukonom RD. Given their similar habits and habitat use, goshawk habitat is like that of the NSO and habitat is present in the project sites.

If surveys are not conducted an LOP of March 1 through August 31 would apply within goshawk suitable habitat.

Environmental Consequences

No Action Alternative

The No Action alternative would have no direct, indirect, or cumulative effects to the species or its habitats. This is because if no action is taken, the project area would continue to exhibit the same habitat characteristics as under current conditions. Future conditions as related to goshawk habitat would naturally change. Under typical forest succession, habitat quality would slowly increase, as trees become larger, canopy increases in complexity, and down wood volume increases. Nesting and foraging habitat would continue to be available. The No Action alternative of the *Aquatic Restoration Project* would not affect the northern goshawk.

Direct and Indirect Effects – Proposed Action

Mechanical and manual activities and placement of large wood (logs and root wads), felling trees, and manual treatments would occur within the proposed project sites. Noise disturbance would have the highest probable effects to individual or nesting northern goshawks, and such disturbance is itself unlikely given that surveys within suitable habitat would occur prior to project implementation. If a goshawk happened to be near the project site during implementation, it is possible that noise from equipment would cause a goshawk to move away from the site and avoid foraging or traveling through the vicinity.

Project activities would occur in and adjacent to suitable goshawk habitat. The project would retain live overstory trees (pre-dominant or dominant) and have minimal effect on habitat suitability post-treatment. Proposed treatments at mechanical sites and ponds may remove some small understory trees and shrubs. Habitat quality may increase as a result of diversification of the riparian areas at the project sites. In all proposed activities, habitat would still function as it is currently classified. Therefore, there would be no change to habitat quality or quantity.

The effects to individual goshawks and their habitat is unsubstantial in intensity and in area and would not affect the goshawk population on the forest or within its range.

Determinations

The Proposed Action of the project may affect individuals, but is not likely to result in a trend toward federal listing or a loss of viability for the northern goshawk in the planning area. This determination is based on the following rationale: Potential effects stem from disturbance if an individual goshawk or nest was present in the project area during the implementation period. Disturbance is unlikely given that

surveys and LOPs would be in place if a nesting pair is found. Site clearance prior to implementation would result in the avoidance of effects to goshawk possibly occurring in the action area. This would prevent disturbance, which may cause an adverse impact to an individual, breeding success, or populations.

Goshawk habitat in the project sites is suitable for foraging and nesting. This suitability would not change as a result of the proposed project activities.

Willow Flycatcher (*Empidonax traillii)*

Affected Environment

Surveys have not been conducted within the project area. No nest site locations are known within or adjacent to the project area. Willow flycatchers have been detected upriver on the KNF. The distribution and amount of willow flycatcher reproduction is not well known on the forest, but reproduction is possible. Therefore, the assumption is that flycatchers are present on the forest and reproduction would be most likely to occur in riparian areas primarily in the low gradient and larger waterways. The remaining waterways within the project area would be high gradient and less suitable or would not contain suitable vegetation for willow flycatcher reproduction. As a California state-listed species protocol surveys would be required if project location is within suitable habitat and if state funding was acquired for project actions.

Environmental Consequences

No Action Alternative

The No Action alternative would have no direct, indirect, or cumulative effects to the species or its habitats. This is because if no action is taken, the project area would continue to exhibit the same habitat characteristics as under current conditions. A discussion of the likely future conditions are offered for comparison with the Proposed Action. Future conditions as related to willow flycatcher habitat would naturally change. Under typical forest succession, meadow and riparian habitat quality would slowly increase if fires or natural events created openings that would benefit this species. Nesting and foraging habitat would continue to be available.

Direct and Indirect Effects – Proposed Action

Mechanical and manual activities and placement of large woody debris (logs and root wads), felling trees, and manual treatments would occur within portions of the proposed project sites. Noise disturbance would have the highest probable effects to individual or nesting willow flycatcher. If a willow flycatcher happened to be near the project site during implementation, it is possible that noise from equipment would cause a willow flycatcher to move away from the site and avoid foraging or traveling through the vicinity.

Project activities are not likely to occur in or adjacent to suitable willow flycatcher habitat. Proposed treatments at mechanical sites and ponds may remove some small understory trees and shrubs. At this scale, it could impact reproductive success for a breeding pair. Habitat quality may increase as a result of diversification of the riparian areas at the project sites. In all proposed activities, habitat would still function as it is currently classified. Therefore, there would be no change to habitat quality or quantity.

The effects to individual or nesting willow flycatcher and their habitat is unsubstantial in intensity and in area and would not affect the willow flycatcher population on the forest or within its range.

Determinations

The No Action alternative of the *Aquatic Restoration Project* would not affect the willow flycatcher. The flycatcher would continue to use available habitat within the project area.

The Proposed Action of the project may affect individuals, but is not likely to result in a trend toward federal listing or a loss of viability for the willow flycatcher in the planning area. This determination is based on the following rationale: Potential effects stem from disturbance if an individual willow flycatcher or nest was present in the project area during the implementation period. Disturbance is unlikely given that surveys and LOPs would be in place if suitable habitat is found within or adjacent to proposed project actions. Site clearance prior to implementation would result in the avoidance of effects to willow flycatcher possibly occurring in the action area. This would prevent disturbance, which may cause an adverse impact to an individual, breeding pair, or populations.

In addition, the proposed project would not affect suitable willow thickets until surveys have proven them unoccupied. This would ensure habitat suitability would not change as a result of the proposed project activities.

Fisher, Marten and Wolverine

The west coast DPS fisher *(Pekania pennanti)* was proposed for listing but withdrawn in 2016 (USDI Fish and Wildlife Service 2016). It thus remains on the Region 5 sensitive species list and is evaluated as such. Fisher observations are uncommon and widespread on the forest. Surveys on the SRNF and KNF's Ukonom RD are well documented and have a long history. There are documented records, observations and habitat occur in the project area. Coastal marten (*Martes caurina)* live in mature conifer forest and is widespread on the KNF and SRNF. Fire effects have been the largest recent influence on marten habitat across the forest and locally on the KNF and SRNF. Fires have decreased mature dense conifer habitat extensively, yet unburned or low-severity patches remain. Suitable denning, foraging, and cover remains, but in altered quantities and distribution. As a California state-listed species, protocol surveys for coastal marten would be required if within project location is within suitable habitat and if state funding was acquired for project actions.

The forested mountains of the SRNF and the KNF's Ukonom RD, including the project area, may be considered suitable wolverines (*Gulo gulo*) foraging and dispersal habitat. Denning habitat may be present in the high elevation portions of the forest, but it is unlikely due to the lack of deep, late spring snow cover. No verified records of wolverine on the forest, although incidental sightings have been reported on the Smith River NRA, and the Orleans and Lower Trinity RDs, primarily in the Siskiyou Wilderness.

Suitable fisher, marten and wolverine habitat is available in and adjacent to the project sites. Because the proposed sites are located within riparian corridors, which are important habitats for fishers in this part of their range. The project sites function primarily serve as foraging habitat and travel routes for fisher. Aquatic restoration project activities may occur in and within 0.25 miles of a den or suitable denning habitat for fisher, marten, and wolverine, though less probable. Mitigations include trees with cavities, defects, and basal hollows would be left on the landscape for denning and resting habitat.

Environmental Consequences

No Action Alternative

The No Action alternative would have no direct, indirect, or cumulative effects to these species or their habitats. This is because if no action is taken, the project area would continue to exhibit the same habitat characteristics as under current conditions. Under typical forest succession, habitat quality would slowly increase as trees become larger, canopy increases in complexity, and down wood volume increases. Denning and foraging habitat would continue to be available. Fisher and marten habitat would improve with increasing forest age, tree size, and structural diversity. The existing wolverine habitat would persist.

Direct and Indirect Effects – Proposed Action

Direct effects, such as injury, are unlikely. Fishers are wary and very mobile, and therefore would likely move out of the project are with increased human activity. This disturbance would be minor and unlikely to cause permanent or long-term abandonment of the project vicinity. Given the paucity of marten records on the forest and the Ukonom RD and the sparse amount of habitat in and near the project sites, there is a low probability that a marten would be present in the project vicinity. Thus, there is an extremely low risk of injury and disturbance. Wolverines are not expected to occur on the SRNF and the KNF's Ukonom RD; therefore, chances of potential injury or disturbance are extremely remote.

Habitat for fisher, marten and wolverine in the project area would remain very similar to current conditions. There would be no change to overstory canopy and minor changes to understory structure where some individual trees are felled for instream restoration. However, the habitat value would remain the same because the extent of tree removal would not alter the function of the project sites to provide habitat. Proposed activities themselves may increase foraging habitat quality because increased vegetation diversity may increase prey species diversity and possibly populations, especially for small mammals. Given the small footprint of the project sites and low percentage of a particular watershed treated in a given year and the large home range of these species, the effect is minimal.

Determinations

The No Action alternative of the *Aquatic Restoration Project* would not affect the fisher, coastal marten or wolverine.

The modified Proposed Action may affect individuals, but is not likely to result in a trend toward federal listing or a loss of viability for the fisher, coastal marten or wolverine in the project area. This determination is based on the following rationale: 1) proposed activities may occur within or near suitable denning and foraging habitat; 2) snags suitable for resting and denning habitat would be retained and are unlikely to be removed; 3) LOPs would be applied to active den sites; and 4) functionally, there would be no change to fisher, coastal marten and wolverine habitat. The dominant forest type and structure would remain. Understory foraging habitat may change with an increase in habitat types and small mammal prey diversity, although to a minor extent.

In addition, fishers and martens can and presumably would avoid human activity during implementation. The project areas are not a substantial portion of a potential home range. Disturbance is likely to be minor, if it occurs at all.

Pallid Bat, Townsend's Big-eared Bat, and Fringed Myotis

*Pallid bats (*Antrozous pallidus*)*
Surveys have not been conducted within the project area, but because suitable large tree roost sites are fairly common and it is reasonable to conclude that pallid bats are present within the project area. Suitable roost sites for pallid bats in the form of large trees and snags do occur in the project area. Other structures, including buildings and bridges, also occur within or adjacent to project area, but are much more limited.

Townsend's big-eared bats (Corynorhinus townsendii)
Surveys have not been conducted and no known locations occur within the project area. Caves or open mines are not known to occur within the project area; however, suitable roost sites for Townsend's big-eared bats in the form of large diameter trees are scattered throughout the project area. Townsend's big-eared bat is a moth specialist, foraging within wooded areas, along edge habitats and near streams. The primary threat to the Townsend's big-eared bat is related to disturbance and/or destruction of roost sites. Thus, it is reasonable to assume that Townsend's big-eared bats are present in the project area. Surveys would not be conducted for this species.

Fringed myotis (Myotis thysanodes)
The fringed myotis is rare across its range but may be quite common locally from sea level to 1,950 meters (6,400 feet). It occurs in a wide range of habitats from desert scrub to high elevation coniferous forests (Pierson and Rainey 1998). It uses open habitats, early successional stages, streams, lakes and ponds as foraging areas. They roost in snags, caves, mines, crevices and man-made structures (Zeiner et al. 1990). Surveys would not be conducted for this species.

The project actions are within the range of pallid, Townsend's big eared and fringed myotis (CNDDB 2015). Suitable foraging and day roosting habitat exists in the project area. Streams run through forested habitat and may provide foraging and roosting habitat for bats in the form of large trees and snags. Better quality foraging habitat is available along low-gradient riparian areas (Klamath River, Trinity River, and Ruth Reservoir) and lakes. These riparian locations may be near fields, small meadows and riparian edge habitat, which provide foraging opportunities.

Affected Environment
There are no known hibernacula or maternity sites in the proposed project vicinity, however riparian and stream habitat are known to be foraging habitats. There are numerous human structures, available for roosting up and down SRNF and the KNF's Ukonom RD river corridors and side canyons. Live trees and snags in the proposed project sites are large enough to provide roost sites.

- **Indicator 1:** The likelihood that project implementation would lead to mortality, harm, failed breeding attempts, habitat connectivity or displacement for wildlife species.

Environmental Consequences

No Action Alternative

The No Action alternative would have no direct, indirect, or cumulative effects to these species or its habitats. This is because if no action is taken, the project area would continue to exhibit the same habitat characteristics as under current conditions. The existing habitat conditions would remain in the short term, and change through forest succession and human made or natural events over the long term. Trees, snags, and human made structures would continue to provide roosting habitat.

Direct and Indirect Effects – Proposed Action

It is unlikely that pallid, Townsend's big-eared, or fringed myotis bats would be affected by implementation of this project. While the forest is in the range of these species there are no records of individuals in the project area, it does not mean there are none. Roosting individuals would be the most likely to be harmed, and in the case of this project, it would be individuals roosting in trees or snags adjacent to the felling of trees. However, potential roosting trees and snags in the project area would be retained as a PDF. Activities that occur near bridges and buildings may cause disturbance, but this is expected to be short-term and may cause bats to leave bridge roosts for other sites during implementation activities.

Large diameter snags are available in the project sites; therefore, any snags felled for safety reasons would be felled for human safety. Snag removal is expected to be minimal, as well.

Although a minor effect, the diversification of habitat at the project sites may benefit local bats. In general, the manual treatment sites would be more open, even with an overstory remaining in unaffected portions of each project site. Intra-canopy foraging space would increase. Insect diversity is likely to be different and higher. However, these small project sites are unlikely to be of any substantial increase in quality relative to the broader foraging opportunities that currently exist.

Determinations

The No Action alternative of the *Aquatic Restoration Project* would not affect the pallid, Townsend's big eared, or fringed myotis bats.

The Proposed Action of the project may affect individuals, but is not likely to result in a trend toward federal listing or a loss of viability for these bat species in the planning area. This determination is based on the following rationale: 1) proposed activities would occur within or near suitable roosting and foraging habitat; 2) large diameter snags and trees suitable for roosting habitat would be retained; and therefore, would not be affected; 3) man-made structures suitable for roosting may be found in and near the project area, and project activities near these sites may disturb resident bats, if present, during implementation; and 4) overstory forested foraging habitat would not be affected. This would prevent disturbance, which may cause an adverse impact to an individual, breeding success, or populations. Below canopy, foraging habitat may increase in structural and insect prey diversity, although to a minor extent.

Pallid, Townsend's big eared, and fringed myotis habitat in the project sites is suitable for foraging and roosting. This suitability would not change as a result of the proposed project activities. Hibernaculum or natal colonies would not be located near proposed project activities.

Western Bumblebee (Bombus occidentalis)

Western bumblebees have an interesting life cycle that is important for understanding the potential effects to the species. The queen survives the winter and emerges in the spring from hibernation and immediately starts foraging. The queen will look for a nest which is often located below the ground in an abandoned rodent hole or the nest could be found above ground in tufts of grass, an old birds' nest, or cavities in trees. The queen will stay at the nest and continue laying eggs through the end of fall, the queen will find an overwintering site, but the workers will not survive the winter (Hatfield et al. 2012).

Bumblebees need three (3) primary components to thrive: 1) flowers for foraging, which could include blackberries; 2) a nest site; and 3) a place to overwinter. Bumblebees are generalist foragers that seek pollen and nectar as a food source. In general, bumblebees prefer open meadow like areas with a high diversity of plant structure with an abundant amount of flowering plants (Hatfield et al. 2012).

Affected Environment

Little to no surveys have been done for western bumblebees however, riparian areas could provide the three primary habitat components including wildflowers. Snags in the proposed project sites are large enough to provide nest sites.

- **Indicator 1:** The likelihood that project implementation would lead to mortality or loss of habitat.

Environmental Consequences

No Action Alternative

The No Action alternative would have no direct, indirect, or cumulative effects to these species or its habitats. This is because if no action is taken, the project area would continue to exhibit the same habitat characteristics as under current conditions. The existing habitat conditions would remain in the short term, and change through forest succession and human made or natural events over the long term. Trees, snags, and flowering plants would continue to provide habitat.

Direct and Indirect Effects – Proposed Action

It is unlikely that western bumblebee would be affected by implementation of this project. While the forest is in the range of these species there are no records of individuals in the project area, it does not mean there are none. Nesting individuals would be the most likely to be harmed, and in the case of this project, it would be due to heavy equipment resulting in destruction of potential nest sites. Since bumblebees are generalist foragers (e.g., Tepedino, Bradley, and Griswold 2008), flowering invasive weeds such as thistles and knapweeds can actually increase native bee abundance, particularly later in the season and in the absence of native flowering plants (Carson 2013).

Determinations

The No Action alternative of the *Aquatic Restoration Project* would not affect the western bumblebee.

Alternative 2 may affect individuals, but is not likely to result in a trend toward federal listing or a loss of viability for western bumblebees in the planning area. This determination is based on the action would have low levels of effects on the disturbance level on the western bumblebee and that larger meadows are not included within the project area. Projects are small in size and primarily within the stream channel.

Cumulative effects for Forest Service Sensitive Species

Forest projects are located within the *Aquatic Restoration Project* area they include the *Somes Bar Integrated Fire Management Project*, *Orleans Community Fuels Reduction and Forest Health Project*, *Waterman Project*, *Beaverslide*, *Kelsey*, *1st 48*, *Gordon Hill*, *Little Jones* and various other forest projects. These forest projects have been determined to be may affect not likely too adversely affect or no effect projects and would have minimum impact to habitat suitability on the forest. Direct and indirect effects to any bat species from implementation of the Proposed Action would not add cumulatively to the effects of actions of the above-mentioned projects.

Project activities are not expected to disturb these bat species and the amount of habitat that may be altered or changed in this project is inconsequential; therefore, the project would not contribute cumulatively to the effects of the above-mentioned projects. Therefore, no cumulative effects to FSS species are expected.

Summary of Determinations

Table 3-11. Species list for the project area, habitats and effects determinations.[20]

Species	Recent observations or occurrences in project area	Habitat	Habitat in Project Area	Determination	Rationale
Threatened, Endangered and Candidate Species Analyzed for the Project					
Northern spotted owl *(Strix occidentalis caurina)*	Yes	Mature and structurally complex mid-seral forests.	Yes	May affect not likely to adversely affect.	Treatments would occur within suitable habitat and CH, but would not change habitat function.
Marbled murrelet *(Brachyramphus marmoratus)*	Yes	Mature and old growth conifer forests for nesting.	Yes	May affect not likely to adversely affect.	Treatments would occur within suitable habitat and CH, but would not change habitat function.
Region 5 Regional Forester's Sensitive Species found on the KNF and SRNF					
Bald Eagle (*Haliaeetus leucocephalusi)*	Yes	Riparian areas and adjacent forests.	Yes	May affect individuals, but not likely to result in a trend toward federal listing or loss of viability for the species in the planning area.	Project may cause short-term disturbance to nesting, foraging or roosting eagles, but would not change habitat function.
Northern goshawk *(Accipiter gentilis)*	Yes	Mature and old-growth forests.	Yes	May affect individuals, but not likely to result in a trend toward federal listing or loss of viability for the species in the planning area.	Project may cause short-term disturbance to nesting, foraging or roosting goshawk, but would not change habitat function.
Willow flycatcher (*Empidonax traillii)*[21]	No	Riparian shrubs / meadows near surface water. In California, preferred habitats are often times dominated by willows.	Yes	May affect individuals, but not likely to result in a trend toward federal listing or loss of viability for the species in the planning area.	Project may cause short-term disturbance to nesting willow flycatcher, but would not change habitat function.

[20] Foothill yellow-legged frog, southern torrent salamander, and western pond turtle are covered in the aquatics section at the beginning of Chapter 3.
[21] Denotes California State listed species.

Species	Recent observations or occurrences in project area	Habitat	Habitat in Project Area	Determination	Rationale
Fisher (*Pekania pennanti)*	Yes	Forest with dense canopy and large woody debris; may use riparian corridors for travel.	Yes	May affect individuals, but not likely to result in a trend toward federal listing or loss of viability for the species in the planning area.	Treatments would occur within suitable habitat, but would not change habitat function.
Coastal marten *(Martes caurina)*[21]	Yes	Conifer forest.	Yes	May affect individuals, but not likely to result in a trend toward federal listing or loss of viability for the species in the planning area.	May impact habitat used for foraging, but would not change habitat function.
North American Wolverine (*Gulo gulo)*	No	Wide range of forested and unforested habitats; persistent spring snow cover for denning.	Yes	May affect individuals, but not likely to result in a trend toward federal listing or loss of viability for the species in the planning area.	May impact habitat used for foraging and dispersal, but would not change habitat function.
Pallid bat (*Antrozous pallidus*)	Yes	Caves, mines, tree hollows and snags are documented for roosting; open areas for foraging. Most common in open, dry habitats that contain rocky areas for roosting.	Yes	May affect individuals, but not likely to result in a trend toward federal listing or loss of viability for the species in the planning area.	May impact habitat used for foraging and dispersal, but would not change habitat function.
Townsend's big eared bat (*Corynorhinus townsendii*)	Yes	Caves, mines, bridges, old buildings, tree hollows, snags for roosting; wide range of foraging habitats.	Yes	May affect individuals, but not likely to result in a trend toward federal listing or loss of viability for the species in the planning area.	May impact habitat used for foraging and dispersal but would not change habitat function.
Fringed myotis *(Myotis thysanodes*)	Yes	Forested areas above 4000-foot elevation.	Yes	May affect individuals, but not likely to result in a trend toward federal listing or loss of viability for the species in the planning area.	May impact habitat used for foraging and dispersal, but would not change habitat function. Majority of project located below 4,000 feet.
Western bumblebee *(Bombus occidentalis*)	No	Open meadows with a high diversity of plant structure and abundance of flowering plants.	Yes	May affect individuals, but not likely to result in a trend toward federal listing or loss of viability for the species in the planning area.	May impact habitat used for foraging and dispersal, but would not change habitat function.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

The *Aquatic Restoration Project* complies with Forest Service policy (FSM 2670), and SRNF and KNF LRMP S&Gs for TESP species.

Endangered Species Act of 1973

The *Aquatic Restoration Project* BA for TE wildlife species (WFRPBA 2015), along with the site-specific review process in this draft EA (*Appendix C*), satisfies §7 consultation requirements for ESA-listed wildlife species.

Currently no wildlife species are listed as endangered or proposed for listing. In the event wildlife species are proposed for listing under the ESA, SRNF would re-initiate consultation with USFWS.

California Environmental Quality Act and California Endangered Species Act

The California Endangered Species Act (CESA) was enacted in 1984 to parallel the federal ESA and allows the California Fish and Game Commission (CFGC) to designate species, including plants, as threatened or endangered. Some of the conditions for incidental take are that the take is minimized and fully mitigated, adequate funding is ensured for this mitigation, and that the activity would not jeopardize the continued existence of the species.

Management Indicator Species

Under the NFMA, the Forest Service is directed to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" (PL 94-588, §6(g)(3)(B)). The 1982 regulations implementing NFMA require that "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area" (36 CFR 219.19). Management indicator species (MIS) is a concept used by the agency to serve as a barometer for species viability at the forest level. Population changes of MIS are believed to indicate the effects of management activities.

The SRNF and KNF LRMPs use MIS to assess potential effects of project activities on the various habitats and habitat assemblages with which these species are associated. Forty-one (41) fish and wildlife species have been selected as MIS or assemblages for a variety of habitats that are potentially affected by resource management activities on the forest (LRMP IV-97). The potential impacts to MIS were analyzed and the results are summarized here. The full report is located within the project file (Yost 2018b).

Affected Environment

The 5th-field watershed identify 0 to 5,840 acres where manual and mechanical treatments could occur. The Project Area includes 32,274 acres of potential manual treatments and 923 acres of potential mechanical treatments. Some of the MIS assemblages overlap a smaller portion of the project area:

- **Individual Species Assemblage:** Northern spotted owls, pileated woodpecker, black bear, coastal marten, fisher and black-tailed deer may occur throughout the areas identified for potential treatment. These areas provide terrestrial species places to roost, nest, den and forage.
- **Bog/Seep/Spring/Wet Meadow Assemblage:** Each 5th-field watershed contains lakes and ponds identified for potential treatment ranging from 0 to 177 acres. The Proposed Action includes 1,165 acres of potential lake and pond treatments. Western pond turtles, wood ducks may occur throughout the lakes proposed for treatment. Lakes provide aquatic and terrestrial species places to get water, nest and forage.
- **Marsh/Lake/Pond Assemblage:** Each 5th-field watershed contains lakes and ponds identified for potential treatment ranging from 0 to 177 acres. The Proposed Action includes 1,165 acres of

potential lake and pond treatments. Western pond turtles, wood ducks may occur throughout the lakes with potential treatments. Lakes provide aquatic and terrestrial species places to get water, nest and forage.

- **River and Stream Species Assemblage:** Each 5th-field watershed contains perennial stream reaches of potential treatments ranging from 0 to 211 miles. The total proposed riparian area within the Proposed Action is 1,234 stream miles. Aquatic species may occur throughout perennial streams in the project area. American dipper, salmonid species, tailed frog, trout, merganser, and ruffed grouse may occur in streamside habitat within and adjacent to perennial streams in the project area.
    - **Habitat is considered high quality:** Standards and guidelines in the forest plan and the aquatic conservation strategy generally preclude actions that would negatively affect riparian area quality.
    - **Sediment:** Habitat for special status aquatic species is dependent upon watershed processes like natural sediment supply and sorting. Soils are erodible in upland areas and there is greater capacity for storage in lower stream reaches such as those found in the project sites. Current conditions are considered normal and would remain similar, barring unpredictable, large-scale upstream disturbances.
    - **Stream Temperature:** In general, tributary habitats are highly valuable for the terrestrial MIS because water temperatures are cooler and even throughout the day. Current conditions are expected to be normal range, varying slightly throughout the day, in particular during the warm seasons.
    - **Large Wood:** Large wood contributes to channel stabilization, sediment storage, pool formation, aquatic hiding cover, and foraging habitat. In the project reaches, large wood is present in the stream courses and adjacent forested riparian areas. Fairly large diameter logs are present in each site. Some wood may be sourced from upstream, but due to the slow stream velocity, much of the wood source is at the project sites in the form of snags and downed trees, as well as potential wood form the existing live trees.
- **Tanoak/Madrone Assemblage:** Hammond's flycatcher, western tanager and black-headed grosbeak may occur throughout the areas where activities may occur. The areas with potential activities provide terrestrial species places to roost, nest, den and forage.
- **Snag Assemblage:** Snags of various diameters are present in the project sites, although they are not abundant. Existing live trees would contribute to snag abundance in the long term, and should include relatively large diameters. Snags can provide nesting and foraging sites for a number of MIS.
- **Down Woody Debris Assemblage:** Down wood of various diameters are present in the project sites. Abundance varies by project location. Existing live trees would contribute to down wood abundance in the long term, and should include relatively large diameters logs. Down wood provides hiding cover, resting, denning, and stream complexity for a number of MIS.

- **Black Oak/White Oak Assemblage:** Acorn woodpecker, scrub jay, lazuli bunting and western gray squirrel may occur throughout the areas where activities may occur. The areas with potential activities provide terrestrial species places to roost, nest, den and forage.

Environmental Consequences

No Action Alternative

Direct Effects and Indirect Effects

This description of the No Action alternative applies all species assemblages below. As there would be no on the ground activity in the No Action alternative, there can be no direct and indirect, and therefore no cumulative effects.

Under this alternative, all habitats would remain in their current state. Certainly, there would be change, but it is unpredictable and barring major landslide or precipitation events, the sites would generally remain stable for many years. Habitat for the terrestrial and aquatic MIS would continue to exist in its current state. Snag and down wood abundance would remain the same in the short-term, and would increase through normal successional processes over time.

There would be no effect to the species assemblage's habitats as described above. For comparison, there would be no pool habitat available for these species. Snag and down wood habitats would not be changed.

Proposed Action

Direct and Indirect Effects

Individual Species Assemblage

Implementation of the *Aquatic Restoration Project* would increase riparian habitat diversity in the affected project sites. Increased down woody material would diversify foraging and cover habitat for prey species and the mammals in this association.

Fisher, marten, pileated woodpecker and the NSO are mobile and would likely move out of the area during implementation. As the proposed treatment within each watershed is small, the expected number of individuals affected is unsubstantial relative to the expected number in suitable habitat across the forest.

Assemblages

In general, there may be temporary disturbance to the species during projects implemented under this decision. As the proposed treatment within each watershed is small, the expected number of individuals affected is unsubstantial relative to the expected number in suitable habitat across the forest. Treating invasive species would improve habitat in all assemblages that overlap the project area. Generally, there would be no change to the dominant forest type and structure, moving large wood, adding gravels, and hazard trees removed incidentally may change assemblages but it would limited due to design considerations. Areas with proposed manual treatments could see a reduction in invasive plants and conifer encroachment. The following MIS assemblages overlap the project area:

- **River and Stream Species Association:** Implementation would increase stream and riparian habitat diversity in the affected project sites. Addition of slow water refugia for fish species would also benefit aquatic species such as tailed frogs who can use these sites during in stream high flows, foraging, and protection from predators. The dipper may use these ponds for additional foraging sites, even if they are strongly associated with faster flowing water. There may be temporary disturbance to the small mammals and the dipper during implementation, but these animals are mobile and may move out of the area. As these sites are small, the expected number of individuals affected is unsubstantial relative to the expected number in suitable habitat across the forest.
- **Marsh/Lake/Pond Assemblage**: Implementation would increase lake, pond and riparian habitat diversity in the affected project sites. The project proposes to treat 1,165 acres of lakes and ponds within the project area. Treating the areas for invasive plants, adding basking platforms, removing invasive species (bullfrog, etc.), and adding brush structures for increased structural diversity would provide cover, basking sites and reduce competition for native species. There may be temporary disturbance to the western pond turtle and the wood duck during implementation but invasive plant treatments, installation of basking platforms, and eradication would have minimal impacts to these animals. As the areas where potential restoration activities may occur are small, the expected number of individuals affected is unsubstantial relative to the expected number in suitable habitat across the forest.
- **Bog/Seep/Spring/Wet Meadow Assemblage**: Implementation would maintain meadow openings including removal of small conifers (less than 9-inches) within 150 feet of the streambank. This would increase riparian habitat diversity for in the affected project sites. Increased down woody material would diversify hiding cover habitat for animals in this association.

Application of LRMP S&Gs, TE wildlife and botany design features would result in little change to the **Snag Assemblage** or **Down Woody Debris Assemblage**. The remainder of the MIS assemblages, **Tanoak/Madrone Assemblage** and **Black Oak/White Oak Assemblage** would have little to no disturbance or changes to habitat or species based the limited amount of habitat within the project area, and no change to the dominant forest type and structure.

Neotropical Migratory Birds

Diverse natural communities are highly dependent upon the disturbance factors (such as riparian restoration) that develop the structure and function of ecosystems. Communities can undergo negative changes in species composition and richness without these disturbance regimes or from the changes that result from a history of active management (reviewed in Atwilla 1994). In the Pacific Northwest, Kennedy and Spies (2005) cite declines of diversified early-seral forests and broadleaf (i.e., hardwood) components of conifer-dominated landscapes federal lands resulting from years of fire suppression and the focus of old-growth conservation. Under current management policies, similar trends have in the same area on federal and non-federal lands have been modeled for the future (Spies et al. 2007).

Negative impacts to songbird populations have been observed to occur as a response to large-scale vegetation changes (Drapeau et al. 2000). Specific to hardwood associated bird communities, Betts et al. (2010) also hypothesized that declines of songbirds in species in the Pacific Northwest were due to the combination of forest succession and increased intensified forestry. This study found positive associations of many songbird species with the amount of broadleaf and young broad leaf forests at broad spatial scales.

Understanding the type and extent of disturbance and other ecological mechanisms in landscapes of interest are critical when considering management approaches (Ibid). The North American Bird Conservation Initiative (2011) has identified the restoration of fire regimes as one of the most important challenges for forest managers nationwide. That synopsis details some successes and challenges to restoration projects including successful riparian restoration that promote meadow, and small forest openings. The *Aquatic Restoration Project* proposes management that attempts to recreate conditions and reintroduces ecological processes conducive to migratory songbirds.

On December 12, 2008, a Memorandum of Understanding (MOU) was signed by the Forest Service and the USFWS to promote the conservation of migratory birds. This MOU directs agencies to evaluate the effects of proposed actions on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors. As riparian restoration activities are implemented in the California Coast and Western Klamath regions, these activities should be closely monitored with respect to their effect on bird abundance and demography. For the SRNF and KNF, the MBS of management concern include species listed under the ESA as threatened or endangered species designated by the Regional Forester as Sensitive species and species listed as MIS. There have been no site-specific surveys for migratory birds within the project area.

Cultural Resources

Introduction

This section presents the scientific and analytical basis for the assessment methodology and predicted direct, indirect and cumulative effects to heritage resources and native cultural practices under the No Action alternative, compared to the Proposed Action (modified; 40 CFR §§1502.16 and 1502.24; CEQA §21002.1(d)). Under the No Action alternative, the discussion focuses on synergetic relationship between tribal resources and practices with their surrounding environment. Under the modified Proposed Action, the presentation targets an evaluation of the habitat alterations and benefits of restoring fisheries as substance to supplement diet and ceremonial practices. It also provides the rationale for how the project's design achieves restoration benefits while avoiding significant impacts, along with feasible mitigations incorporated to minimize compaction, movement, breakage, or total destruction of artifacts, features, site stratigraphy (i.e., subsurface cultural deposits), or the entire site.

Each restoration project would be subject to the interdisciplinary development, review and compliance process, prior to implementing ground-disturbance operations specified in *Appendix C*, to

assure design (methods, placement and timing) and mitigations are relevant to changing conditions and new information.

Analysis Methodology

Area of Potential Effect

The area of potential affect (APE) is confined to within 150 feet of either side of fish bearing waterways, lakes and ponds across the entirety of SRNF, as well as 35 areas (ranging from 0.3 to 216 acres in size) that were surveyed where the potential use of heavy equipment or ground disturbance may potential occur. In total, the combined APE (both heavy equipment locations and manual project sites) is just under 37,000 acres along fish bearing waterways, and lakes and ponds in the forest. Within this area, approximately 200 heritage sites have been identified either through archeological reconnaissance or through a records search of previously recorded sites. Of these, less than 20 sites fall within or adjacent to restoration areas where heavy equipment would be used.

Archeological Survey Approach

The Forest Service conducted literature review to identify previously recorded cultural resource sites within the project area to determine appropriate PDFs for proposed activities using manual methods. The Cultural Resource Inventory Report (CRIR) describes the findings of intensive survey coverage in the proposed heavy equipment project locations completed by Humboldt State University's Cultural Resource Facility team in 2018, with transects being spaced at 15-meter intervals. These intensive surveys were deemed appropriate due to the potential for ground disturbance and use of heavy equipment, capable of crushing, re-locating or burying artifacts on-site. Across the landscape, there is a wide variety of cultural resources ranging from historic mines and trails to pre-contact tools, villages, and ceremonial grounds.

Just under 3,900 acres, or approximately 10 percent, of the proposed manual restoration area has been covered by previous archeological surveys. This has provided a sampling of use patterns associated with the area that suggests stream banks, lake shores, and the surrounding areas would have been used by both Pre-Contact and historic peoples. It is not expected that any of the manual restoration activities would adversely affect this cultural heritage. In the case of inadvertent discoveries during implementation, work would cease and both the forest's heritage program manager and the affected tribes would be notified. Protocol for inadvertent discoveries is detailed in the CRIR.

Also included in the records search were known resource areas. These are specific locations previously determined by the tribes that have been, and in most cases still are, used for hunting and gathering. Resource areas may or may not have artifacts present; these sites provide evidence about past human use or management. These areas may or may not qualify as archeological sites.

Affected Environment

The affected environment was considered in light of the living cultures and native practices which pervade on the SRNF. In making a determination of affect, it is understood that impacts considered shall include not only the archeological record, but also its living descendants who still lay claim to the cultural heritage alive in the lands. With that in mind, this analysis considered traditional knowledge, including but not limited to, TEK. Identifying plants and animals that have a cultural use or other underlying significance is an integral component of the SRNF heritage management plan.

Cultural Context

The SRNF has a long cultural history, spanning across thousands of years. Evidence of past use is prevalent upon the landscape; material remains are scattered throughout the environment, indicating a use pattern with strong ties to riverine and riparian environments. Remnants of tribal villages, gathering areas, ceremonial grounds, historic mining complexes, homesteads, and trails are located along the stream banks. The *Aquatic Restoration Project* has the potential to benefit many of these sites by restoring the landscape to its original state. Moreover, many of the tribes who have inhabited this land for generations have expressed an interest in the project as a possible means to rehabilitate resource areas, which have suffered in recent years.

Pre Contact

Within the boundaries of the forest, there are 12 federally recognized tribes and four (4) non-federally recognized tribal groups. Each of the tribes exhibits its own unique cultural history, though one aspect the tribes all have in common is a reliance upon the rivers and tributaries as well as their associated resources. The *Aquatic Restoration Project* focuses on rehabilitating habitat for these important riverine and riparian species. Traditional subsistence strategies relied heavily upon the practice of hunting and gathering. Gathering was employed to collect materials for foods, medicines, and basketmaking, while hunting refers to the process of tracking, killing, and processing of animals (including fish).

Traditional Cultural Properties

Portions of the proposed project area fall within a number of traditional cultural properties (TCPs). The presence of the living cultures associated with these TCPs has allowed Forest Service archeologists to acquire a more intimate understanding of the cultural land use across the ages, which otherwise may have remained a form of esoteric knowledge. These areas have been used since time immemorial, with ceremonies being intrinsically tied to the place in which they are performed; as such, the ceremonies that take place here cannot be performed elsewhere. While the TCPs are defined by their physical location, the associated practices and beliefs are of central importance to their designation. These ceremonies constitute a major part of traditional life, the practice of which is integral in maintaining cultural identity.

The *Aquatic Restoration Project* APE overlaps the boundaries of multiple TCPs throughout the forest; work done within the boundary of a TCP would adhere to certain restrictions. Prior to project implementation, any associated tribes would be consulted to determine appropriate actions. Complete or partial avoidance of the TCP, associated sites, and/or features may be necessitated. All work within TCPs

would be monitored. None of the actions at the restoration locations would adversely affect the integrity or use of TCPs. Two (2) restoration areas using heavy equipment are adjacent to TCPs; all work within these two (2) units would be closely coordinated with the affected tribes. All TCPs may be afforded ceremonial closures and designated no fly zones if the associated tribes express a desire to do so. Any that have the potential to produce a noise disturbance would cease during ceremonial times.

Anadromous Fish as a Cornerstone of Culture

Traditional ceremonies involving salmon include the World Renewal Ceremony, the Salmon Festival, and the First Salmon Run, among many others. These ceremonies do not suffer just from the dwindling salmon population; many of them simply cannot be performed.

First Salmon ceremonies are common throughout the tribes of northern California. Within the SRNF, the Karuk, Yurok, Hupa, Tolowa, and Shasta all perform a variation of this ceremony. These first salmon rites and associated ritual behavior celebrate the return of the salmon to the rivers at the beginning of the spring salmon run. If First Salmon is treated correctly, he would lead the rest of the salmon upriver to their spawning grounds. For some, this ceremony may be related to World Renewal. While there are many variations to the ceremony between tribes, there are certain similarities that pervade. When First Salmon is sighted in the spring, the ceremony commences and lasts a set number of days before fishing may begin. Before the ceremony is completed, it is taboo to eat salmon; many believe that eating salmon in this time would have serious repercussions. After the ritual preparation and consumption of first salmon, fishing season may begin for all. The ceremony is accompanied by praying, fasting, and sweating by a medicine man and/or his assistant. Yet for many, the loss of salmon has meant that this ceremony has faded into the past.

The Yurok, Karuk, and Hupa also take part in the First Salmon Run. This run is performed by two (2) children from the tribe; as First Salmon was spotted by the mouth of the Klamath river, the children would run upriver from village to village to announce the return of the salmon. The run covers approximately 240 miles from the mouth of the river up to Klamath Falls in Oregon. No single village along the river attempted to capitalize upon the surge in salmon, but rather allowed enough salmon to travel upstream in order to supply food for the peoples upriver. While this practice had all but died out, recent years have seen a resurgence in tribal youth engaging in ceremonial runs to celebrate the return of the salmon.

After the first salmon rites were observed, many tribes began the construction of fishing weirs on the Klamath, Trinity, and Smith rivers. The construction of the larger weirs was often a community wide effort accompanied by ceremonies and song.

During World Renewal ceremonies, it is common for medicine men to follow a strict diet. While the specifics vary between tribes, this diet often included or was restricted to dried salmon. Some of the dances executed during World Renewal aim at ensuring a bountiful harvest and food for the year, as well as to cleanse the world of dirty actions performed by its inhabitants.

Past land uses and tribal management would have focused upon the synergetic relationship between humans and their surrounding environment; a nurturing relationship, which realized that in order to continue to live off the land, one must not exploit her resources beyond her capacity to regenerate.

Evidence of past management practices can be seen in old oak groves, which were treated with fire for generations; healthy willow plots, which were groomed to make them viable for weaving; and high-country viewsheds, which offer spiritual respite, to simply name a few. Traditional ecological knowledge (TEK) aids archeologists in identifying resource areas across this living landscape.

The cultural resources identified provide us with insight into how the land was used and managed in the past. Many of these resources are still utilized by local tribes today. Be it for gathering, hunting, ceremony, or other endeavors, these resources are not considered *artifacts*, a term referring to objects discarded by people of the past, but as objects intended to be reused by generations to come and imbued with the spirit of the past. They offer a glimpse into the past, but they also reveal the relationship the past has to the present and the future, especially in regards to management practices. The strong presence of living cultures throughout the forest offer a new perspective on archeological thought. These peoples have watched as the salmon decrease in number and suffer in vitality. They understand the natural cycles of the salmonids, and many believe the survival of their culture depends upon the survival of the salmon. As the rivers and their tributaries suffer, so too do the people who depend so heavily upon its resources.

For the past 56 years, the Yurok have hosted a Salmon Festival that coincides with the spring salmon run. Traditionally, salmon from the Klamath were fished and provided the meals for the festival. However, this has changed in the past 3 years. The decline in the salmon population has led tribal leaders to call for a cease in eating salmon during the festival. Some years, only enough salmon is taken to feed the elders, other years, no one is allowed to eat the fish. In 2016, the food for the festival was supplied by food trucks, and in 2017, salmon was brought in from outside the Klamath region. The decision not to eat salmon from the Klamath does not stop at the public festivals, but extends into the everyday life of the tribes. These momentous decisions alone highlight the severity of the salmon crisis and its direct effects on traditional cultures.

Other Cultural Resources from the River

Basketweaving has long been a characterizing practice among native tribes of northern California. Both utilitarian and socio-technic, the tradition of basketweaving formed an integral part of community life. Materials used for weaving included fibers from beargrass found in the high country, willow from the riverbanks, and woodwardia and maidens hair fern from riparian zones. In the current state of the forest, these resources are threatened. Beargrass suffers with the restriction of fire, willow suffers as the rivers are artificially diverted and dammed, and the ferns suffer as riparian zones are disappearing. Invasive species crowd out native plants, decreasing biodiversity and intrinsically changing these ecosystems. With other projects focusing on the high country, and this restoration focusing on streams and tributaries, it is the hope of the Forest Service and the local communities that we may improve forest health and revise management strategies to revitalize traditional cultural practices.

Contact and the Historic Period

The first sustained contact by colonial settlers occurred in 1828 with the expedition of the fur trapper Jedidiah Smith. Though it was not until about 1850 that the area saw large migrations of miners after signs of placer gold were discovered in the Trinity River. It was during this initial period of mining that

gold miners shifted from the sluice method to that of hydraulic mining. Hydraulic mining uses high-pressure jets of water to dislodge and direct earthen materials. Using monitors, minors could move large portions of mountainsides and quickly sort massive amounts of gravel to extract gold. The resulting refuse was deposited in tailings consisting of sand, gravel, and cobbles. While gold mining activities dwindled after the initial rush in the mid-1800s, in the last 175 years, the surrounding area was mined (primarily for gold and later for chromite), logged, and colonized by European settlers. The remnant of these mining operations occurred along the banks of the streams and tributaries throughout SRNF.

The settlers and the tribe had a very contentious relationship, fueled by the competition for land and water rights. The history is strife with massacres, retaliatory killings, and broken treaties; reservations were established and the native population was decimated during this time.

The first sustained contact by colonial settlers occurred in 1828 with the expedition of Jedidiah Smith. However, it was not until about 1850 that the area saw large migrations of miners. In the last 175 years, the surrounding area was mined (primarily for gold, and later for chromite), logged, and colonized by European settlers. The settlers and the tribe had a fairly contentious relationship, epitomized by the events preceding to and during the Red Cap War in the 1850s. During this time, reservations were established and the native population was decimated. In 1905, the Forest Service was established and timber became the primary use of the land. The SRNF was established in 1947 and the timber output increased annually until national forest policy became more aligned with federal compliance regarding natural and cultural resource laws in the 1980s. Recreation increased in the forest, and the post 1980s saw many administrative improvements on forestlands.

In 1905, the Forest Service was established and timber became the primary use of the land. The forest was established in 1947 and the timber output increased annually until national forest policy became more aligned with federal compliance regarding natural and cultural resource laws in the 1980s. Recreation increased in the forest, and the post-1980s saw many administrative improvements on forestlands.

Environmental Consequences

Alternative 1 – No Action

Direct Effects

Under the no-action alternative, no project activities would occur; therefore, there would be no direct effects on cultural resources.

Indirect Effects

Under the No Action alternative, the fish bearing streams would not undergo any restoration activities. As such, the degradation that has been seen over the past years would continue at its current rate. This has the potential to adversely affect culturally utilized resources, including the anadromous fish populations. The traditional way of life, which relies upon these fish for ceremony and subsistence, is threatened. Habitat loss and degradation would continue to be an issue, and the overall forest health would suffer.

The holistic approach adopted by the SRNF Heritage Program recognizes the landscape as an aspect of traditional culture. The broader vision of this approach, as it was explained for the *Somes Bar Integrated Fire Management Project* (*Somes Bar Project*) is to enable the restoration of cultural practices and protect the loss of cultural identity. Many of the tribes within SRNF identify as *River People*, or at the very least, they depend upon anadromous fish populations for sustenance and ceremony. The degradation of the river and its diverse species concurrently results in a symbiotic degradation of native cultures.

Cumulative Effects

While the cultural resources present may not see any adverse cumulative effects under the No Action alternative, if the degradation of fish habitat continues at its current rate, the traditional way of life of many tribes within SRNF would be threatened.

Alternative 2 – Proposed Action

Direct Effects

Alternative 2 has the potential to benefit cultural resources, especially aquatic and riparian species. These resources have been fundamental to tribal livelihood and lifestyle for thousands of years. Some of the proposed use of heavy equipment at restoration areas are located within, or in close proximity to traditionally utilized areas, including sacred fishing holes and ceremonial grounds. While it is recognized that these sensitive areas should generally be avoided during implementation, tribal consultation has indicated an interest in working in these spaces to aid in the restoration of fish habitat. Any projects occurring within or in close proximity to TCPs or otherwise sensitive areas (e.g., gathering areas and/or historic sites) will require tribal consultation prior to implementation, as well as close coordination and tribal monitoring during implementation.

Restoration actions involving the use of heavy machinery or ground-disturbing activities have the potential to affect cultural resources in the following ways: compaction, movement, breakage, or total destruction of artifacts, features, site stratigraphy (subsurface cultural deposits), or the entire site. In order to mitigate any potential adverse effects to cultural properties, intensive surveys were conducted in all units where heavy equipment or ground disturbing actions are proposed. Site avoidance strategies and/or site protection measures would be used to address all of these potential effects. Equipment exclusion zones (EEZ) and/or buffers may be marked on the ground prior to implementation. If the Proposed Action has the potential to benefit a cultural site, or there are no foreseeable affects to the integrity of the site, some proposed activities may be allowable within site boundaries, using On-Site Historic Property Protection Measures (specified in the Region 5 Programmatic Agreement (R5 PA)), as determined by a Forest Service archeologist. Any ground-disturbing activities would require either a Forest Service archeologist or tribal monitor to be present during implementation. Therefore, the potential effects are not considered adverse.

Using manual methods involve minimal ground disturbance, and generally have a low likelihood of causing significant impacts to cultural sites. A records search indicates there are just under 200 cultural sites located within areas proposed for manual methods. The majority of these sites would see no adverse

effects as a result of the proposed activities. Sites that have been determined to be at risk or of a sensitive nature would be buffered (flagged) and avoided use of heavy equipment during implementation.

While the proposed activities have the potential to affect cultural resources—including historic properties, archeological sites, TCPs, sacred sites, and traditional use areas—with the application of PDFs and standard resource protection measures (SRPM), Alternative 2 would rehabilitate fish bearing waterways and ponds to support healthy aquatic and riparian ecosystems. Accomplishing this would assist in providing habitat for salmonids, anadromous fish, and other species that have been adversely affected by prior undertakings. This program stands to benefit cultural practices, which rely on salmonids, native plants, and overall river health. With the decline in native fish populations, many traditional practices and lifestyles have been affected.

While many of the proposed actions are low impact, and therefore would have no significant effect on cultural properties, there are locations that permit ground disturbance with heavy equipment. These areas received intensive surveys to identify any cultural properties present, and with proper PDFs and avoidance mitigations in place, no significant effects are foreseen.

Indirect Effects

Heavy equipment use may result in rutting and compaction, which besides having the potential to directly affect cultural sites, may also increase the potential of erosion creating an indirect effect on cultural resources. The EEZs and other SRPMs would mitigate any potential erosional damage to cultural sites.

While there is a possibility of erosion affecting sites which are located along river bars and banks, it has been determined that the potential extent of erosion resultant from the proposed activities is at such a degree that it would have no adverse effect upon cultural resources. The natural flows of the streams, and past flooding events have created erosional conditions, which far exceed those that may result from the proposed activities.

Noise resulting from heavy equipment operating in or near TCPs has the potential to interrupt traditional ceremonies. Closures and no fly zones would be implemented during ceremonial times to minimize any disturbance.

With SRPMs in place, no adverse effects are anticipated for heritage resources within the project area. In fact, the *Aquatic Restoration Project* has great potential to benefit cultural sites and practices throughout the forest. Restoration of fish habitat would allow traditional fishing practices to pervade and support the traditional ways of life, which are practiced by tribes in the SRNF. Moreover, removal of invasive plants and propagation of native species would increase quality and accessibility of culturally utilized plants.

Cumulative Effects

When considering past, present, and reasonably foreseeable actions, the Proposed Action would have no adverse cumulative effects upon cultural resources.

Within the project area, there are 219 archeology surveys completed in the past. An additional 233 archeology surveys occurred within one-quarter mile of the APE. The majority of these surveys were completed as part of the compliance process for timber and fuels management projects. All past, present, and foreseeable future projects which have the potential to affect cultural resources or TCPs have gone (or

would go) through the National Historic Preservation Act (NHPA) §106 process. Mitigation measures have been, or would be, implemented to keep ground-disturbing activities out of site boundaries. As such, the potential cumulative effects on cultural resources and TCPs are not considered adverse.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Archeological surveys have been completed for the *Aquatic Restoration Project* in accordance with the requirements of the NEPA and NHPA §106. The guiding document for archeological survey is the R5 PA with State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP). Compliance with these laws ensures the appropriate environmental approvals necessary for implementation of this project. The NHPA §106 requires that 1) any adverse effects to historic properties be considered, analyzed, mitigated, and disclosed before initiating an undertaking, and that 2) ACHP be given the opportunity to comment on any such potential adverse effects.

For the *Aquatic Restoration Project*, SRPMs would be applied to all sites within or adjacent to the APE, in accordance to Appendix E of the R5 PA. If all SRPMs are completed, it is anticipated that no historic properties would be adversely affected by this project. This analysis does not address site-specific effects from the perspective of the NHPA; these effects would be addressed in compliance documentation completed for the inventory, evaluation, and resolution of effects on cultural resources to meet the requirements of NHPA §106. The results of the archeological survey completed by the Humboldt State University Cultural Resource Firm are recorded in a restricted CRIR, which is on file at the SRNF Supervisor's Office, as well as at the Humboldt State University Cultural Resource Firm. Archeological surveys were conducted in accordance with the R5 PA. Information regarding sensitive cultural materials and all locational data would be protected from public disclosure and are not subject to the Freedom of Information Act (FOIA). Relevant federal statutes include the 2008 Farm Bill, the FOIA identification of exemptions (5 USC §552 (b)(3)), and NHPA confidentiality (16 USC §470 hh).

Within the *Aquatic Restoration Project* APE, there are a number of cultural sites, which are listed as eligible on the National Register of Historic Places (NRHP), including numerous TCPs. All cultural sites are considered eligible until determined otherwise, and are thus protected as such; all cultural sites have been recorded on standard California DPR forms with discrete site boundaries. Being eligible for the NRHP is the means by which federal agencies determine the significance of cultural resources on a national scale. Eligibility is determined by examining a property's age, integrity, and historical significance. Eligible properties may fit in one or more of the following categories:

- The property is associated with events that have made a significant contribution to the broad patterns of our history;
- The property is associated with the lives of persons significant in our past;
- The property embodies 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

- The property has yielded, or may be likely to yield, information important in prehistory or history (36 CFR 60.4).

Tribal consultation has been initiated with 12 federally recognized tribes and conferred with four (4) non-federally recognized tribal groups. Consultation would continue to occur on a project-by-project basis, and tribal input would be considered prior to any project implementation. Projects occurring in or adjacent to sensitive cultural properties would be closely coordinated with the appropriate tribal councils and tribal monitors would be implemented as necessary.

Recreation

Introduction

This section presents the scientific and analytical basis for analyzing the proposed activities in regard to recreation use and facilities, recreation sites, wilderness, wild and scenic rivers, and the recreation opportunity spectrum (ROS) classes within the analysis area for the predicted direct, indirect and cumulative effects of the No Action alternative, compared to the Proposed Action (40 CFR §§1502.16 and 1502.24; CEQA §21002.1(d)).

Recreation-related goals of the SRNF include providing a range of recreation opportunities, settings and facilities for the public's enjoyment for a variety of both motorized and non-motorized activities. This includes providing safe developed facilities compatible with a forest environment that are accessible to as many people as possible. The diverse system of trails provide for the enjoyment of all users, and providing interpretation, information, and educational opportunities on ecological principles, significant cultural resources, and preserve their historical, cultural, archaeological, and/or architectural values.

The resilient watersheds of the forest are perhaps best known for these water-based recreational activities and provide some of the best fishing opportunities in California. Targeting fisheries restoration by increasing spawning and rearing habitat would benefit commercial, sport and subsistence fisher people.

Analysis Methodology

Several methods were used to identify primary recreational uses of the forest by the public. A nationally recognized classification system called the Recreation Opportunity Spectrum (ROS) is used to describe different recreation settings, opportunities, and experiences that help guide recreation management decisions and activities on NFS lands (USDA Forest Service 1986), including river oriented recreational opportunities (e.g., boating, white-water rafting and kayaking).

Estimates of recreation derived from National Visitor Use Monitoring (NVUM) database of inventories that took place on the forest in 2007 to 2008 and 2012 to 13 were used. These inventories are conducted for all national forests on a 5-year cycle. The two (2) NVUM surveys are the basis for estimating present recreation use and demand and for projecting the growth of recreation use on the SRNF.

The NVUM inventories are not intended to examine in-depth recreation activities on a national forest. However, they do provide some basic information for recreation uses on the forest, including vehicle travel, off highway vehicle travel, and other recreation pursuits.

The forest's geographic information system was used to analyze the proposed activities about recreation use and facilities, recreation sites, and the ROS classes within the analysis area.

Data Gaps

The NVUM inventory process has limitations that should be noted. Visitor use is measured at specific predetermined recreation sites falling into high, medium, or low use categories. Small or little used sites are not included in the inventories. However, they may represent a significant contribution to a given recreation pursuit and not be adequately represented in the data. In addition, participation is voluntary and some visitors, or activities, may better lend themselves to interviewing. For example, a party pulling a pack string may be less inclined to participate because the disruption may provide opportunity for the string of animals to experience trouble. Consequently, the data is collected from a segment that is willing or able to participate and extrapolated to represent visitor use as a whole.

Resource Indicators

Activities associated with any proposed aquatic restoration activities that occur in riparian areas located near or adjacent to developed recreation sites or trailheads, or on or alongside/adjacent to forest roads that access those recreation sites, may cause temporary loss of access or delays of access for the recreating public. Dispersed (i.e., user-created) campsites may be temporarily inaccessible if located in, or within close proximity to, riparian areas.

Affected Environment

The main reason visitors come to the forest are driving for pleasure, hunting, hiking or walking, viewing wildlife, relaxing, seeking primitive camping opportunities, and viewing natural features (SRNF NVUM Data 2012-2013).

The SRNF manages 46 developed recreation sites on the forest, which include campgrounds, viewpoints, picnic areas, trailheads, and horse camps. The project area overlaps 7,975 acres wilderness areas along 225 miles of streams in the Siskiyou, North Fork, Trinity Alps, Lassics, and North Fork Eel wilderness with all potential projects limited to manual handwork. Developed hiking, horse, and OHV trails are located throughout the Forest.

Three (3) designated wild and scenic rivers flow through the forest: the Smith Wild and Scenic River, the Trinity Wild and Scenic River, and the Eel Wild River. Anadromous fish are an outstanding remarkable value (ORV) associated with the wild and scenic river designation within NFS lands (LRMP IV-26, IV-56). The forest plans allow for manual instream restoration activities for fisheries in both wild and scenic portions (LRMP IV-27) of these rivers.

Twenty (20) percent of the SRNF is under the 2001 Roadless Area Conservation Rule. Combined, these inventoried roadless areas (IRA) encompass a total of 199,000 acres; however, the project area does not overlap with IRAs.

The ROS classes represented within the analysis area are *Semi-Primitive Motorized*, *Semi-Primitive Non-Motorized*, *Roaded Natural* and *Roaded Modified*.

The forest's dispersed campsites are managed as Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Modified, and Roaded Natural. Dispersed campsites are rustic in nature and are frequently found near streams, lakes and ponds. Dispersed campsites change location over time due to user discretion, and based off factors such as vegetation succession, and ease of access. To meet ACS objectives for sites within the project area, recreational practices that retard or prevent attainment of these objectives would be evaluated and restoration actions under the modified Proposed Action could be implemented to continue to allow the publics enjoyment of these sites (LRMP IV-48).

Environmental Consequences

Alternative 1 – No Action

Direct Effects

Under the No Action alternative, there would be no change to current unconfined or primitive recreational uses (SRNF LRMP p. IV-11; KNF LRMP p. 4-70; CEQA §21000(c)). The outstanding natural resources and natural processes would operate freely to maintain values, character and scenic integrity within the ROS classified semi-primitive non-motorized areas, wilderness, wild and scenic rivers, recreational river and inventoried roadless areas, as there would be no removal of trees or native forest vegetation.

For the same reason, there would be no risk of compromising future designation of eligible State Scenic Highways or the viewing integrity of natural features near day-use sites, overnight camping sites or trails. The current natural, free-flowing, and primitive character of segments of the river corridor designated as *wild* for anadromous fisheries, as well as recreation opportunities, would remain unaltered. Similarly, the existing variety of river-oriented recreation opportunities on segments of the river corridor designated as *recreational* would remain unchanged. Where high quality scenery and largely undeveloped shoreline of segments of the river corridor designated as *scenic* exist, continued high opportunities to explore, experience isolation free from evidence of human activities, and trends for very infrequent encounters with other users, would continue at present levels.

As field crew reconnaissance and use heavy equipment (or helicopters) would not occur, there would be no noise disturbance or change in semi-primitive non-motorized quiet recreation or opportunities for solitude. Visitor uses of developed recreation sites, NFTS trails or dispersed recreation sites would not be restricted. The current locations for developed recreation sites and developed system trails within riparian areas would remain unchanged. Under the No Action alternative, public recreational access to facilities along NFTS roads would not change, as there would be no transport or use of heavy equipment.

Indirect Effects

The predicted indirect effect would be associated with the continued spread of invasive plants as seeds/spores are spread by travelers and on the treads of motor vehicle tires, acting to place native vegetative composition and scenic integrity at-risk. The current locations for developed recreation sites and developed system trails within riparian areas would remain unchanged. Over time, it would be expected that soil erosion, soil compaction, increased stream sedimentation, impaired hydrologic function, dewatered wetlands, and displaced riparian wildlife may cause unwanted impacts to riparian vegetation associated with ongoing activities.

There would be no other indirect effects to the quality of quiet recreational uses, opportunities to explore and experience solitude, or the outstanding values associated with wilderness, and wild, scenic and recreational rivers, or eligible state scenic highways.

Cumulative Effects

There would be no cumulative effects to the quality of recreational uses, opportunities to explore and experience solitude, or the outstanding values associated with wilderness, and wild, scenic and recreational rivers, or eligible state scenic highways.

Alternative 2 –Proposed Action (Modified)

Direct Effects

The design and mitigations under Alternative 2 would provide for high-quality environments that at all times are healthful and pleasing to the senses and intellect of the public (CEQA §21000(b)), along with opportunities for the collaborative development of natural resource-based enterprises (SRNF LRMP p. IV-113). Alternative 2 would ensure that the character and quality of recreational environments are maintained to avoid significant effects and mitigation minor, unavoidable effects to resource values for which the rivers were designated or recommended (KNF LRMP p. 4-121).

The restoration activities proposed would either spatially overlay or occur within proximity (100 feet) of 46 recreation sites (16 developed campgrounds, 8 undeveloped campsites (campgrounds), and 5 river access points, including China Flat, Georges Folly, Brother K Camp-Haydens Gulch, Larson Camp, Camp Creek, Van Duzen, Monumental, Baker Flat, Ore Grande, Knopki 1, Patrick Creek Camps and Upper Middle Fork 2. Heavy equipment may be used within 50 feet of the following NFTS trails: Bald Butte, Long Bridge, Bull Pine Mine, Fish Lake and 3 unnamed trails (all about 0.25 mile long). However, during the project planning process (*Appendix C*) any potential negative impact to trails and campgrounds would be mitigated .Campgrounds and dispersed sites would be maintained so they are free from safety hazards to protect visitors.

Visual quality objectives (VQO; FSH 462 and 559), which define nationally established principles and methods for managing scenery integrity and quality, apply to site-specific projects visible from the forest's inventoried Maximum Modification, Moderate and High Sensitivity Viewpoints (Level 1 and 2) and Preservation classifications. The project design would achieve VQOs objective for the Preservation classification immediately upon completion of operations. For all other MAs, compliance would be

achieved within three (3) years (KNF LRMP p. 4-116). Along State Highways 96, 299 and 36, and US Highway 199, eligible for designation as State Scenic Highways, project design would achieve Partial Retention VQO for the middleground viewshed.

Although cutting and falling trees and ground disturbing activities would be visible to visitors in short-term, there would be minimal change to the native undergrowth or forest tree canopy within 150 feet either side of stream corridors due to the design limits the size, distribution and amount of trees that may be used for LW recruitment. As mature forest habitats and outstanding scenic values correlate to LSRs, Zone 1 high quality (MAMU) wildlife habitat and wilderness areas, design features for LSRs would limit tree size limit less than or equal to 20-inch dbh would apply.

To maintain or improve recreation sites according to the ACS, hazard trees felled within recreation sites could be used to block trails that result in sedimentation out of compliance with the ACS objectives. Rehabilitation would be achieved through alteration, concealment (piling slash over tree stumps for example), or removal of obtrusive elements such as equipment, slash and debris to provide a level of attractive, natural-appearing forested scenery, whereby human activities are not evident to the casual Forest visitor in the long term (KNF LRMP 4-115; SRNF LRMP; CEQA).

As the Proposed Action required the use of existing roads with no new access constructed, heavy equipment project use would not occur within the ROS classified Semi-Primitive Non-Motorized wilderness areas—Siskiyou, Trinity Alps, Lassics and North Fork. Twenty (20) of the thirty-five (35) sites proposed for a combination of manual labor and heavy equipment are in proximity to river segments classified as scenic and recreational river, designated components of the national wild, scenic and recreational system or rivers recommended in the SRNF and KNF LRMPs for inclusion in the national system.

There are no proposed heavy equipment project locations within the *wild* portions of wild and scenic river designations, applicable to segments of the Smith, Trinity, and Eel Rivers (Wild and Scenic Rivers (WSR) Act §2 (a)(ii))) and those rivers designated under the Smith River National Recreation Area Act. The *scenic* classification applies to those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but may be accessible in places by roads. One (1) project area is within the scenic corridor; however, proposed activities would not affect the free-flowing condition of the river and would lead to improvement to the ORV. Under Alternative 2, the use of heavy equipment to bring LW to a location on the Salmon River near Butler Creek, within the scenic corridor, would not involve any construction. The proposed restoration activities are restricted to 150 feet on either side of streams, affecting a minor component of the one-quarter mile on each side of the river corridor boundary. The proposed activities would not affect the free-flowing condition of the river; and therefore, §7 of the WSR Act is not required (WSR Act §7(a)).

As instream and riparian restoration activities include the potential for use of heavy equipment along 19 segments designated as *recreational*, there would be short-term noise and scenic disturbances to rafters and visitors, due to heavy equipment operations and presence of field crews. To mitigate potential instream safety hazards to kayakers and rafters, rebar or cables would not be used or protrude.

To ensure public safety when heavy equipment is in use or tree felling is occurring, temporary closures or public access restrictions may displace forest recreation users in the short-term. To minimize short-term

disruptions to recreationists, the Forest Service would place signing at or directly adjacent to recreation sites and trails, post press release notification a minimum of one week prior to operations, and coordinate with local user groups to redirect recreation activities to safe areas during operations.

Indirect Effects

There would be no lasting measurable indirect effects on forest recreation, including wilderness, and wild and scenic rivers, as a result of Alternative 2, other than potential site noise at the time of riparian improvement from motorized equipment in authorized locations. This duration limited, motorized noise disturbance would be outside of wilderness, and scenic portions of wild and scenic rivers.

Cumulative Effects

Activities, and anticipated activities specifically centered on recreation resources include routine annual site management, such as hazard tree mitigation at campgrounds, trail clearing and maintenance, operation and maintenance of developed recreation sites. Cumulatively, these activities could foreseeably increase, or decrease depending on vegetation manipulation prescriptions at a particular site, associated with riparian enhancement activities.

Aquatic restoration activities on the forest may overlap in time and space with recreation activities on the forest. Aquatic restoration activities recognized in this document include measures to protect recreation and scenic resources, where applicable. Impacts from aquatic restoration activities to recreation and trail resources range from minor, short-term visual effects to relocating or temporary closure recreation sites and trails. Ultimately, the impacts of aquatic restoration activities are not likely to add to vegetation management impacts on recreation and trail resources in any discernible way beyond potential periodic maintenance.

Aquatic restoration activities on the forest may also overlap in time and space with recreation projects. Impacts from aquatic restoration activities to recreation and trail resources range from minor, short term visual effects to relocating or temporary closure recreation sites and trails. Aquatic restoration activities, may improve the condition of recreation sites and trails over the long term, contributing to the benefit of recreation and trail projects while meeting ACS objectives.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Implementing the *Aquatic Restoration Project* would comply with all applicable laws and regulations as pertaining to recreation resources. Numerous federal laws require federal land management agencies including the Forest Service to consider recreation resources in land management planning, resource planning, and project design implementation and monitoring. These federal laws include the Wilderness Act of 1964, Wild and Scenic Rivers Act of 1968, National Trails System Act of 1968, National Forest Management Act of 1976 US PL 90-542.

Forest Service policies to manage, protect, and improve recreation resources of national forests are established in Forest Service objectives and policies outlined in Forest Service Manual (FSM) 2300, the LRMPs, and the following USDA and Forest Service handbooks: 1986 ROS Book, ROS Primer and Field Guide (R6-REC-021-90), ROS Users Guide 1982 (unnumbered).

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Finding of No Significant Impact

As the responsible official, I am held accountable for taking a hard look at the environmental effects of the *Six Rivers Aquatic Restoration Project* (*Aquatic Restoration Project*), relative to the definition of significance established by the Council on Environmental Quality (CEQ), 40 CFR 1508.13, and the California Environmental Quality Act (CEQA) §15064. I have reviewed and considered the environmental assessment (EA) and documentation included in the entire project record, prepared using an integrated, interdisciplinary approach considering public comments, natural and social sciences, and quantitative and qualitative factors or indicators. I have determined there is no substantial evidence considering scientific information, expert analyses and knowledge of site-specific conditions gained from field visits indicating Alternative 2, nor any of its aspects, would cause a significant impacts(s) on the environment or cause significant impacts on the quality of the human environment (substantial adverse effects on human beings, either directly or indirectly). As a result, an environmental impact statement/environmental impact report (EIS/EIR) will not be prepared.

This assessment was guided by the California Office of Planning and Research 2014 guidance *NEPA and CEQA: Integrating Federal and State Environmental Reviews* which encourages federal, state and local agencies to coordinate the NEPA and CEQA process so that one environmental document is prepared that meets the requirements for both CEQA and NEPA.

Context

Federal agencies must analyze significance of an action in several contexts, such as society as a whole (human), the affected region, the affected interests, and the locality. The potential for significant effects varies with the setting and is unique to natural, cultural and social resources. In the case of site-specific activities under Alternative 2, significance is considered in context of effects in the locality.

Although the project area encompasses 1,234 stream miles, numerous ponds and lakes across all administrative units on the Six Rivers National Forest (SRNF or forest), as well as the Ukonom Ranger District (RD) of the Klamath National Forest (KNF), under SRNF delegated administrative authority, the context of Alternative 2 is limited in scope. The direct physical changes in the environment caused by phased activities occurring within streams and their immediate riparian zones extending up to 150 feet from the channels edge (i.e., large wood, invasive plant treatments) or greater (i.e., off-channel habitat) would be minor and of short-term duration. Individual project sites would average less than an acre, with the possible exception of individual off-channel habitats. As the implementation of each project would occur incrementally over time, scattered across the forest, the context inherently avoids potential for significant impacts. Under Alternative 2, unavoidable, minor adverse effects would be mitigated to limit operational impacts and duration, as presented *Chapter 3* and in *Appendix C* of the draft EA, to the extent all impacts are within levels allowable under the SRNF and KNF land and resource management plans (LRMP or forest plan), consistent with standards and guidelines (S&Gs) and state regulations.

The analysis of reasonably foreseeable indirect and cumulative physical changes in the environment caused by the project would be constrained via annual design, activity thresholds per watershed and features to avoid significant effects.

Intensity

Intensity is a measure of the severity, extent, or quantity of effects, based on information from the effects analysis of this EA and the project record.

Our finding of no significant impact is based on the context of the project and intensity of effects considering the following 10 factors identified in 40 CFR 1508.27(b) and CEQA §§15064.7 and 15065. Our rationale for this finding is as follows:

1. *Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that on balance the effect would be beneficial.*

Multiple resources would be subject to both beneficial and short-term adverse impacts from implementing the *Aquatic Restoration Project,* including targeted threatened and endangered anadromous salmonids, co-located aquatic Forest Service Sensitive (FSS) species, botanical species, cultural resources, and recreation.

The *Aquatic Restoration Project* would restore aquatic habitats to recover Endangered Species Act-(ESA) listed salmon and steelhead and achieve beneficial conservation goals for endemic species, while maintaining a diversity of botanical riparian-dependent communities (Resource Planning Act of 1974; National Forest Management Act of 1976 (NFMA); Forest Service Manual (FSM) 2670.21 and 2607.32). Under Alternative 2, the proposed aquatic restoration activities would have an overall beneficial effect on ESA-listed salmonids and the watersheds they occupy. In pursuit of restoration actions, individual salmon and steelhead (and other aquatic FSS species) may be incidentally injured or killed by all activities involving heavy equipment. These direct effects would be minimized through design criteria and are not considered significant (NMFS BO 2015). Alternative 2 implements restoration activities identified in the *Southern Oregon/Northern California Coast (SONCC) Recovery Plan* (NMFS 2014) and *Coho Recovery Plan* (CDFW 2005) in partnership with California Department of Fish and Wildlife (CDFW) and the National Marine Fisheries Service (NMFS), while meeting Aquatic Conservation Strategy (ACS) objectives. In developing the *Aquatic Restoration Project*, activities were identified that would also benefit other aquatic and riparian Forest Service Sensitive (FSS) species. Alternative 2 includes increasing habitat for western pond turtles, a FSS species (EA pp. 78, 82; *Appendix A*).

The *Aquatic Restoration Project* would also result in beneficial and adverse impacts to invasive species management. It was developed to provide mutual benefits for other aquatic species, including removing invasive aquatic biota that currently compete with or consume native species. Where implementation of invasive plant control measures are undertaken, riparian conditions are expected to improve. With mitigations and project design features (PDF) in place, implementing Alternative 2 would result in a low risk of invasive species introduction and spread. Treating invasive species may result in an improvement in botanical Sensitive species, where invasive species have displaced Sensitive species (EA pp. 90, 98).

The proposed activities have the potential to affect cultural resources, including historic properties, archeological sites, traditional cultural properties (TCP), sacred sites, and traditional-use area. This program stands to benefit cultural practices, which rely on salmonids, native plants, and overall river health. The decline in native fish populations used during traditional practices has altered lifestyles and diet. With the application of PDFs and standard resource protection measures, Alternative 2 would rehabilitate fish-bearing waterways and ponds to support healthy aquatic and riparian ecosystems. Accomplishing this would assist in providing habitat for salmonids, anadromous fish, and other species that have been adversely affected by prior undertakings (EA pp. 142-143).

The proposed activities may improve localized conditions of recreation sites and trails over the long term by removing invasive plants and enhancing habitats and water quality, contributing to the benefit of recreational use experiences. Under Alternative 2, project site activities would contribute incrementally to enhance the unique biological diversity of anadromous fisheries; and the wild, scenic and recreational potential of the Smith River, designated a Key watershed, the Smith River National Recreation Area (Smith River NRA; SRNF LRMP p. IV-34), and other designated wild, scenic and recreational river networks. Aquatic restoration activities may overlap in time and space with recreation projects. Impacts from aquatic restoration activities on recreation and trail resources range from minor, short-term visual effects to relocating or temporary closure of recreation sites and trails (EA pp. 145, 150).

2. The degree to which the Proposed Action affects public health or safety.

Public Safety. To ensure public safety when heavy equipment is in use or tree felling is occurring under Alternative 2, temporary closures or public access restrictions may displace forest recreation users in the short term. To minimize short-term disruptions to recreationists, the Forest Service would place signage at or directly adjacent to recreation sites and trails, post notifications a minimum of one (1) week prior to operations, and coordinate with local user groups to redirect recreation activities to safe areas during operations. As instream and riparian restoration treatments include the potential for heavy equipment operation along 19 river segments designated as *recreational*, there would be short-term noise and scenic disturbances to rafters and visitors from heavy equipment engines and the presence of field crews. To mitigate potential instream safety hazards to kayakers and rafters, the use of rebar or cables would be avoided, and if used, would not be allowed to protrude above or immediately below the water line (EA pp. 48, 50, 60, 129, 149).

Hazards and Hazardous Materials. The project activities do not involve the use of hazardous materials, except for the use of petroleum products needed to operate motorized heavy equipment and chainsaws. Water quality best management practices (BMP; *Appendix B*) for equipment use near waterways would prevent introduction into streams, ponds, lakes and soils. All large machinery, stationary power equipment (e.g., generators, canes), and gas-powered equipment with tanks larger than five (5) gallons used for instream work would be cleaned for petroleum accumulations, dirt, plant material (to prevent the spread of noxious weeds), and leaks repaired prior to entering the project area. Hazardous materials would not be stored in or near recreational sites, developed campgrounds, water sources,

trailheads/trails, or adjacent private land wells, and would be secured from public access (EA pp. 50, 60, 62, 148, 180, 201; *Appendix B*).

Clean Air Act of 1970 and its amendments provide for the protection and enhancement of the nation's air resources. The North Coast Unified Air Quality Management District (NCUAQMD) regulates the air in Humboldt, Del Norte and Trinity counties, considered to be "in attainment" of state and federal ambient air quality standards. The two (2) pollutants of greatest concern in the region are ozone and particulate matter. Particulate matter (PM) is fine mineral, metal, soot, smoke and dust particles suspended in the air. Alternative 2 would not influence air quality, as no burning is included, and the need for access for heavy equipment would be dispersed and infrequent with insignificant levels of dust production and emissions. Therefore, Alternative 2 would be not result in significant effects to air quality (EA pp. 15, 61).

Clean Water Act. The protection of water quality and quantity is an important part of the mission of the Forest Service (USDA Forest Service 2015). Management activities on National Forest System (NFS) lands must be planned and implemented to protect the hydrologic functions of forest watersheds, including the volume, timing and quality of streamflow. The alternatives, as proposed, will comply with the Clean Water Act, Porter-Cologne Water Quality Control Act, applicable water quality control plans, and the NCRWQCB waiver of waste discharge requirements. This project represents a programmatic strategy to avoid significant effects, while mitigating minor unavoidable effects to water quality. A waiver application would be filed after the Decision Notice (DN) is signed and the project implementation process and checklist (*Appendix C*) have been completed.

The NCRWQCB Basin Plan contains water quality objectives, implementation plans for meeting those objectives, and other policies of the State Water Quality Control Board and the federal government, applicable to any ground-disturbing actions that have the potential to affect water quality. The water quality standards in the NCRWQCB Basin Plan that most closely apply to the proposed actions are sediment and turbidity. The standard for sediment states that sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses. The standard for turbidity states that turbidity shall not be increased more than 20 percent above naturally occurring background levels. The NCRWQCB Basin Plan states that controllable water-quality factors shall not cause further degradation of water quality when it has already been established as degraded, and efforts to restore the impaired beneficial uses of these watersheds must be made. The water-quality analysis of the *Alternative 2* focused on minimizing delivery of management-related sediment and improving the long-term sediment regime and supporting beneficial uses in the project area (EA pp. 83, 86, 177; *Appendix B*).

3. *Unique characteristics of the geographic area such as the proximity to historical or cultural resources, parklands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.*

Traditional Cultural Properties. Treatments may be allowable within traditional cultural property (TCP) site boundaries provided on-site historic property protection measures are followed as stipulated in the Region 5 Programmatic Agreement (R5 PA), and it is determined those activities would have no significant impact to the integrity of historic properties (EA p. 114).

Wetlands and Floodplains. No wetlands per Executive Order (EO) 11990 exist within the project area; therefore, there would be no effect to these resources from implementing Alternative 2. Executive Order 11988 – Floodplain Management (1977) requires federal agencies to avoid the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid the direct or indirect support of floodplain development. If an action must be located in a floodplain, EO 11988 requires that agencies minimize potential harm to people and property, and to natural and beneficial floodplain values. Under Alternative 2, the proposed activities would act to restore connectivity and inundation of the floodplain and increase complexity of riparian areas. Any side channels constructed would be within existing channels and would be designed to not impact people or property. Therefore, there would be no significant effects to these resources (EA p. 67).

Parklands, Prime Farmlands, Agricultural and Forestry Resources: There are no parklands, prime farmlands, agricultural or forestry resources within or immediately adjacent to the project area. Therefore, there would be no significant effects to these resources or changes to forest conditions from implementing Alternative 2. Therefore, there would be no significant effects to these resources (EA p. 62).

Research Natural Areas (RNA) are areas allocated to research, education and to protect biodiversity on NFS lands. Although Alternative 2 allows entry into RNAs within the project area, the restoration activities are restricted to manual methods only. In additional, coordination and approval from the Pacific Southwest Research Station (PSW) would occur prior to implementation. Therefore, there would be no significant effects to these resources (EA p. 8).

Wilderness Areas. Land management activities within wilderness areas must adhere to the Wilderness Act of 1964, the California Wilderness Act of 1984, and regulations pursuant to those acts and Forest Service Manual (FSM). The project area overlaps 7,975 acres of wilderness along with 225 miles of streams in the Siskiyou, North Fork, Trinity Alps, Lassics, and North Fork Eel wilderness areas with treatments limited to manual handwork. Although Alternative 2 allows for restoration in streams within designated wilderness, proposed activities are limited to manual methods and access would be restricted to existing roads and routes. Therefore, there would be no significant effects to these resources (EA pp. 28, 53, 60, 149-150).

Wild, Scenic and Recreational Rivers. Under Alternative 2, 20 of 35 sites proposed for a combination of manual labor and heavy equipment are in proximity to river segments classified as *scenic* or *recreational* river, designated components of the National Wild and Scenic (WSR) River System or rivers recommended in the SRNF/KNF LRMPs for inclusion in the national system. Anadromous fish are an outstanding remarkable value (ORV) associated with the wild and scenic river designation within NFS lands (LRMP IV-26, IV-56). Under Alternative 2, restoration treatments include the potential to use heavy equipment along one (1) segment of a designated *scenic* river. The proposed activities would not affect the free-flowing condition of the river and, would instead lead to improvement to the ORV by improving rearing habitat; therefore, §7 of the WSR Act is not required (WSR Act §7 (a)). There are no proposed heavy equipment treatments within the *wild* portions of the WSR designation, applicable to segments of the Smith, Trinity, and Eel rivers (WSR Act §2(a)(ii)). Therefore, there would be no significant effects to these resources. The forest plans allow for manual instream restoration activities for

fisheries in both wild and scenic portions of these rivers (SRNF LRMP IV-26, IV-56; KNF LRMP p. 4-90, 4-149). Therefore, there would be no significant effects to these resources (EA pp. 60, 146, 149).

Inventoried Roadless Areas. Approximately 20 percent of the SRNF lies within inventoried roadless areas (IRA) per the 2001 Roadless Area Conservation Rule. Combined, these IRAs encompass 199,000 acres; however, the project area does not overlap with IRAs. Therefore, there would be no significant effects to these resources (EA p. 146).

Recreational Opportunity Spectrum. There are no proposed project locations that allow heavy equipment use within the Recreation Opportunity Spectrum (ROS) Semi-Primitive Non-Motorized classification. The Proposed Action would not build new roads or access points, and all heavy equipment use is via existing roads; therefore, there are no significant effects to these resources (EA pp. 147, 149-150).

Retention and Partial Retention Management Areas Visual Quality Objectives. Visual quality objectives ((VQO; FSH 462 and 559), which define nationally established principles and methods for managing scenery integrity and quality, apply to site-specific projects visible from the forest's inventoried Maximum Modification, Moderate and High Sensitivity Viewpoints (Level 1 and 2) and Preservation classifications. The project design would achieve VQO objective for the Preservation classification immediately upon completion of operations. For all other management areas (MAs), compliance would be achieved within three (3) years (KNF LRMP p. 4-116). Along State Highways 96, 299 and 36, and US Highway 199, eligible for designation as State Scenic Highways, treatment design would achieve Partial Retention VQO for the middleground viewshed. The proposed tree removal treatments would blend well to conserve the scenic quality and integrity of the project area. Therefore, there would be no significant effects to these resources (EA pp. 148-149).

4. *The degree to which the effects on the quality of the human environment are likely to be highly controversial.*

The term *controversial* in this context refers to cases where substantial scientific dispute exists as to the size, nature, or effects of a major federal action on some human environmental factor. Consideration was given to effects of the project on fisheries, wildlife, recreation and cultural values. Responses to the public outreach indicate a high level of support and enthusiasm.

The affected environment was considered in light of the living cultures and native practices within the SRNF. In making a determination of affect, it is understood that impacts considered shall include not only the archeological record, but also its living descendants who still lay claim to the cultural heritage alive within these lands. With that in mind, this analysis considered traditional knowledge, including but not limited to, traditional ecological knowledge. Identifying plants and animals that have a cultural use or other underlying significance is an integral component of the SRNF heritage management plan. No adverse effects are anticipated for heritage resources within the project area. In fact, the *Aquatic Restoration Project* has great potential to benefit cultural sites and practices throughout the forest. Restoration of fish habitat would allow traditional fishing practices to pervade and support traditional ways of life practiced by tribes within the SRNF. Moreover, removal of invasive plants and propagation of native species would increase quality and accessibility of culturally utilized plants (EA pp. 138, 140, 143).

The SRNF manages 46 developed recreation sites on the forest, including campgrounds, viewpoints, picnic areas, trailheads and horse camps. Developed hiking, horse, and off-highway vehicle (OHV) trails are located throughout the SRNF. Under Alternative 2, design features and mitigations would provide for high-quality environments that are healthful and pleasing to the senses (CEQA §21000(b)). Future opportunities for collaborative development of natural resource-based enterprises would be facilitated (SRNF LRMP p. IV-113). The design of Alternative 2 would ensure the character and quality of recreational environments would be maintained to avoid significant effects. The application of mitigations would minimize minor, unavoidable effects to resource values for which the rivers were designated, and to protect features and values, described in the forest plans (KNF p. 4-90, 4-149; SRNF IV-27, IV-56; (EA pp. 148-149).

Executive Order 12898 – Environmental Justice requires an assessment of whether there would be disproportionate effects to minority or low-income populations. Although there are minorities and low-income populations living in the North Coast California area, they would benefit from the project. Environmental justice means that, to the greatest extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner, by government programs and activities affecting human health or the environment. There would be no discernable differences between Alternative 2 and Alternative 1 (No Action) regarding effects on minorities or the civil rights of any American citizen. Alternative 2 would not result in disproportionately high or adverse effects to human health, high or adverse environmental effects, substantial environmental hazard, or affects to differential patterns of consumption of natural resources. Extensive scoping did not reveal any issues or concerns associated with the principles of environmental justice.

5. *The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.*

Alternative 2 would achieve objectives identified in the SRNF and KNF LRMPs. Project design features and resource protection measures represent standard operating practices (SOPs) considered to be effective resource protection practices that have been validated via monitoring over time. Recently released technical guidance, *USDA Guidance for Stream Restoration* (Yochum 2018), provides a bibliographic repository of information to assist with the collaborative process of planning, analyzing, and designing site-specific stream restoration projects, including information on the effectiveness of project designs.

Appendix C outlines the process for designing and implementing a site-specific project. In addition to collaboration with tribes, landowners and restoration community, full interdisciplinary (IDT) review of project components would reduce existing risk factors and address conditions that are unknown at this time. In the case of inadvertent discoveries of heritage resources during implementation, work would cease and both the Forest Service heritage program manager and affected tribes would be notified.

The availability of natural resources contributes to the quality of life for many local tribes and county residents. Families can experience benefits from healthy fisheries associated with food gathering. Alternative 2 would also provide job opportunities (EA p. 6; *Appendix C*).

Relationships between local, short-term uses of the human environment and maintenance or enhancement of long-term productivity. Short-term uses are expected to change the human environment during heavy equipment use due to noise disturbances and presence of field crews. Cutting and falling trees would not alter long-term effects and should not appreciably change the human environment after project has been completed. Few trees would be cut; most projects are remote and would be spread across multiple watersheds. Therefore, any minimize disturbance to nearby neighbors and natural resources (EA pp. 150, 157; *Appendix C*).

6. *The degree to which the action may establish precedent for future actions with significant effects or represents a decision in principle about a future consideration.*

The Proposed Action does not set a precedent for future actions that may have significant effects, nor does it represent a decision in principle about a future consideration. All site-specific projects implementing activities identified in *Chapter 2*, analyzed in *Chapter 3* and listed in *Appendix D* would undergo additional collaboration and interdisciplinary evaluation through a the Project Implementation and Checklist Process (*Appendix C*).

Irreversible or Irretrievable Commitments of Resources. An irreversible commitment of resources refers to a loss of non-renewable resources, such as mineral extraction, heritage (or cultural) resources, or to those factors which are renewable only over long time spans. Irretrievable commitment applies to losses that are temporary such as the use of renewable natural resources. Trees felled for large wood (LW) instream recruitment are considered irretrievable, but, the number to be cut would be not affect stand structure, forest canopy closure, productivity, or natural processes. Under Alternative 2, there would be no irreversible or irretrievable commitment of resources (EA pp. 53, 115).

Adverse Environmental Effects that cannot be Avoided. In pursuit of restoration actions, individual salmon and steelhead (and other aquatic FSS species) may be incidentally injured or killed by activities involving heavy equipment or moving LW. These direct effects would be minimized through design criteria and are not considered significant at any population level (NMFS BO 2015). Alternative 2 would have short-term adverse environmental effects due to increased sediment and turbidity, particularly during heavy equipment use. Increased turbidity during the summer and early fall may result in short-term behavioral changes of juvenile salmonids (Newcombe and Jensen 1996). These effects would be minimized by timing operations with flows/onset of wet weather and implementation of water quality BMPs (*Appendix B*) to prevent sediment from entering stream channels. Therefore, the project would not result in significant effects that would preclude a future decision (EA pp. 78, 81, 83).

Energy Requirements of Alternatives. The implementation of the *Aquatic Restoration Project* would require the use of various amounts of fossil fuels. Fossil fuel energy is not retrievable and is not in short supply. Therefore, use would not have an adverse effect upon continued availability of these resources.

7. *Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.*

The IDT evaluated the Proposed Action in context of past, present, and reasonably foreseeable actions, and described the potential cumulative effects in the EA. Based on this analysis, it is not reasonable to anticipate a cumulatively significant impact on the environment based on the nugacity of effects. The Proposed Action contributes non-significant cumulative effects for the following resources:

- **Fish.** During and shortly after implementation of restoration activities, the possibility exists that minor adverse impacts could occur relative to direct harm, harassment and increased turbidity locally. However, the context and intensity is limited by design during the initial stage of each project to ensure effective design and review with consideration for new information and changing conditions. Although the majority of the restoration activities could result in short-term impacts, they would either be effectively minimized or rectified through design and mitigations with annual, watershed-scale limits to avoid potential for significant cumulative effects (EA p. 81; WFRPBA).
- **Water Quality.** The effects of sediment entering the stream channel would be minimized by General Aquatic Conservation Measures (GACM), design criteria (*Appendix A*), and water quality BMPs (*Appendix B*) considered SOPs for instream enhancement as defined by consultation with NMFS and CDFW salmonid restoration programs. These project design criteria (PDC) and BMPs aim to minimize the amount of fine sediment disturbance and associated turbidity during all stages of the project. Alternative 2 sets maximum treatment allowances by restoration activity to accommodate the variability in context of potential effects (intensity) to natural resources. The activities under Alternative 2 would span 21 5th-field watersheds to incrementally improve aquatic habitat and protect beneficial uses of water quality, and the upper limits of actions on 5th-field watersheds would constrain the affected area to less than 4 percent of the total watershed acres. Therefore, the intensity of activities would not contribute to adverse cumulative effects to avoid significant watershed effects. The cumulative watershed effects (CWE) analysis indicates the impact intensity for adverse watershed effects under Alternative 2 would remain below the threshold of concern (EA p. 84).

8. *The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.*

The Forest Service researched prior archeological surveys (estimated 3,900 acres or approximately 10 percent) within the proposed manual restoration areas. The sampling of use patterns associated with the area indicates streambanks, lakeshores, and the surrounding areas would have been used by both Pre-Contact and historic peoples. The design features and mitigations under Alternative 2 would ensure there would be no adverse impacts to cultural heritage or features. Buffer zones may be established on a case-

by-case basis for highly sensitive areas. These buffer zones would be marked prior to implementation and avoided. Tribes would be consulted on the use and size of protection buffers to ensure no adverse effects to Native American TCPs and features (EA pp 57, 60; *Appendix C*).

Appendix C outlines the process for designing and implementing a site-specific project. In addition to collaboration with tribes, landowners and restoration community, full IDT review of project components would reduce risk factors as well as address future unknown conditions. In the case of inadvertent discoveries of heritage resources during implementation, work would cease and both the forest's heritage program manager and the affected tribes would be notified.

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973 (ESA).

The SRNF does not expect the Proposed Action to have significant adverse effects to threatened or endangered species or habitat under the ESA. The project would fully comply with the ESA, as amended. The project is consistent with the conservation needs of FSS species and would not contribute to the need to list any FSS species, either under the provisions of the ESA or other provisions of the manual (FSM 2670; EA pp. 80, 83, 99, 115, 120, 130).

The ESA of 1973 (16 USC 1531 et seq.) requires any action authorized by a federal agency to not jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of the critical habitat of such species. Section 7 of the ESA, as amended, requires the responsible federal agency to consult with the US Fish and Wildlife Service (USFWS) and the NMFS concerning endangered and threatened species under their jurisdiction.

The California Endangered Species Act (CESA) was enacted in 1984, to parallel the federal ESA and allows the California Fish and Game Commission (CFGC) to designate species, including plants, as threatened or endangered. Under CESA, CDFW may permit *take or possession* of threatened, endangered, or candidate species for scientific, educational, or management purposes, and may also permit *take* of these species incidental to otherwise lawful activities if certain conditions are met.

Fisheries. The *Watershed and Fisheries Restoration Program BA* (WFRPBA 2015), along with the site-specific review process in this draft EA (*Appendix C*), and corresponding NMFS biological opinion (BO; NMFS 2015) satisfies §7 consultation requirements for ESA-listed anadromous fish. Consultation on the *Watershed and Fisheries Restoration Program* (WFRP) began with NMFS in 2014. On December 15, 2015, they concluded that the WFRP implemented recovery actions, and based on the best scientific and commercial information available, the WFRP, is not likely to jeopardize the continued existence of the SONCC evolutionary significant unit (ESU) of coho salmon or Northern California (NC) steelhead distinct population segments (DPS); and is not likely to result in the destruction or adverse modification of designated Critical Habitat (CH) for these species (CEQA §2053). The NMFS expects that certain activities of the WFRP may result in incidental *take* of SONCC coho salmon and NC steelhead, providing non-discretionary reasonable and prudent measures, and terms and conditions that further reduce anticipated incidental *take* of SONCC coho salmon and NC steelhead. These provisions were addressed through GACM, PDC (aka PDFs) and SOPs, described in *Chapter 2* and *Appendix A*.

The NMFS has also concurred with the SRNF's determination that the WFRP may affect, but is not likely to adversely effect, California Coastal (CC) Chinook salmon ESU (*O. tshawytscha*) and its designated CH. The essential fish habitat (EFH) consultation was prepared pursuant to §305(b) of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA). Activities described in the Proposed Action and *Appendix A* are consistent with that consultation effort along with the corresponding BO (December 14, 2015), including meeting recovery goals for SONCC coho salmon and NC steelhead. In the event anadromous salmonids are proposed for listing under the ESA, SRNF would re-initiate consultation with NMFS (EA p. 85; WFRPBA).

Wildlife. The draft wildlife biological assessment (BA) for the *Aquatic Restoration Project* (*Wildlife BA/BE* 2018) was submitted to USFWS for review. Through the Level 1 process, the project activities and design features to reduce potential effects to NSO and MAMU and their habitat were reviewed. Based on the PDFs and the project implementation process (*Appendix C*), the *Aquatic Restoration Project* would result in a *Not Likely to Adversely Affect* determination for northern spotted owl (NSO) and marbled murrelet (MAMU). The BA contains a detailed analysis of effects and determinations on the following ESA listed species:

- **Marbled murrelet (federally listed Threatened and State Endangered).** The action area for the MAMU is 13 5th-field watersheds on the SRNF and KNF identified as Zone 1. The SRNF has detected MAMU on radar and through audio-visual surveys on the forest. The action area contains 163,323 acres of nesting habitat. Aquatic restoration activities may occur within 0.25 miles of an occupied site, suitable habitat, or Critical Habitat. Mitigations described in *Chapter 2* of the EA would be applied to prevent adverse impacts to habitat and limited operating periods (LOP) would be applied as needed to prevent noise disturbance during the breeding season.
- **Northern spotted owl (federally listed Threatened, State Candidate for listing under CESA).** Because the SRNF strives towards recovery of the spotted owl, all NSO activity centers (AC) receive the highest level of protection. This goes beyond the requirement of Recovery Action (RA) 10. There are multiple known NSO ACs included in the analysis area for the *Aquatic Restoration Project*. Northern spotted owl ACs would not be effected (indirect or direct) as a result of habitat treatments. Proposed treatments would not remove or downgrade suitable nesting/roosting or foraging habitat. Aquatic restoration activities may occur in and within 0.25 miles of known ACs, nesting/roosting habitat, or Critical Habitat. All NSO nesting/roosting, foraging and dispersal habitat would be maintained during the implementation of this project. Habitat would not be downgraded or removed during implementation. Mitigations (i.e., PDFs) described in *Chapter 2* of the EA would be applied to prevent adverse impacts to habitat to retain nesting/roosting, foraging, and dispersal habitat primary constituent elements (PCE), along with LOPs as needed, to prevent noise disturbance during the breeding season (EA p. 132; Wildlife BA/BE).

Botanical. There are no occurrences of the federally listed endangered botanical species within the project area. Therefore, there will be no effects (direct or indirect) under Alternative 2 per §7 of the ESA, and consultation with the USFWS is not required for "no effect" determinations (EA p. 99).

10. Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.

The following are consistency requirements under the SRNF and KNF land management plans including direction given post LRMP decisions:

Aquatic Conservation Strategy Consistency. Project National Environmental Policy (NEPA) decisions must be consistent with the ACS, including consistency with the nine (9) ACS objectives described in the 1994 Northwest Forest Plan Record of Decision (NWFP ROD p. B-10) and in the May 22, 2007 Memorandum. Alternative 2 would maintain and actively attain the ACS in the sub-watersheds in the short and long term by maintaining and restoring the nine (9) ACS objectives; therefore, Alternative 2 is consistent with the ACS (EA p. 13).

National Forest Management Act – Best Management Practices. Use of water quality and other resource protection BMPs in national forests are required by the NFMA, and prescribed in the LRMPs. Consequently, all land management activities, must be implemented using BMPs for control of non-point source water pollution (USDA Forest Service 2011). Applicable BMPs for sediment and petrochemicals are identified in the Proposed Action and listed in *Appendix B*; therefore, Alternative 2 is consistent with the NMFA (EA p. 15; *Appendix B*).

Special Habitat – Late Successional Reserves. Direction from both LRMPs on this MA consists of special provisions for peregrine falcon, bald eagle and late-successional reserves (LSR). The LRMPs include a provision for the Special Habitat MA around peregrine falcon eyries. Alternative 2 proposes aquatic restoration treatment within the Special Habitat area; however, no known peregrine falcon eyries are located within 0.5 miles of proposed treatments. If treatments occur within 0.5 miles of a known peregrine eyrie, surveys would be conducted. Alternative 2 would not impact suitability of nesting habitat for peregrine falcon; therefore, it is consistent with the management of this area and would not be analyzed further for this project (EA pp. 27, 107, 113).

Survey and Manage. The NWFP includes S&Gs for Survey and Manage (SM) species associated with late-successional forests (USFS et al. 2001). Recent direction for SM species is from the May 13, 2014 *Direction Regarding the Survey and Manage Standards and Guidelines,* which applies to projects initiated after April 30, 2015. Specifically a) a reference to the December 2003 species list and categories, except for the red tree vole, which remains as Category C across its range; and/or b) the four (4) categories of projects exempt from the SM S&Gs, as stipulated by Judge Pechman (October 11, 2006 "Pechman exemptions").

Of the Pechman exemptions, one (1) includes activities associated with riparian and stream improvement:

- Riparian and stream improvement projects where the riparian work is riparian planting, obtaining material for placing in-stream, and road or trail decommissioning; and where the stream improvement work is the placement of large wood, channel and floodplain reconstruction, or removal of channel diversions.

In light of this exemption, pre-disturbance surveys are not required for the project. The S&G pertaining to management of known sites would apply to this project through interdisciplinary review process (EA pp. 14, 108; *Appendix C*).

Forest Service Sensitive Species. In keeping with FSM 2670 (USDA Forest Service 2005), S&Gs from the SRNF LRMP (USDA Forest Service 1995) state that before the NEPA process is completed, projects will be assessed through a biological evaluation (BE) to determine if management activities are likely to adversely affect sensitive plant resources. After completion of the evaluation, proposed actions will be prohibited if they are found likely to jeopardize the continued existence of the species or the maintenance of the viable populations throughout their existing range. Appropriate mitigation measures will be required if activities are not prohibited. A BE was prepared for wildlife, aquatic and botanical species (*Sensitive Species BE* 2018). For terrestrial and aquatic species it was determined that Alternative 2 would have no effect on 11 species and a may impact, not likely to jeopardize the continued existence for an additional 20 species (*Sensitive Species BE* 2018). The Proposed Action would have no effect on any FSS plant species.

Forest Service Sensitive Aquatic Species. For Sensitive aquatic species (i.e., non-anadromous salmonids, invertebrates and herpetofauna), based on the size, nature and duration of these restoration activities, it is the determination of the fisheries biologist that Alternative 2 may impact individuals, but would not result in a trend towards federal listing or loss of viability.

- **Coastal Cutthroat Trout** (*Oncorhynchus clarkia*) habitat in the Smith River would follow the same general effects as that of ESA-listed coho salmon as their habitat is similar. Overall, habitat would be improved though actions aimed at coho salmon where they overlap, and for activities specifically aimed at improving cutthroat habitat. Potential negative impacts would be related to sediment and turbidity; however, the same planning, design criteria, mitigations, and BMPs would apply.
- **Lamprey Species.** Indirect effects to lamprey habitat could occur through changing of habitat and flow conditions. However, additional suitable habitat for lamprey could also be created as both salmon and lamprey use clean gravels for spawning. The insignificant amount of sediment delivered into lamprey habitat could impact spawning gravels, and potentially settle out in backwater conditions for ammocoetes habitat. Early consideration of lamprey in the project design, including USFSW BMPs for lamprey, would minimize impacts to lamprey species by avoidance of spawning and backwater areas and including passage considerations for lamprey when designing or modifying structures.
- **California Floater Freshwater Mussel** (*Anodonta californiensis*). Indirect effects to California floater habitat could occur through changing of habitat and flow conditions. Early consideration of mussels in the project design would minimize impacts to lamprey species by avoidance of mussel beds. As mussels are filter feeders that live in soft substrate, minor amounts of sediment would not impact *Anodonta*.

- **Frogs.** Indirect effects to frog habitat could occur during instream restoration activities. Breeding habitat, the most likely to be affected by instream projects, occurs in wide, shallow, slow-flowing water with at least some pebble and cobble substrate, often near confluences with tributaries (Hayes et al. 2016). Foothill yellow-legged frogs are common within the project areas, whereas northern red-legged frogs are incidental. Effects would be minimized for both species by implementing BMPs during planning and implementation (CDFW 2018, Hayes et al. 2016).
- **Western Pond Turtle** (*Clemmys marmorata*). Indirect effects would be positive when basking platforms are added within occupied streams and ponds. Management direction calls for maintaining habitat characteristics consistent with their habitat capability model within 300 feet (91 meters) of occupied pond and stream habitat. Heavy equipment would be on existing roads and access points, and would not affect breeding habitat. Timing of instream work would be during lowest flows and would avoid breeding and egg laying. Project location and type would be chosen to minimize changes to maintain habitat characteristics (i.e., basking sites). Moving individuals would be considered during heavy equipment use.

Forest Service Sensitive Wildlife Species. It was determined that the *Aquatic Restoration Project* would have no effect on certain FSS species, based on either the lack of habitat, lack of detections during surveys, or the fact that habitat would not be impacted. Species that would not be affected by this project include the greater sandhill crane, great gray owl, Siskiyou Mountains salamander, cascade frog, northern red-legged frog, western bumblebee and Tehama chaparral snail. It was determined that Alternative 2 may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the following species:

- **Bald Eagle.** Disturbance is unlikely given that known nests and suitable habitat would be surveyed for eagles. Site clearance prior to implementation would result in the avoidance of effects to bald eagle possibly occurring in the action area. In addition, the Proposed Action would not affect suitable nest trees, wintering roost trees, or foraging habitat (EA p. 121).
- **Northern Goshawk.** Disturbance is unlikely given that surveys and LOPs would be in place if a nesting pair is found. Site clearance prior to implementation would result in the avoidance of effects to goshawk possibly occurring in the action area. Foraging and nesting suitability would not change as a result of the proposed project activities (EA p. 122).
- **Willow Flycatcher.** Disturbance is unlikely given that surveys and LOPs would be in place if suitable habitat is found within or adjacent to proposed project actions. Site clearance prior to implementation would result in the avoidance of effects to willow flycatcher possibly occurring in the action area. The proposed project would not affect suitable willow thickets until surveys have proven them unoccupied. This would ensure habitat suitability would not change as a result of the proposed project activities (EA p. 124).
- **Fisher, Marten and Wolverine.** Suitable fisher, marten and wolverine habitat is available in and adjacent to the project sites. Proposed activities may occur within or near suitable denning and

foraging habitat. Snags suitable for resting and denning habitat would be retained and are unlikely to be removed. Therefore, no change to fisher, coastal marten and wolverine habitat would occur. Limited operating periods would be applied to active den sites. The dominant forest type and structure would remain. Understory foraging habitat may change with an increase in habitat types and small mammal prey diversity, although to a minor extent. In addition, fishers and martens can and presumably would avoid human activity during implementation. The project areas are not a substantial portion of a potential home range. Disturbance is likely to be minor, if it occurs at all (EA p. 125).

- **Pallid Bat, Townsend's Big-eared Bat, and Fringed Myotis.** Proposed activities would occur within or near suitable roosting and foraging habitat with large diameter snags and trees suitable for roosting habitat retained. Man-made structures suitable for roosting may be found in and near the project area, and project activities near these sites may disturb resident bats, if present, during implementation. Overstory forested foraging habitat would not be affected. Below canopy, foraging habitat may increase in the diversity of habitat structural and insect prey species although to a minor extent. Bat habitat in the project sites is suitable for foraging and roosting, and would not change as a result of the proposed project activities. Hibernaculum or natal colonies would not be located near proposed project activities (EA p. 127).
- **Western Bumblebee.** It is unlikely that western bumblebee would be affected by implementation of this project. While the forest is in the range of these species there are no records of individuals in the project area, it does not mean there are none. Nesting individuals would be the most likely to be harmed, and in the case of this project, it would be due to heavy equipment resulting in destruction of potential nest sites. Since bumblebees are generalist foragers, flowering invasive weeds such as thistles and knapweeds can actually increase native bee abundance, particularly later in the season and in the absence of native flowering plants. Suitable bee habitat is available in and adjacent to project sites. Proposed activities may have low levels of effects on the disturbance level on the western bumblebee. Projects are small in size and primarily within the stream channel (EA p. 128).

Forest Service Sensitive Botanical Species. Sensitive botanical species are those for which there is a concern for viability of the species based upon population trends or loss of habitat that will reduce the species existing distribution (USDA Forest Service 2005, FSM 2670.5). The project was designed to not lead toward a loss of viability or a trend toward federal listing in compliance with KNF and SRNF forest plan direction, and disclosed in the BE (*Sensitive Species BE* 2018).

For species like *Peligera gowardii*, which can occupy the surface of rocks or boulders within the stream channel, or *Buxbaumia viridis*, which grows on advanced decay class logs, boulder or log placement or relocation could impact these species. Sensitive lichens, such as *Ramalina thrausta*, which reside on the branches and twigs of riparian trees, could be removed with the felling of conifer trees to provide structure to the streams.

A key component of the Proposed Action is the requirement that site-specific proposed actions be reviewed by resource specialists and signed off by a line officer. *Appendix C* outlines the process that

would be undertaken before project activities could occur. Review would first involve assessment of the spatial data coinciding with the project location to see if there are any recorded occurrences of species at the project site or proximal to the site. Habitat suitability would then be reviewed in advance of field surveys to stratify project sites according to attributes such as canopy cover (i.e., floodplain settings versus intact riparian areas). Based upon this review, surveys would be conducted to ascertain if a Sensitive species is present and if detected, either applicable PDFs would be applied to ensure there is no potential negative effect to the species or its habitat or the action would not proceed (EA p. 99).

Management Indicator Species. Under NFMA, the Forest Service is directed to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" (PL 94-588 §6 (g)(3)(B)). The 1982 regulations implementing NFMA require that "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area" (36 CFR 219.19). Forty-one (41) fish and wildlife species have been selected as Management Indicator Species (MIS) or assemblages for a variety of habitats that are potentially affected by resource management activities on the forest (LRMP IV-97). Application of forest S&Gs, and threatened and endangered wildlife and botany design features would result in little change to the Snag Assemblage or Down Woody Debris Assemblage. The remainder of the MIS assemblages—Tanoak/Madrone Assemblage and Black Oak/White Oak Assemblage—would have little to no disturbance or changes to habitat or species based the limited amount of habitat within the project area, and no change to the dominant forest type and structure. Alternative 2 would result in improved habitat condition for River and Stream Species Association, Marsh/Lake/Pond Assemblage and the Bog/Seep/Spring/Wet Meadow Assemblage (EA p. 133).

Neotropical Migratory Bird Species. On December 12, 2008, a Memorandum of Understanding (MOU) was signed by the Forest Service and the USFWS to promote the conservation of migratory birds. This MOU directs agencies to evaluate the effects of proposed actions on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors. As riparian restoration activities are implemented in the California Coastal and Western Klamath regions, these activities should be closely monitored with respect to their effect on bird abundance and demography. For the SRNF and KNF, the migratory bird species (MBS) of management concern include species listed under the ESA as threatened or endangered species, designated by the Regional Forester as Sensitive species, and species listed under S&Gs 8-21 through 8-34 of the KNF LRMP as MIS for project-level assessments (MIS Report, available from SRNF). Alternative 2 would promote recreating conditions and ecological processes conducive to migratory songbirds (EA p. 134).

Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA), as amended by the Sustainable Fisheries Act of 1996 (PL 104-267), requires federal agencies to consult with National Oceanic and Atmospheric Administration (NOAA) Fisheries on all actions and proposed actions authorized, funded or undertaken by the agency that may adversely affect essential fish habitat (EFH). All EFH assessments must include 1) a description of the Proposed Action; 2) an analysis of the effects, including cumulative effects of the Proposed Action on EFH, the managed species and associated species, including life history stages potentially affected; 3) the federal agency's views regarding the effects of the

action on the EFH; and 4) proposed mitigation, where applicable (50 CFR 600.920(g)(2)).The information prepared under a BA for formal or informal consultation under the ESA (50 CFR 402.12) may serve as the EFH assessment curtailing the need for separate analysis (EA p. 16).

The *Aquatic Restoration Project* would have no impact on the following:

- **Greenhouse Gas Emissions.** The project activities would not generate greenhouse gas emissions.
- **Land Use and Planning.** The project is compliant with LRMPs and does not involve changes to private land use or county zoning regulations.
- **Mineral Resources.** The project does not involve the extraction of mineral resources from either public or private lands.
- **Population and Housing, Public Services, Transportation/Traffic or Utilities and Service Systems.** The project is entirely on NFS lands and would have no impact on these amenities.

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Chapter 4. Consultation and Coordination

Forest Service Interdisciplinary Team

The interdisciplinary team (IDT) members responsible for preparing the *Six Rivers Aquatic Restoration Project* (*Aquatic Restoration Project*) draft environmental assessment (EA) are listed in Table 4-1.

Table 4-1. Interdisciplinary team (IDT) members.

Interdisciplinary Team Member	*Role or Resource Area*
Ted O. McArthur	Forest Supervisor, Responsible Official
Corrine Black	Hydrology, Soils, Geology
Janet Boomgarden	Grants and Agreements
Bryson Code	Recreation
Carolyn Cook	Natural Resources Staff Officer
LeRoy Cyr	Fisheries Biologist – Orleans/Ukonom/Lower Trinity Ranger District
Jeanne Goetz	Heritage Consultation
Lisa Hoover	Botany and Invasive Species
Jeff Jones	Vegetation: Port-Orford-Cedar
Karen Kenfield	Fisheries Biologist/Consultation/Editor
Bridget Litten	Public Affairs/Editor/Publisher
Andrea McBroom	Fisheries Biologist – Orleans/Ukonom/Lower Trinity Ranger District
Mike McCain	Fisheries Biologist – Smith River NRA
Jennifer Peterson	Geographic Information Systems (analysis and mapping)
Tara Smith	Heritage/Cultural Resources
Carol Spinos	Environmental Planner, Writer/Editor
Bryan Yost	Wildlife and Consultation

Federal, State, and Local Agencies

The USDA Forest Service (Forest Service) also consulted with the following federal, and state and local agencies during the development of this EA:

- National Marine Fisheries Service (NMFS, California Coastal Branch)
- US Fish and Wildlife Service (USFWS)
- State Historic Preservation Officer (SHPO)
- North Coast Regional Water Quality Control Board (NCRWQCB)
- California Department of Fish and Wildlife (CDFW)
    - Jennifer Olson – Environmental Scientist, Coastal Conservation Planning
    - Gordon Leppig – Senior Environmental Scientist Supervisor

Tribes

The Forest Service consulted with the following federally recognized tribes:

- Bear River Band of Rohnerville Rancheria
- Big Lagoon Rancheria
- Blue Lake Rancheria
- Cher-Ae Heights Indian Community of the Trinidad Rancheria
- Elk Valley Rancheria
- Hoopa Valley Tribe
- Karuk Tribe
- Resighini Rancheria
- Round Valley Indian Tribes: A Sovereign Nation of Confederated Tribes
- Tolowa Dee-ni′ Nation
- Wiyot Tribe
- Yurok Tribe

The Forest Service consulted with the following non-federally tribes:

- Eel River Nation of Sovereign Wailaki
- Lassic Band of Wylacki-Wintoon Family Group, Inc.
- Tolowa Nation
- Tsnungwe Council

Watershed Restoration Non-Profits, Collaborative Groups, Partners

In developing the Proposed Action (Alternative 2), the Forest Service held public meetings and outreached to partners including watershed restoration groups, collaborative groups, and interested publics.

Watershed and Collaborative Groups

- Mid Klamath Watershed Council
- Salmon River Restoration Council
- Smith River Alliance
- Hayfork Watershed Center
- Redwood Community Action Agency
- Smith River Collaborative Group
- Western Klamath Restoration Partnership
- Trinity County Collaborative Group

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Appendix A. Design Criteria for Aquatic Restoration Site-Specific Projects

Introduction

The Proposed Action was developed to avoid significant effects by incorporating aquatic, wildlife, botany, invasive species, cultural resources and recreation design features and mitigations. Key to implementing projects under this modified Proposed Action is the interdisciplinary review process (*Appendix C*). This process and the following General Aquatic Conservation Measures (GACM) and project design criteria (PDC) were developed to minimize adverse effects to the aquatic environment and as well as other species potentially occupying the same reaches (*Watershed and Fisheries Restoration Program Biological Assessment* (WFRPBA; 2015) and are required under the corresponding biological opinion (BO) from the National Marine Fisheries Service (NMFS; 2015). These design criteria supplement the most recent version of California Department of Fish and Wildlife's (CDFW) Fisheries Restoration Grant Program (FRGP) minimization measures.

General Aquatic Conservation Measures

Pre-Project Planning

1. Ensure that the interdisciplinary review process has conclude and is signed off on by a line officer. The following GACM have been modified from the original WFRPBA to include resource design features.

Technical Skill and Planning Requirements

1. Ensure that an experienced fisheries biologist or hydrologist is involved in the design of all projects covered by this WFRPBA. Experience should be commensurate with technical requirements of a project.
2. Planning and design includes field evaluations and site-specific surveys, which may include reference reach evaluations that describe the appropriate geomorphic context in which to design and implement the project. Planning and design involves appropriate expertise from staff or experienced technicians (e.g., fisheries biologist, hydrologist, geomorphologist, wildlife biologist, botanist, engineer, silviculturist).
3. Review current restoration manuals (e.g., CDFW restoration manual available at *www.dfg.ca.gov/fish/resources/habitatmanual.asp*) and literature for best available information and monitoring results on restoration techniques.
4. Best management practices (BMPs) would be implemented on a site-specific basis during project-level National Environmental Policy Act (NEPA) analysis. The appropriate BMPs necessary to protect or improve water quality and the methods and techniques of implementing the BMPs are

identified at the time of this on-site, project-specific assessment. Best management practices would be incorporated into implementation documents (LRMP IV-71; Appendix M-1).

5. The project fisheries biologist/hydrologist would ensure that PDC are incorporated into implementation contracts. If a biologist or hydrologist is not the contracting officer's representative (COR), then the biologist or hydrologist must regularly coordinate with the project COR to ensure the project design criteria and conservation measures are being followed.

Work Periods/Timing

1. **Sediment:** Individual projects with the potential to generate sediment under the WFRPBA would occur either during the normal operating season (between June 15 and November 1[22]) or before the first significant rainfall, whichever comes first. The project start and end dates would be influenced by weather and rainfall predictions. The work window could be extended to November 15, contingent upon appropriate dry weather conditions and stream flows. Extensions would be initiated on an as needed basis and as agreed upon by NMFS as documented on the notification form.
    a. The forest would monitor weather and stream flows during fall months, using all appropriate tools, such as the fall, low flow season emails and phone calls with National Weather Service (NWS). Projects would end early if needed.
2. **Flows:** Instream projects in occupied habitat should consider flow levels and life history stage when implementing projects with heavy equipment. Instream projects would occur during times of low stream flow, which typically occurs during summer and early fall months.
3. **Other:** Limited operating periods (LOP) for wildlife species would be implemented based on type of project and location as described in the wildlife, Port-Orford-cedar (POC), and cultural project design features (PDF). Forest closure orders may influence timing of work.

Site Assessment for Contaminants

In developed or previously developed sites, such as areas with past dredge mines, or illegal cannabis cleanup locations, a site assessment for contaminants would be conducted on projects that involve excavation of greater than 20 cubic yards of material where in proximity to threatened, endangered and potential candidate (TEP) salmonid habitat. The forest would complete a site assessment to identify the type, quantity, and extent of any potential contamination.

Site Preparation

1. **Flagging Sensitive Areas:** Prior to implementation, flag critical riparian vegetation areas, wetlands, and other sensitive sites to minimize ground disturbance.

[22] FRGP instream work period

2. **Staging Area:** Establish staging areas for storage of vehicles, equipment, and fuels to minimize erosion into or contamination of streams and floodplains.
    a. **No Topographical Restrictions:** Place staging area outside riparian reserves where topography does not restrict such a distance.
    b. **Topographical Restrictions:** Place staging area away from any natural water body to the greatest extent possible in areas with high topographical restriction, such as constricted valley types.
3. **Temporary Erosion Controls:** Place sediment barriers prior to ground disturbance around sites where significant levels of erosion may enter the stream directly or through road ditches. Temporary erosion controls would be in place before any significant alteration of the action site and would be removed once the site has been stabilized following activities.
4. **Stockpile Materials:** Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Any large wood, topsoil, and native channel material displaced by construction would be stockpiled for use during site restoration. Materials used for implementation of aquatic restoration categories (e.g., large wood, boulders, fencing material) may be staged within the 100-year floodplain.

Heavy Equipment Use

Heavy equipment would be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (e.g., minimally sized, low-pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils). These GACM for using heavy equipment include design features for working in stream, fueling locations, road-related activities including water drafting, and considerations for noise (pile driving):

1. **Work from Top of Bank:** To the extent feasible, heavy equipment would work from the top of the bank, unless work from another location (instream) would result in less habitat disturbance, less floodplain disturbance, and/or better meet WFRPBA design criteria. In another way, operate heavy equipment in streams only when project specialists believe that such actions are the only reasonable alternative for implementation, or would result in less sediment in the stream channel or damage (short- or long-term) to the overall aquatic and riparian ecosystem relative to other alternatives.
    a. Use of heavy equipment in the wetted channel would be minimized and only occur after all salmonid species have emerged from the gravels and have sufficient flee response (post June 30 for steelhead).
2. **Fueling and Cleaning and Inspection for Petroleum Products and Invasive Weeds:**
    a. All equipment used for instream work would be cleaned for petroleum accumulations, dirt, plant material (to prevent the spread of noxious weeds), and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power

equipment (e.g., generators, canes), and gas-powered equipment with tanks larger than five (5) gallons.

b. Store and fuel equipment in staging areas after daily use.

c. Inspect daily for fluid leaks before leaving the vehicle staging area for operation.

d. Thoroughly clean equipment before operation below ordinary high water or within 50 feet of any natural water body or areas that drain directly to streams or wetlands and as often as necessary during operation to remain grease free.

e. List and describe any hazardous material that would be used at the project site, including specific cleanup and disposal instructions for different products available on the site; proposed methods for disposal of spilled material; and employee training for spill containment.

3. **Access Points:** Existing roadways or travel paths would be used. No new temporary roads/access points would be built. Minimal clearing could occur on existing routes.

    a. Access points would have erosion control features as needed during project.

    b. Access points in wet or flooded areas would be restored by the end of the applicable in-water work period.

4. **Timely Completion:** Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. Complete earthwork (e.g., drilling, excavation, dredging, filling and compacting) as quickly as possible. During excavation, stockpile native streambed materials above the bankfull elevation, where it cannot reenter the stream, for later use.

Ensuring Fish Passage during Restoration Activities

Fish passage would be provided for any adult or juvenile fish likely to be present in the action area during instream activities, stream isolation and dewatering is required during project implementation (below), or where the stream reach is naturally impassible at the time of implementation. After project implementation, adult and juvenile passage that meets NMFS's fish passage criteria (NMFS 2011a) would be provided for the life of the action. See *Activity-Specific Design Features* below.

Fish Handling – Work Area Isolation, Fish Capture and Release

When activities occur in occupied habitat and it is determined that removing of listed salmonids would result in less of an effect, isolate the work area and remove fish from a project site for projects that include concentrated and major excavation at a single location within the stream channel. The need for work isolation and fish handling would be identified at the annual coordination meeting and would typically include fish passage and activities that would impact the entire channel width (such as Legacy Structure Removal; and any log or boulder full spanning weir construction).

Few projects of this scale are anticipated under this WFRBPA and outside funding would be required. These funding sources (e.g., NOAA and CDFW) typically have their own requirements for fish capture and release, including electrofishing guidelines. This WFRPBA identifies one (1) fish handling effort for three (3) populations of Southern Oregon/Northern California Coast (SONCC) coho salmon—Smith, Middle Klamath, and Lower Trinity rivers—as these are the places where the likelihood of fish handling is the greatest.

Dewatering Project Site – Fish-Bearing Locations

When dewatering is necessary to protect species and/or critical habitat, divert flow around the construction site with a cofferdam (built with non-erosive materials) and an associated pump, a by-pass culvert, or a waterproof lined diversion ditch. Diversion sandbags can be filled with material mined from the floodplain as long as such material is replaced at end of project. Small amounts of instream material can be moved to help seal and secure diversion structures. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. If diversion allows for downstream fish passage, place diversion outlet in a location to promote safe reentry of fish into the stream channel, preferably into pool habitat with cover. When necessary, pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.

1. **Dewatering a Work Site:** A fish screen must be used on the pump intake to avoid juvenile fish entrainment that meets criteria specified by NMFS (2011, or most recent version).
2. **Stream Re-watering:** Upon project completion, slowly re-water the project site to prevent loss of surface water downstream as the project site streambed absorbs water and to prevent a sudden increase in stream turbidity. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the project site.

Site Restoration

Upon project completion, rehabilitate all disturbed areas in a manner that results in similar or better than pre-work conditions through removal of project related waste, spreading of stockpiled materials (e.g., soil, large wood, trees) seeding, and/or planting with local native seed mixes or plants.

1. **Short-term Stabilization:** Measures may include the use of non-native sterile seed mix when native seeds are not available, weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures would be maintained until permanent erosion control measures are effective. Stabilization measures would be instigated within three days of project completion.
2. **Revegetation:** Replant each area requiring vegetation prior to or at the beginning of the first growing season following ground disturbance. Achieve re-establishment of vegetation in disturbed areas to at least 70 percent of pre-project levels within three years. Use an appropriate mix of species that would achieve establishment and erosion control objectives, preferably forb,

grass, shrub, or tree species native to the project area or region and appropriate to the site. All riparian plantings shall use native plants as approved by the forest botanist. Barriers would be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

3. **Decompact Soils:** When necessary, loosen compacted areas, such as access roads and paths, stream crossings, staging, and stockpile areas.

Monitoring

Project-specific monitoring would be outlined during project NEPA or during Annual Coordination Level 1 meeting. Projects identified could include the following:

1. **Implementation (General)**
    a. Visually monitor during project implementation to ensure effects are not greater (amount, extent) than anticipated and to contact Level 1 representatives if problems arise.
    b. Fix any problems that arise during project implementation.
    c. Regular biologist/hydrologist coordination with COR if biologist/hydrologist is not always on site to ensure contractor is following all stipulations.
    d. Water Quality Checklists for Category B-type projects under the Waiver.
    e. **Fish Mortality during Project Implementation:** If a sick, injured, or dead specimen of a threatened or endangered species is found in the project area, the finder must notify NMFS through the contact person identified in the transmittal letter for this opinion and follow any instructions. If the proposed activities may worsen the fish's condition before NMFS can be contacted, the finder should attempt to move the fish to a suitable location near the capture site while keeping the fish in the water and reducing its stress as much as possible. Do not disturb the fish after it has been moved. If the fish is dead, or dies while being captured or moved, report the following: a) NMFS consultation number; b) the date, time, and location of discovery; c) a brief description of circumstances and any information that may show the cause of death; and d) photographs of the fish and where it was found. The NMFS also suggests that the finder coordinate with local biologists to recover any tags or other relevant research information. If the specimen is not needed by local biologists for tag recovery or by NMFS for analysis, the specimen should be returned to the water in which it was found, or otherwise discarded.
2. **Post Project:** For projects identified during the annual coordination meeting, a post-project review shall be conducted after winter and spring high flows as identified on the project tracking form.
    a. For each project, conduct a walk through/visual observation to determine if there are post-project effects that were not considered during consultation.

b. In cases where remedial action is required, such actions are permitted without additional consultation if they use relevant PDCs and ACMs and the effects of BO programmatic actions are not exceeded.

Activity-Specific Project Design Criteria

Instream habitat enhancement

Increasing instream cover and complexity for juvenile survival and spawning success are intended to provide predator escape and resting cover, increase spawning and rearing habitat, improve migration corridors, improve pool to riffle ratios, and add habitat complexity and diversity. Specific techniques for instream habitat improvement include:

- Placing large wood (LW) in stream channel to enhance pool formation and increase stream channel complexity. Projects would include both anchored (engineered log jams) and unanchored logs, depending on site conditions and wood availability. Large woody debris placed in streams without cabling would allow for natural distribution of wood in the channel. Sources of LW are described below.
    - Placing new boulders in stream channel to provide cover and scour opportunities (boulder clusters, deflectors).
    - Maintaining and improving historic instream enhancement sites through reconstruction or addition of LW. This could include:
        - Addressing low flow barriers in old weirs by adding low flow notches or reconfiguring boulders or logs,
        - Placement of imported spawning gravel, and/or
        - Restoration of habitat to support beaver populations.

These projects would occur in stream channels and adjacent floodplains to increase channel stability, rearing habitat, pool formation, spawning gravel deposition, channel complexity, hiding cover, low velocity areas, and floodplain function. Equipment such as helicopters, excavators, dump trucks, front-end loaders, full-suspension yarders, and similar equipment may be used to implement projects.

Large Wood and Boulder Projects

Sources of Trees for Instream Work

Large wood could come from existing riparian wood sources—spanner logs dropped into channel, moving downed LW from adjacent riparian areas, cutting and falling individual trees into channel:

- Live conifers and other trees can be felled or pulled/pushed over in the riparian area and upland areas for in-channel large wood placement only when conifers and trees are fully stocked and fall within Archeology and Wildlife consultation documents.
    - Tree felling shall not create excessive stream bank erosion or increase the likelihood of channel avulsion during high flows.
    - Canopy cover would not be reduced based individual tree selection from riparian areas; therefore, no change to stream temperatures would be anticipated.

Large wood could also come from off-site sources and be brought in via trucks or helicopters.

- Hazard trees and trees killed through fire, insects, disease, blow-down and other means can be felled and used for in-channel placement regardless of live-tree stocking levels.
- Trees from other management activities may be stock piled for future instream restoration projects. The removal and stockpiling of these trees would be analyzed under a separate project.
- Downed trees from clearings made for illegal cannabis grows.

Design Features

1. Place LW and boulders in areas where they would naturally occur and in a manner that closely mimic natural accumulations for that particular stream type. For example, boulder placement may not be appropriate in low-gradient meadow streams.
2. Structure types shall simulate disturbance events to the greatest degree possible and include, but are not limited to, logjams (See *Engineered Logjam* below), debris flows, wind-throw, and tree breakage.
3. No limits are to be placed on the size or shape of structures as long as such structures are within the range of natural variability of a given location and do not block fish passage.
4. The partial burial of LW and boulders is permitted and may constitute the dominant means of placement. This applies to all stream systems but more so for larger stream systems where use of adjacent riparian trees or channel features is not feasible or does not provide the full stability desired.
5. Large woody debris includes whole conifer and hardwood trees, logs, and rootwads. The size of LW (diameter and length) should account for bankfull width and stream discharge rates. When available, trees with rootwads should be a minimum of 1.5 times the bankfull channel width, while logs without rootwads should be a minimum of 2 times the bankfull width.
6. Structures may partially or completely span stream channels or be positioned along stream banks. See engineered log jams and boulder weirs for additional design features)
7. Stabilizing or key pieces of LW must be intact, hard, with little decay, and if possible have root wads (untrimmed) to provide functional refugia habitat for fish. Consider orienting key pieces such that the hydraulic forces upon the large wood increases stability.
8. **Anchoring Large Wood:** Anchoring alternatives may be used in preferential order:

a. Use of adequate sized wood sufficient for stability,
b. Orient and place wood in such a way that movement is limited,
c. Ballast (gravel and/or rock) to increase the mass of the structure to resist movement, and/or
d. Use of large boulders as anchor points for the LW.
e. Pin LW with rebar to large rock to increase its weight. For streams that are entrenched or for other streams with very low width to depth ratios an additional 60 percent ballast weight may be necessary due to greater flow depths and higher velocities.

Engineered Logjam (ELJ)

These are structures designed to redirect flow and change scour and deposition patterns. To the extent practical, they are patterned after stable natural log jams and can be either unanchored or anchored in place using rebar, rock, or piles. These logjams create a hydraulic shadow, a low-velocity zone downstream that allows sediment to settle out. Scour holes develop adjacent to the logjam. While providing valuable fish and wildlife habitat they also redirect flow and can provide stability to a streambank or downstream gravel bar. Designing these projects would require an interdisciplinary team (IDT) of biologists, hydrologists, geologists and engineers.

1. Engineered logjams would be patterned, to the greatest degree possible, after stable natural logjams.
2. Grade control ELJs are designed to arrest channel downcutting or incision by providing a grade control that retains sediment, lowers stream energy, and increases water elevations to reconnect floodplain habitat and diffuse downstream flood peaks.
3. Stabilizing or key pieces of LW that would be relied on to provide streambank stability or redirect flows must be intact, solid (little decay). If possible, acquire LW with untrimmed rootwads to provide functional refugia habitat for fish.
4. When available, trees with rootwads attached should be a minimum length of 1.5 times the bankfull channel width, while logs without rootwads should be a minimum of 2.0 times the bankfull width.
5. The partial burial of LW and boulders may constitute the dominant means of placement, and key boulders (i.e., footings) or LW can be buried into the stream bank or channel.
6. The LW portions of engineered logjam structures should be oriented such that the forces upon the large wood increases stability. If a rootwad is left exposed to the flow, the bole placed into the streambank should be oriented downstream parallel to the flow direction so the pressure on the rootwad pushes the bole into the streambank and bed. Wood members that are oriented parallel to flow are more stable than those oriented at 45 or 90 degrees to the flow.
7. If LW anchoring is required, a variety of methods may be used. These include buttressing the wood between riparian trees, the use of manila, sisal or other biodegradable ropes for lashing connections. If hydraulic conditions warrant use of structural connections, such as rebar pinning

or bolted connections, may be used. Rock may be used for ballast but is limited to that needed to anchor the LW.

Boulder Weirs

1. Full channel spanning boulder weirs are to be installed only in highly uniform, incised, bedrock-dominated channels to enhance or provide fish habitat in stream reaches where log placements are not practicable due to channel conditions (not feasible to place logs of sufficient length, bedrock dominated channels, deeply incised channels, artificially constrained reaches, etc.), where damage to infrastructure on public or private lands is of concern, or where private landowners would not allow log placements due to concerns about damage to their streambanks or property.
2. Install boulder weirs low in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 1.5-year flow event).
3. Boulder weirs are to be placed diagonally across the channel or in more traditional upstream pointing "V" or "U" configurations with the apex oriented upstream.
4. Boulder weirs are to be constructed to allow upstream and downstream passage of all native fish species and life stages that occur in the stream. Plunges shall be kept less than 6 inches in height.
5. The use of gabions, cable, or other means to prevent the movement of individual boulders in a boulder weir is not allowed.
6. Rock for boulder weirs shall be durable and of suitable quality to assure long-term stability in the climate in which it is to be used. Rock sizing depends on the size of the stream, maximum depth of flow, planform, entrenchment, and ice and debris loading.
7. The project designer or an inspector experienced in these structures should be present during installation.
8. Full spanning boulder weir placement should be coupled with measures to improve habitat complexity and protection of riparian areas to provide long-term inputs of LW.

Gravel Augmentation

Design Features

1. Gravel can be placed directly into the stream channel, at tributary junctions, or other areas in a manner that mimics natural debris flows and erosion.
2. Augmentation would only occur in areas where the natural supply has been eliminated, significantly reduced through anthropogenic disruptions, or used to initiate gravel accumulations in conjunction with other projects, such as simulated logjams and debris flows.
3. Gravel to be placed in streams shall be a properly sized gradation for that stream, clean, and non-angular. When possible use gravel of the same lithology as found in the watershed. Reference the

Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings to determine gravel sizes appropriate for the stream. This manual can be found at *http://stream.fs.fed.us/fishxing/aop_pdfs.html*.

4. After gravel placement in areas accessible to higher stream flow, allow the stream to naturally sort and distribute the material.
5. Do not place gravel directly on bars and riffles that are known spawning areas, which may cause fish to spawn on the unsorted and unstable gravel, thus potentially resulting in redd destruction.
6. Imported gravel must be free of invasive species and non-native seeds. If necessary, wash gravel prior to placement.

Existing or Legacy Structure Improvements or Removal

Projects would be implemented to reconnect stream corridors, floodplains, and estuaries, reestablish wetlands, improve aquatic organism passage, and restore more natural channel and flow conditions. This includes removal or modifying channel-spanning weirs and existing habitat structures as needed to restore fish passage and improve instream conditions. Projects involving earthen embankments, subsurface drainage features, outfalls, pipes, instream flow redirection structures (e.g., drop structure, gabion, groin), or similar devices used to control, discharge, or maintain water levels would be improved. These existing water diversions are operated through special use permits. Equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

Improvement of Legacy Structures Design Features

This action includes modification of past projects and includes adding components to exiting locations and modifying those legacy structures that are no longer functioning properly (i.e., log weirs that have undercut and may be a low flow barrier to juvenile salmonids). Design criteria for instream structure work as described above would apply to modification.

Existing Water Diversion Improvements

Improvements to existing diversion sites could result in decreased impacts to water quality and potentially water quantity. No new diversions would be approved under this draft EA. Only those diversions sites within the footprint of the Proposed Action are improvements allowed.

1. Diversion structures—associated with points of diversion and future fish screens—must pass all life stages of threatened and endangered (T&E) aquatic species that historically used the affected aquatic habitat.
2. Diversions that involve setting minimum flows that could affect fish movement or cool water refugia may be outside the scope of this consultation as determined during project notification at the annual coordination meeting.
3. Water diversion intake and return points must be designed (to the greatest degree possible) to prevent all native fish life stages from swimming or being entrained into the diversion. The

NMFS fish screen criteria (Appendix B-4 of the WFRPBA) would apply in T&E and Forest Service Sensitive (FSS) salmonid habitat.

4. Abandoned ditches and other similar structures would be plugged or backfilled, as appropriate, to prevent fish from swimming or being entrained into them.
5. When making improvements to pressurized diversions, install a totalizing flow meter capable of measuring rate and duty of water use. For non-pressurized systems, install a staff gage or other measuring device capable of measuring instantaneous rate of water flow.

Removal or Improvement of Legacy Structures Design Features

This action includes the removal or improvement of past projects, such as large wood, boulder, rock gabions, and other in-channel and floodplain structures.

1. If the structure being removed contains material (e.g., LW, boulders) not typically found within the stream or floodplain at that site, remove material from the 100-year floodplain.
2. If the structure being removed contains material (i.e., large wood, boulders, etc.) that is typically found within the stream or floodplain at that site, the material can be reused to implement habitat improvements described under *Large Wood, Boulder, and Gravel Placement* activity category in this WFRPBA.
3. If the structure being removed is keyed into the bank, fill in *key* holes with native materials to restore contours of stream bank and floodplain. Compact the fill material adequately to prevent washing out of the soil during over-bank flooding. Do not mine material from the stream channel to fill in *key* holes.
4. When removal of buried log structures may result in significant disruption to riparian vegetation and/or the floodplain, consider using a chainsaw to extract the portion of log within the channel and leaving the buried sections within the streambank.
5. If the legacy structures (i.e., log, rock, or gabion weirs) were placed to provide grade control, evaluate the site for potential headcutting and incision due to structure removal. If headcutting and channel incision are likely to occur due to structure removal, additional measures must be taken to reduce these impacts.

Beaver Habitat Restoration

This includes installation of in-channel structures to encourage beavers to build dams in incised channels and across potential floodplain surfaces. The dams are expected to entrain substrate, aggrade the bottom, and reconnect the stream to the floodplain. Like natural beaver dams, these beaver dam analogs (aka beaver dam support (BDS) structures or post-assisted woody structures (PAWS)) are temporary features on the landscape. These structures are intended to aid in the development of beaver dams where beavers are present. And, like streams with beaver colonies, multiple placements of these analogs are important to increase the overall system resilience and not count on any one resulting dam (Pollock et al. 2015). Most

work would be accomplished by hand; however, use of equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

Design Features

1. **Determine suitability** of site for beaver habitat restoration through coordination with CDFW and review of site selection criteria (i.e., biological, political, social), such as developed in the *2015 Beaver Restoration Guidebook* (Pollock et al. 2015) or the *Beaver Tool Box* located at *www.martinezbeavers.org*.
    a. Tribal consultation to determine if site is used for willow gathering.
2. **In-Channel Structures:**
    a. Place posts in channel to aid in the creation of beaver dams. Posts may be driven into the stream channel using heavy equipment or a hydrologic post-hole digger.
    b. Consist of porous channel-spanning structures comprised of biodegradable vertical posts (i.e., BDS structures or PAWS) approximately 0.5 to 1 meter apart and at a height intended to act as the crest elevation of an active beaver dam. Variation of this restoration activity may include post lines only, post lines with wicker weaves, construction of starter dams, reinforcement of existing active beaver dams, and reinforcement of abandoned beaver dams (Pollock et al. 2015).
    c. Consider fish passage, both adult and juvenile life stages in managing beaver instream habitat with structures by:
        i. Placing structures in a low gradient area so that during higher flows when adult salmonids are moving there are side channels and over topping flows that provide channels for passage.
        ii. During long periods of low flows during the winter when fish are moving, there needs to be diligent monitoring and ability to break out a section of the willows to allow passage.
    d. Place BDS structures in areas conducive to dam construction as determined by stream gradient and/or historical beaver use.
    e. Place in areas with sufficient deciduous shrub and trees to promote sustained beaver occupancy.
3. **Habitat Restoration:**
    a. Drainages historically occupied by beaver, but which may be currently unsuitable for relocations, may require management for improvement and recovery. Restoration activities may include planting riparian hardwoods (e.g., willow, red osier dogwood, and alder) and building exclosures (e.g., temporary fences) to protect and enhance existing or planted riparian hardwoods until they are established.
    b. Maintain or develop grazing plans that would ensure the success of beaver habitat restoration objectives.

Side Channel/Off Channel Rearing Habitat

Projects would be implemented to reconnect historic side-channels with floodplains by removing off-channel fill and plugs. Furthermore, new side-channels and alcoves can be constructed in geomorphic settings that would accommodate such features. This activity category typically applies to areas where side channels, alcoves, and other backwater habitats have been filled or blocked from the main channel, disconnecting them from most if not all flow events. These project types would increase habitat diversity and complexity, improve flow heterogeneity, provide long-term nutrient storage and substrate for aquatic macroinvertebrates, moderate flow disturbances, increase retention of leaf litter, and provide refuge for fish during high flows. Creating side channels or off channel rearing habitat has been identified as a critical need for recovering SONCC coho salmon. Types of side channel or off-channel restoration projects include:

- Connecting of abandoned side channel, pond habitats or remnant oxbows to restore fish access,
- Creating of side channel or off-channel habitat with self-sustaining channels, and
- Improving hydrologic connection between floodplains and main channels.

Restoration projects in this category may include channel and pond excavation, creating temporary access roads, constructing wood or rock tailwater control structures, removal or breaching of levees and dikes, and construction of LW habitat features.

Implementation of these types of projects may require the use of heavy equipment (e.g., self-propelled logging yarders, mechanical excavators, backhoes).

Design Features

- **Allowable Excavation:** Off- and side-channel improvements can include minor excavation (<10% of volume) of naturally accumulated sediment within historical channels. There is no limit as to the amount of excavation of anthropogenic fill within historic side channels as long as such channels can be clearly identified through field and/or aerial photographs. Excavation depth would not exceed the maximum thalweg depth in the main channel.
- **Excavated material** removed from off- or side-channels shall be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity.

Streambank Restoration and Enhancement

Improve streambank condition by stabilizing stream banks with appropriate site-specific techniques. Reduction of streambank sediment input would improve fish habitat and fish survival by increasing fish embryo and alevin survival in spawning gravels, and minimizing the loss of, or reduction in size of, pools from excess sediment deposition. The proposed activities would reduce stream sedimentation from bank erosion by streambank projects include:

- Stabilizing stream banks by use of structures,
- Reducing recreation impacts associate with stream access points, and

- Limiting livestock access to stream banks.

Implementation of these types of projects could require the use of heavy equipment (e.g., mechanical excavators, backhoes) with hand tools (including chainsaws) used when possible.

Stabilizing Streambanks

Stream banks that are currently eroding fine sediments into the channel could be protected using boulders, logs and native plant material to deflect flows away from raw banks until revegetation would occur. Projects would be implemented through bank shaping and installation of coir logs or other soil reinforcements as necessary to support riparian vegetation; planting or installing large wood, trees, shrubs, and herbaceous cover as necessary to restore ecological function in riparian and floodplain habitats; or a combination of the above methods. Benefits include increased amounts of riparian vegetation and associated shading, bank stability, and reduced sedimentation into stream channels and spawning gravels. Equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

Design Features

1. Without changing the location of the bank toe, restore damaged streambanks to a natural slope and profile suitable for establishment of riparian vegetation. This may include sloping of unconsolidated bank material to a stable angle of repose or the use of benches in consolidated, cohesive soils.
2. Complete all soil reinforcement earthwork and excavation in the dry season. When necessary, use soil layers or lifts that are strengthened with biodegradable fabrics and penetrable by plant roots.
3. Include large wood to the extent it would naturally occur. If possible, large wood should have untrimmed root wads to provide functional refugia habitat for fish. Wood that is already within the stream or suspended over the stream may be repositioned to allow for greater interaction with the stream.
4. Use a diverse assemblage of vegetation species native to the action area or region, including trees, shrubs, and herbaceous species. Vegetation, such as willows, sedge and rush mats, may be gathered from abandoned floodplains, stream channels, etc.
5. Install fencing as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
6. Conduct post-construction monitoring and treatment or removal of invasive plants until native plant species are well established.

Reduction/Relocation of Recreation Impacts

These projects are intended to close, better control, or relocate recreation infrastructure and use along streams and within riparian areas. This includes removal, improvement, or relocation of infrastructure associated with designated campgrounds, dispersed campsites, day-use sites, foot trails, and off-road vehicle (ORV) roads/trails in riparian areas. The primary purpose is to eliminate or reduce recreational impacts to restore riparian areas and vegetation, improve bank stability, and reduce sedimentation into

adjacent streams. Equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

Design Features

1. For existing recreation facilities within Riparian Reserves, evaluate and mitigate impact to ensure that these do not prevent, and to the extent practicable contribute to, attainment of ACS objectives (LRMP IV-48).
2. Adjust dispersed and developed recreation practices that retard or prevent attainment of ACS objectives. Where adjustment measures (e.g., education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures) are not effective, eliminate the practice or occupancy (LRMP IV-48).
3. Design remedial actions to restore floodplain characteristics (i.e., elevation, width, gradient, length, and roughness) in a manner that closely mimics, to the extent possible, those that would naturally occur at that stream and valley type.
4. To the extent possible, non-native fill material shall be removed from the floodplain to an upland site.
5. Overburden or fill comprised of native materials, which originated from the project area, can be used to reshape the floodplain, placed in small mounds on the floodplain, used to fill anthropogenic holes, buried on site, and/or disposed into upland areas.
6. For recreation relocation projects (e.g., campgrounds, dispersed sites, ORV trails) move current facilities out of the riparian area or as far away from the stream as possible.
7. Consider de-compaction of soils and vegetation planting once overburden material is removed.
8. Place barriers (e.g., boulders, fences, gates) outside of the bankfull width and across traffic routes to prevent ORV access into and across streams.
9. For work conducted on ORV roads and trails, follow relevant PDC in the *Road and Trail Erosion Control and Decommissioning* category.

Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering Facilities

Within the project area (as defined by a buffer around fish bearing stream reaches and ponds), fences to exclude riparian grazing could be constructed to reduce impacts to riparian areas. Such projects promote a balanced approach to livestock use in riparian areas, reducing livestock impacts to riparian soils and vegetation, streambanks, channel substrates, and water quality. Hand tools would be used.

Riparian Restoration and Enhancement

Improve riparian condition by increasing future recruitment of LW to stream. Riparian habitat restoration projects would aid in the restoration of riparian habitat by increasing the number of plants and plant groupings. Riparian projects include:

- Planting native species,

- Girding alders in dense stands to allow natural alder mortality leading to increasing sunlight for conifer recruitment, and
- Removing invasive riparian species, including blackberry, etc.

Implementation of these types of projects would likely be accomplished with hand tools.

Riparian Vegetation Planting

This includes the planting of native riparian species that would occur under natural disturbance regimes. Activities may include the following: planting conifers, deciduous trees and shrubs; placement of sedge and or rush mats; gathering and planting willow cuttings. The resulting benefits to the aquatic system can include desired levels of stream shade, bank stability, stream nutrients, large wood inputs, increased grasses, forbs, and shrubs, and reduced soil erosion. Equipment may include excavators, backhoes, dump trucks, power augers, chainsaws, and manual tools.

1. Experienced silviculturists, botanists, ecologists, or associated technicians shall be involved in designing projects involving riparian vegetation.
2. Species to be planted would be of the same species that naturally occur in the project area. Acquire native seed and/or plant sources as close to the watershed as possible.
3. Tree and shrub species, willow cuttings, as well as sedge and rush mats to be used as transplant material shall come from outside the bankfull width, typically in terraces (i.e., abandoned flood plains), or where such plants are abundant.
4. Sedge and rush mats should be sized to prevent their movement during high flow events.
5. Concentrate plantings above the bankfull elevation.
6. Removal of native and non-native vegetation that would compete with plantings is permitted.
7. Exclosure fencing to prevent utilization of plantings by deer, elk, and livestock is permitted.

Riparian Vegetation Restoration

This includes actions to accelerate conifer growth in areas where areas were historically conifer dominate. Girdling is a technique used to suppress and then stop the growth of a living tree without felling it among other healthy plants. Using a saw (often a chainsaw), the tree is cut about an inch or so to cut off the flow of water and food up and down the tree. Girdling forces the tree to become less competitive for sunlight, and gradually the leaves fail to capture sunlight and the tree dies in place, standing. Over time, the tree would die and either fall over or degrade in place all the while providing parts of the forest system with something of value (e.g., habitat, protection).

1. Involve experienced silviculturists, botanists or ecologists in designing projects involving vegetation activities.
2. Minimize number of alders to be girdled while still creating openings to accelerate conifer growth.
3. Consider staggering projects along stream channels.

Non-Native Invasive Plant Control

This includes manual methods to remove invasive non-native plants within Riparian Reserves, or equivalent and adjacent uplands. This activity is intended to improve the composition, structure, and abundance of native riparian plant communities important for bank stability, stream shading, large wood and other organic inputs into streams, all of which are important elements for fish.

Where invasive plant management is planned and prioritized (small, discrete sites):

- Utilize hand tools such as weed wrenches or Pulaskis to ensure removal of the root system; do not use weed whackers (this would only result in multiple branched sprouting, thus more seeds);
- Treat early in the growing season for most invasive species, before flowering;
- If the removed plants are mature shrubs with fruits (e.g., Scotch broom) or Himalayan blackberry, locate removed plants/stems or canes to a suitable location (e.g., burn pile, area already dominated by the respective species), do not leave on site;
- Monitor at least annually and repeat treatment until eradicated or controlled (e.g., likely to be out-competed by native vegetation), adapt schedule as needed; and,
- During the early phases of treatment, actively revegetate if suitable with relatively fast-growing native trees or shrubs to provide competition to invasive plants and canopy cover to reduce productivity (Bennett 2007).

Resident Aquatic Species Lake and Stream Restoration

Activities described here include the improvement of the recreational fisheries in Ruth Reservoir and in natural lakes where fishing is allowed. Additionally, restoration or enhancement of other water bodies with native non-salmonid aquatic fish and wildlife species would occur. Lakes where activities are likely to occur are found on the *Aquatic Restoration Project* maps in *Chapter 2*. Activities include:

- Maintenance of bass structures at Ruth Reservoir,
- Manual invasive weed removal in natural lakes and ponds,
- Installation of western pond turtle basking platforms, and
- Bullfrog/non-native aquatic species eradication through non-chemical methods (e.g., seining, draining) of natural and artificial (livestock) ponds.

Pond levels may be lowered to aid in removal of nonnative species. Implementation of these types of projects could typically involve use of hand tools (including chainsaws) and hand labor.

Project Notification to NMFS Guidance

Projects that have the potential (based on proximity, probability and magnitude analysis or stressor/response analysis) to result in a “may affect, likely to adversely affect” determination to listed species or designated habitat would require notification prior to construction (typically at the annual coordination meeting) and completion of post-project reporting.

The following is guidance on when projects should be brought forward to the annual NMFS and SRNF Level 1 coordination meeting for pre-implementation review and when projects, especially recovery actions, would be shared.

- Any project that involves listed fish handling or potential for harm (e.g., displacement) to occur due to type of action and/or actions occurring near or within occupied habitat.
- Projects that may result in a short term minor sediment delivery or turbidity, temporary change in flow conditions, species disturbance, where the changes to habitat or disturbance to species cannot be discounted and project results in a long term benefit to aquatic ecosystems.
- Projects that may involve temporary change in flow conditions, or, in the case of improving water diversion locations, involve setting minimum flows that could affect fish movement or cool water refugia.
- Any project that involves full spanning structures or engineered projects in listed fish habitat.

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Appendix B. Mitigations, Best Management Practices, and Monitoring

Introduction

This section provides an integrated presentation of best management practices (BMPs) and mitigation measures to avoid, rectify, or minimize unintended operational impacts included under Alternative 2. The USDA Forest Service (Forest Service) is required by Council on Environmental Quality (CEQ) regulations to implement the procedural provisions of the National Environmental Policy Act (NEPA) to identify all relevant, reasonable mitigation measures that could improve the project (40 CFR 1508.20).

Mitigations

Coordination Mitigations

- Coordinate with federal and private utility managers when managing forest activities near utility corridors to ensure that forest activities do not conflict with the intended permitted use and management of the utility corridor.
- When working within state and county right-of-ways, notify and obtain easement permit prior to operations.
- Notify adjacent landowners and holders of special use permits prior to operations.
- Employ precautions when using equipment to prevent fire ignition.
- Avoid all irretrievable or irreversible commitment of resources that would preclude designation would be allowed for eligible rivers that are being recommended for inclusion into the National Wild and Scenic River System.
- In areas of intermingled ownerships, ensure property boundaries near river access sites are clearly marked and posted prior to operations.

Best Management Practices Mitigations

- Apply and monitor relevant national Water Quality BMPs (USDA Forest Service 2012) associated with all project activities. Best management practices would be subject to 100 percent implementation monitoring documented by means of photographs and inspection reports. Effectiveness monitoring adheres to established BMP protocols and are conducted after one or more post-project winters. Effectiveness monitoring results, and any follow-up corrective measures taken, would be reported annually to partners and applicable regulatory agencies. A complete description of the BMPs and the specific measures employed to meet resource objectives are included below.

- Apply the Invasive Species BMPs (USDA Forest Service 2014) presented below are in keeping with Executive Order 13112 and aim to reduce the risk of introduction and spread of invasive species as a result of project implementation. These BMPs serve as over-arching project design features for this project, specifically when heavy equipment is involved to locate boulders or large wood, or staged at settings with existing invasive plant species such as some existing landings or high river bar settings. The practices also address the importation of gravel or rock, specifically ensuring that the material source is free of invasive plant material. A complete description of the BMPs and the specific measures employed to meet resource objectives are included on page 203.
- Apply species-specific best management practices and conservation considerations that are considered best available science to avoid affecting species. These documents should not be interpreted as an order or mandatory standard for environmental review, but rather considerations and examples for avoiding or minimizing project-related impacts. Recent publications include:
    - *Considerations for Conserving the Foothill Yellow-legged Frog* (CDFW 2017)
    - *Conserving the Gems of Our Waters. Best Management Practices for Protecting Native Freshwater Mussels during Aquatic and Riparian Restoration, Construction and Land Management Projects and Activities*. (Blevins et al. 2018)
    - *Best Management Practices to Minimize Adverse Effects to Pacific Lamprey (Entosphenus tridentatus;* USFWS 2010)

Water Quality Best Management Practices

National Best Management Practices for Water Quality Management

National BMPs are derived from the Forest Service publication *National Best Management Practices for Water Quality Management on National Forest System Lands* (USDA Forest Service 2012). The project would follow all applicable water quality BMPs listed below. The purpose of this summary is to emphasize a selection of methods employed by the project that exemplify how the project meets applicable BMPs.

Planning

AqEco-1 *Aquatic Ecosystem Improvement and Restoration Planning:* Reestablish and retain ecological resilience of aquatic ecosystems and associated resources to achieve sustainability and provide a broad range of ecosystem services.

This project establishes a consistent methodology for design, implementation and monitoring of aquatic restoration activities. Each individual restoration activity is designed and reviewed by an interdisciplinary team of qualified professionals and is subject to the *Six Rivers Aquatic Restoration Project* (*Aquatic Restoration Project*) review and compliance process introduced in *Chapter 2* and described in *Appendix C*.

Within Streams

AqEco-2 *Operations in Aquatic Ecosystems:* Avoid, minimize or mitigate adverse impacts to water quality when working in aquatic ecosystems. When conducting restoration activities in or adjacent to stream channels, the following measures would be taken to minimize unwanted impacts to aquatic habitat:

- Erosion control plans are approved prior to starting work and included in site-specific project implementation measures (WQ, IP, POC).
- Instream projects would occur during times of low stream flow (typically summer to early fall).
- Clearly delineate the geographic limits of any areas to be cleared, to minimize unnecessary ground disturbance.
- Locations where heavy equipment can operate would be clearly defined and limited to the minimum area needed to complete the project.
- Stage construction operations as needed to limit the extent of disturbed areas without installed stabilization measures.
- Promptly install and appropriately maintain erosion control measures, such as silt fence, wattles, and mulch.
- Promptly rehabilitate or stabilize disturbed areas following construction or maintenance activities.

AqEco-3 *Ponds and Wetlands:* Design and implement pond and wetlands projects in a manner that increases the potential for success in meeting project objectives and avoids, minimizes or mitigates adverse effects to soil, water quality and riparian resources.

- No wetlands are in the Project Area. Utilize established protocols described above in AqEco-1 and AqEco-2.

Fac-7 *Vehicle and Equipment Wash Water:* Avoid or minimize contamination of surface water and groundwater by vehicle or equipment wash water that may contain oil, grease, phosphates, soaps, road salts, other chemicals, suspended solids, and invasive species.

- Heavy equipment and vehicles would be washed and cleaned off-site at designated locations prior to entering project area to prevent spread and introduction of pathogens, invasive weeds and chemicals to waterbodies.

Veg-1 *Vegetation Management Planning:* Use the applicable vegetation management planning processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during mechanical vegetation treatment activities.

- Vegetation management includes girdling (with chainsaws) undesired vegetation in riparian areas and in meadows. Girdling is a technique used to suppress and then stop the growth of a living tree without felling it among other healthy plants. Experienced silviculturists, botanists or ecologists shall be involved in designing projects involving vegetation.

Veg-2 *Erosion Prevention and Control:* Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by implementing measures to control surface erosion, gully formation, mass slope failure, and resulting sediment movement before, during, and after mechanical vegetation treatments.

- Refer to measures described in Aqo-2. All ground-disturbing activities are subject to the Six Rivers National Forest wet weather operational guidelines.

Veg-3 *Aquatic Management Zones (AMZ):* Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when conducting mechanical vegetation treatment activities in the AMZ.

- Utilize established protocols described above in AqEco-2.

Veg-8 *Mechanical Site Treatment:* Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling the introduction of sediment, nutrients, chemical, or other pollutants to waterbodies during mechanical site treatment. Mechanical treatments include cutting and piling; chipping or mulching; roller chopping or masticating using heavy equipment; and pushing over vegetation.

- Cutting and falling trees, dropping spanner logs or placement of large wood from off-site in riparian areas would occur where needed to improve aquatic habitat only. Select appropriate spanner log sources where adverse impacts to stream channels, stream banks and water quality would be minimized and other resource PDFs are met. Existing canopy cover would not be reduced when selecting large wood sources in riparian areas.

Connected Actions

Road-4 *Road Operations and Maintenance:* Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling road use and operations and providing adequate and appropriate maintenance to minimize sediment production and other pollutants during the useful life of the road.

- Existing roads would be used to transport equipment and personnel to the work site. Road use would occur during the normal operating period across the forest (typically June 15 to November 1) when the roads are not saturated and the potential for sediment production and other pollutants from entering watercourses is reduced.
- Access points in wet or flooded areas would have erosion control features installed where needed to prevent erosion and left in a stable, free draining condition.

Road-9 *Parking and Staging Areas:* Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing and maintaining parking and staging areas.

- The project would utilize existing parking and staging areas. These areas would be designated prior to mobilizing heavy equipment and crew transport vehicles. No new areas would be constructed.

Road-10 *Equipment Refueling and Servicing:* Avoid or minimize adverse effects to soil, water quality, and riparian resources from fuels, lubricants, cleaners, and other harmful materials discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources during equipment refueling and servicing activities.

- All equipment used for instream work would be cleaned for petroleum accumulations, dirt, plant material (to prevent the spread of noxious weeds), and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power equipment (e.g., generators, canes), and gas-powered equipment with tanks larger than five gallons.
- Store and fuel equipment in staging areas after daily use.
- Inspect daily for fluid leaks before leaving the vehicle staging area for operation.
- List and describe any hazardous material that would be used at the project site, including specific clean up and disposal instructions for different products available on the site; proposed methods for disposal of spilled material; and employee training for spill containment.
- Servicing of equipment would occur at landings outside of riparian reserves wherever possible and a minimum distance from streams, ponds, and wet areas such that fuels and other harmful materials would not reach any waterbody. Appropriate spill containment measures would be on site and would be employed as needed (e.g., absorbent pads, drip pans and containment trays). Containers of fuel and oil are removed daily off-site.

Invasive Species Best Management Practices

Terrestrial and Aquatic Invasive Species

The following Invasive Species BMPs (USDA Six Rivers 2014) presented below are in keeping with Executive Order 13112 and aim to reduce the risk of introduction and spread of invasive species as a result of project implementation. These BMPs serve as over-arching project design features for this project, specifically when heavy equipment is involved to locate boulders or large wood, or staged at settings with existing invasive plant species such as some existing landings or high river bar settings. The practices also address the importation of gravel or rock, specifically ensuring that the material source is free of invasive plant material.

GPA-1 Minimize the movement of aquatic invasive species, including fish, crustaceans, mollusks, plants, insects, and diseases, including *Phytophthora lateralis* among waterways during actions involving transfer of water between basins including aquatic habitat management and assessment activities. In consultation with a fisheries biologist or aquatic specialist, BMPs may include the following:

- Movement between watersheds or even from one reach to another may require equipment cleaning.
- Use most current cleaning techniques depending on potential invasive hitchhiker to clean boots, waders and stream gear.

- Clean equipment that comes in contact with water infested with aquatic invasive species.

GP-2 Prior to implementation of any forest activities or those authorized by the forest a risk assessment of the potential for invasive species introduction and spread shall be completed by a staff botanist or other staff trained in invasive plant management. Level of analysis (e.g., Invasive Plant Risk Assessment with site-specific design features or over-arching BMPs) may vary depending on such variables as geographic scope, type and location of the activity.

GP-3 Incorporate applicable BMPs into contract specifications (FSM 2904.47) or partner agreement responsibilities. Address invasive plant provisions during pre-work and other meetings prior to ground disturbance.

GP-5 Actions conducted or authorized by written permit by the Forest Service operating on and outside the road prism (including public works, special-uses, and service contracts) would require cleaning of all heavy equipment (e.g., bulldozers, skidders, graders, backhoes, dump trucks) prior to entering National Forest System (NFS) lands).

GP-6 Each unit shall identify sites for Forest Service vehicle cleaning and equip the sites sufficiently (i.e., high-pressure hose) to ensure mud or vegetative material trapped in tires or on the carriage of the vehicle can be effectively removed.

GP-7 If there is a moderate to high risk of spreading invasives from an infested area to an uninfested area during operations and alternate project design features are not feasible to reduce risk of spread, equipment/machinery shall be cleaned prior to leaving the infested area and operating elsewhere.

GP-8 When needed to control soil erosion, use mulch from chipped or masticated material or mulch native material or certified weed-free straw (see *www.cal-ipc.org/ip/prevention* for a weed-free forage and straw supplier list).

GP-9 Rock, sand or other material to be used for projects conducted or authorized by the Forest Service shall originate from a weed-free source. Rock source shall be inspected by staff trained in invasive plant identification or if source is off-forest, contractor shall provide documentation that material is weed-free.

GP-10 Material excavated at a project site that is contaminated with invasive plants can be a. reused at the site, b. stockpiled on site or c. relocated to an area that is already contaminated. During transport of contaminated soil or sand, cover material with an impervious material.

GP-14 For activities conducted or authorized by the forest and where seeding is determined to be necessary (including emergency soil stabilization related to fire, flood, landslide, etc.), use when available, native seed stock or refer to the *Six Rivers National Forest Seeding Guidelines* for direction.

GP-15 Locate activity boundaries or areas of concentrated use to exclude areas infested with invasive plants. Activity boundaries include staging areas, parking areas, trailheads, river access points, roadside pullouts, and timber harvest landings.

Monitoring

This section discusses the monitoring strategy linked to proposed management activities under the NEPA process.

Implementation and Effectiveness Monitoring

Monitoring is important for tracking the implementation of a project; ensuring activities are implemented as planned, as well as to measure success in meeting the purpose of required mitigation. Monitoring and evaluation are separate, sequential activities that provide information to determine whether programs and projects are meeting forest plan direction. Monitoring collects information, on a sample basis, from sources specified in the forest plan. Evaluation of monitoring results is used to determine the effectiveness of the forest plan and the need either to change the plan through amendment or revision, or to continue with the plan. Overall direction is found in FSM 1922.7, FSH 1909.12 (Chapter 6), and 36 CFR 219.12(k).

Project activities would be monitored during and after implementation of management actions to ensure that mitigation measures are implemented as specified. Monitoring is also proposed to evaluate the effectiveness of planned activities, including standard practices and mitigation measures, in achieving desired project outcomes. Lessons learned from monitoring and evaluation would be incorporated into future project planning efforts. A full spectrum of techniques and methods may be used, including:

- Formal joint management and collaborative field reviews,
- Site-specific observations by on-site resource specialists,
- Field assistance trips by other technical specialists,
- On-going accomplishment reporting processes,
- Discussions with other agencies and various public users, and/or
- Interdisciplinary team (IDT) reviews of monitoring results

Port-Orford-Cedar Monitoring Requirements

The project inspector would insure compliance with the contract that would include the appropriate disease control prescriptions. This includes the entire project area and travel routes.

Forest-level POC monitoring is ongoing as follows:

- Healthy and diseased stands have been identified. Summaries of disease status and the use of control strategies would be completed and reported to the Forest level for completion of their annual report that coincides with the interregional summary and report.

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Appendix C. Project Implementation Process and Checklist

Introduction

This draft National Environmental Policy Act (NEPA) document represents a programmatic strategy to optimize community collaboration, implement effective designs to benefit multiple resources and to avoid significant effects, and mitigate minor unavoidable effects. The following section describes the steps for project design and implementation. This project implementation process is designed to not only avoid or reduce negative impacts to resources, but design for potentially beneficial outcomes for these resources.

As indicated in *Chapter 2*, in developing a site-specific project, the General Aquatic Conservation Measures (GACM) and the applicable activity-specific project design criteria (PDC) from the *Watershed and Fisheries Restoration Biological Assessment* (WFRPBA) must be fully incorporated into the planning, implementation and monitoring of each project in order to be compliant with consultation (*Appendix A*). In addition, other resource specific project design features (PDFs) and mitigations (best management practices (BMPs) and limited operating periods (LOPs)) that avoid significant impacts would also be fully incorporated into the site specific project development (*Chapter 2*) through an IDT process.

The following outline of the combination of the GACM, PDC, resource PDFs and mitigations would effectively avoid or reduce unintended effects, so there are no quantifiable adverse impacts while still meeting the Purpose and Need.

This forest-wide NEPA document relies on continued coordination with resource disciplines, landowners, interested publics and tribes. The following is the anticipated process for implementing site-specific projects. While all stages would be followed, the time spent in each stage depends on the complexity of the project and the individual resources potentially affected.

Stages of Project Development

- Stage 1 and 2 – Iterative Process
    - Developing the site-specific project – implementation description.
    - Collaboration with interdisciplinary team (IDT), interested publics, and tribes.
    - Refine project as needed.
- Stage 3 – Line Officer Approval – signed compliance checklist
- Stage 4 – Detailed Design, Funding, Permitting and Contracting
- Stage 5 – Pre-Implementation
- Stage 6 – Implementation
- Stage 7 – Monitoring/Reporting

Site-Specific Project Description (Stages 1 through 3)

Summary of Proposed Action[23]

- Activity type with site-specific details.
- Location with map, photos, etc.
- Habitat and species targeted.
- Connected actions (which access roads, large wood (LW) sources, etc.).

LRMP – Management Areas and Land Use Conformance

- Identify SRNF/KNF management areas.
- USDA Forest Service facilities potentially impacted (recreation sites, lands).
- Tribal use areas.

Identification of Site-Specific Design Elements, Surveys, and Risk Assessments

- General Aquatic Conservation Measures (GACM).
- Applicable project design criteria (PDC) for activity type.
- Project design features (PDF) by resource area, including need for surveys.
- Additional mitigations based on site-specific conditions.

Coordination

- Determine if project fits under California Environmental Quality Act (CEQA) exemption (§15333) if necessary.
- Notify landowners.
- Identify potential cultural gathering in project area.
- Closures necessary for recreation or cultural practices.

Line Officer Sign-off

- Document design features and have line officer sign-off for project to move forward.

Approved Project Implementation (Stages 4 through 7)

The level of detail necessary for Stages 4 through 7 would be identified in Stages 1 and 2 with continued coordination with IDT, landowners and stakeholders.

[23] Assumes stream surveys have been completed and a limiting factor analysis completed to determine site-specific restoration needs.

Resource Project Design Checklist and Line Officer Approval (Stage 3)

Resource Project Design and Forest Plan Compliance Checklist

Project Name: _____ **Date:** _____

Activity Type: _____ **Location:** _____

Project Description: _____ **Ground Disturbing: Y ☐ / N ☐**

Timing of Project: _____ **Date of LOP:** _____

Watersheds: _____

Location identified in the ARAP? _____

Partners: _____

Funding Source Identified? _____

Tribal Consultation Complete? _____

Adjacent/Downstream Private Land Holders Notified. _____

Resource and Land Management Consistency

- ☐ Y/N Wilderness: _____
- ☐ Y/N Special Habitat – Late-Successional Reserves
- ☐ Y/N Wild and Scenic River
- ☐ Y/N Special Interest Areas
- ☐ Y/N Research Natural Areas
- ☐ Y/N Semi-Primitive Non-Motorized Recreation Areas
- ☐ Y/N NACUA/TCP affected

Design Feature Consistency

- ☐ PDF for Heritage addressed (Heritage Surveys; Avoidance areas).
- ☐ PDF for Botany addressed (Sensitive Plant Surveys, S&M known sites).
- ☐ PDF for Invasive Species (Risk of spread - Terrestrial and Aquatic).
- ☐ PDF for Wildlife addressed (TES species, S&M known sites)
- ☐ PDF for Water Quality addressed.
- ☐ PDF for Recreation addressed.

Comments: _____

Survey Needs: _____

Projects Design Criteria and Forest Plan Compliance Checklist

I have reviewed this project and have determined it is within the Project Design Criteria identified for my resource.				Notification
Resource	**Signature**	**Date**	**Comments**	**60 Day Req'd?**
Heritage				
Botany				
Wildlife				
Fish*				
Hydrology*				
Range				
Soils				
Recreation				
Lands and Special Uses				
Engineering				
Fuels / Fire				
Silvicultural				

* Ensure that an experienced fisheries biologist or hydrologist is involved in the design of all projects covered by W*atershed and Fisheries Restoration Program BA/BO*. The experience should be commensurate with technical requirements of a project.

Line Officer Signature: _____ **Date:** _____

Hardcopy Signatures Required

Appendix D. Known Project Site Locations

Introduction

The following table provides a description of the suite of potential instream and riparian restoration project areas identified through initial collaboration with partners and tribes, where operations would involve a combination of manual labor and, in some, the use of heavy equipment. Additional sites may be identified based future surveys but would be limited to no ground disturbance greater than 1 cubic yard per acre.

Table D-1 describes representative project activities by map identification number (red highlighted areas) displayed below in Figure D-1, to illustrate the extent and range of individual projects activities being proposed under Alternative 2. Not all sites listed below are on the map, including areas where no ground disturbance or heavy equipment would be used. The type of manual labor and/or use of heavy equipment for each project would be determined during the design phase. The majority of the project area (1,234 miles) would be accomplished through manual methods with the remaining 35 acres being a combination of manual and mechanical based on the restoration need and resource concern at the site.

Table D-1. Proposed project locations by map identification site number.

Map ID	5th-Field Watershed	Stream / Site	Description of the Proposed Activities
NRA-1	South Fork Smith River	Hurdygurdy Creek	Opportunities exist to improve existing structures, natural LW jams and plant or manually release existing conifers to promote natural future recruitment of large wood (LW). Project areas may include strategic invasive plant species activities to improve riparian conditions.
NRA-2	Middle Fork Smith River	Siskiyou Fork	Activities proposed would improve existing fish habitat by placing additional LW to increase cover and promote scour, adjust boulders to improve off-channel connectively and habitat diversity, plant or manually release existing conifers to promote natural future recruitment of LW. Project areas may include strategic invasive plant species treatments to improve riparian conditions.
NRA-3	Middle Fork Smith River	Monkey Creek	Improving instream cover and promote scour through use of LW, plant or manually release existing conifers to promote natural future recruitment of LW. Project areas may include strategic invasive plant species treatments to improve riparian conditions.
NRA-4	Middle Fork Smith River	Patrick Creek	Improving existing boulder weirs would improve existing fish habitat increase cover and promote scour and habitat diversity. Plant or manually release existing conifers to improve shade canopy and promote natural future recruitment of LW, look at utilizing beavers for off-channel/side channel habitat. Project areas may include strategic invasive plant species treatments to improve riparian conditions.
NRA-5	Middle Fork Smith River	Shelly Creek	Activities proposed would improve existing fish habitat by placing additional LW to increase cover and promote scour, adjust boulders to improve off-channel connectively and habitat diversity, plant or manually release existing conifers to promote natural future recruitment of LW. Project areas may include strategic invasive plant species treatments to improve riparian conditions.
NRA-6	Middle Fork Smith River	Middle Fork / Knopki Creek	Improve existing fish habitat by placing additional LW to increase cover and promote scour, adjust boulders to improve off-channel connectively and habitat diversity, plant or manually release existing conifers to promote natural future recruitment of LW. Project areas may include strategic invasive plant species treatments to improve riparian conditions. Potential site exists ay Knopki/Middle Fork confluence for re-establishing natural channel through excavation of logging road fill in channel.

Map ID	5th-Field Watershed	Stream / Site	Description of the Proposed Activities
NRA-7	Middle Fork Smith River	Griffin Creek	Opportunities exist to improve existing structures and plant or manually release existing conifers to promote natural future recruitment of LW. Project areas may include strategic invasive plant species treatments to improve riparian conditions.
OR-1	Bluff Creek-Klamath River	Lower Aikens Creek	The lower mile of Aikens Creek occupies the pre-1964 Bluff Creek channel. Currently, the existing stream channel is simplified due to the changes resulting from previous floods, the placement of the existing road and associated dispersed campsites. Proposed activities would widen the channel and reconnect a portion of the remnant floodplain by removing accumulated bedload deposits. Side channel ponds would be created to restore complexity for instream and off-channel salmonid habitat. Placement of LW would enhance spawning and overwintering rearing fish habitat. Removal of invasive non-native plants would improve the health of existing native vegetation. Riparian plantings would increase shade, enhance vertical/horizontal structure and diversity, and promote future LW recruitment to the site.
OR-2	Bluff Creek-Klamath River	Bluff Creek / Fish Lake	Eurasian water milfoil is considered the most problematic invasive aquatic plant in the area. Because it is widely distributed and difficult to control, existing Eurasian water milfoil would be periodically removed from the boat access, day use areas and perimeter of Fish Lake where feasible. Large wood would be added to enhance cover for fish habitat, western pond turtles and other species. Eradicate bullfrogs and other non-native species inhabiting the area.
OR-3	Bluff Creek-Klamath River	Bluff Creek / Wright's Ranch	Since the mid-1980s, fisheries enhancement projects have occurred in Bluff Creek. Project activities would improve existing fish habitat by aligning existing boulders to improve off-channel connectively and habitat diversity, placing additional LW to increase cover, detritus retention and side channel complexity, and stabilize existing lower hillslopes to reduce bank erosion in this reach.
OR-4	Bluff Creek-Klamath River	Bluff Creek / Dragon Bar	This fisheries habitat improvement proposes to adjust and improve existing boulders and place logs with rootwads to provide cover, promote pool scour, sediment sorting and metering, and induce favorable hydraulics. Side channel habitat would be improved to promote connectivity to off-channel features and create over-wintering TES salmonid habitat.
OR-5	Bluff Creek-Klamath River	Bluff Creek (near FSR 12N13H)	This stream segment is lacking instream habitat complexity. The placement of LW in this low gradient reach would create pools, provide cover, reduce gravel movement and enhance slow water fish habitat.
OR-6	Bluff Creek-Klamath River	Lower Slate Creek	Project activities would incorporate bioengineering techniques to improve bank stabilization and vegetative structure and diversity in the lower reaches. In-stream LW structures would be added to promote channel scour and thalweg development, as well as, increase spawning and rearing fisheries habitat.
OR-7	Bluff Creek-Klamath River	Lower Red Cap Creek, Larson's Place	Adjust existing instream structures found within the mainstem and side channel habitat. Add LW with root wads to increase cover and habitat complexity. Induce favorable hydraulics and connectivity to existing off-channel features. Improve the depth and quality of pool habitat within disconnected side channel features. Remove invasive plant species at strategic locations and plant a diverse array of native riparian species to promote diversity and future LW recruitment in this stream reach.
OR-8	Bluff Creek-Klamath River	Red Cap Creek (near FSR 10N02 Bridge)	Project activities would improve existing fish habitat by removing an old bridge abutment and fence rock gabions. Place additional LW with root wads in low gradient areas to provide mainstem and side-channel habitat complexity by mimicking natural processes. Stabilize existing side slopes to reduce bank erosion in this stream reach.
OR-9	Bluff Creek-Klamath River	Upper Red Cap Creek, Schnable Diggings	This improvement proposes to adjust previously placed boulders found instream and alongside slopes. Place logs with rootwads to enhance cover, promote pool scour, sediment sorting and metering, and induce favorable hydraulics and connectivity to existing off-channel features. Project activities may also include some streambank restoration to improve stability, promote native species composition, structural diversity and integrity of existing riparian plant community.

Map ID	5th-Field Watershed	Stream / Site	Description of the Proposed Activities
OR-10	Bluff Creek-Klamath River	Lower Boise Creek	Modify bedrock outcrop and boulders found near the mouth to improve seasonal passage to adult and juvenile fish. Improve and maintain connectivity of existing off-channel beaver ponds. If deemed necessary, consider routing a portion of the creek through beaver ponds and around bedrock cascade near the confluence. Consider potential development of other off channel ponds where cold-water seeps connect to the old Klamath River floodplain. Remove invasive plant species found within the area. Enhance the existing riparian plant community to improve root cohesion, roughness and vertical and horizontal vegetative structure.
OR-11	Bluff Creek-Klamath River	Lower Ullathrone Creek	Improve fish habitat found near the confluence of lower Ullathrone Creek and the Klamath mainstem. This restoration activity would remove some of the aggraded bedload deposits, extending the contribution of cold-water refugia found in the area. Develop off channel rearing ponds along this river bar and add LW to enhance juvenile salmonid summer and winter rearing.
OR-12	Bluff Creek-Klamath River	Lower Camp Creek	Remove proliferation of exotic plants and maintain riparian species composition and structural diversity of native plant community. Accelerate growth of riparian canopy within this entire lower stream reach. Project areas may include strategic invasive plant species treatments to improve streamside conditions. Improve connectivity to channel found with Klamath floodplain near confluences. Place LW with rootwads within backwater stream margins to enhance naturally occurring alcoves and remnant oxbows.
OR-13	Bluff Creek-Klamath River	Middle Camp Creek Mainstem	This improvement would restore complexity and resiliency to instream and off-channel habitats by aligning existing structures, removing old cable and rebar, placing additional LW, and excavating disconnected side channels. Remove discarded remnants of existing fish rearing facility (fence, etc.) and introduced exotic plant species, where feasible. Accelerate growth of riparian canopy, and promote species composition and structural diversity of native plant community.
OR-14	Lower Salmon River	Lower Merrill Creek	Low-flow fish passage remains a seasonal concern within lower Merrill Creek. This proposal would modify the bedrock outcrop and boulders found near the mouth below the Hwy 93 bridge to improve salmonid passage. Willow and other riparian plantings would improve vertical and horizontal vegetative structure and bank stability.
OR-15	Lower Salmon River	Salmon River near Oak Bottom	Across from Somes Creek, a large right-bank river bar is formed at the Oak Bottom River Access. Project activities propose to enhance the existing off-channel pools found on the eastern end of the river bar in partnership with a private landowner. These enhancement activities would capture existing stream flow from this right bank tributary and reconnect this floodplain feature to enhance existing off-channel rearing habitat.
OR-16	Lower Salmon River	Lower Salmon River near Butler Creek	Proposed projects would enhance the left bank side channel of the Salmon River near the mouth of Butler Creek by adding some LW with rootwads to increase cover for juvenile and adult fish. Utilize bioengineering techniques to increase vegetative structure, cover and diversity to the site.
OR-17	Lower-mid Klamath River	Lower Irving Creek	In partnership with local landowners, this improvement proposes to integrate the use of willows and other native plants to enhance the riparian community and to place logs with rootwads to promote pool scour, cover and diversify existing monotypic habitat features.
OR-18	Lower-mid Klamath River	Stanshaw Creek	Enhance the Klamath River off-channel pool located near mouth to increase summer and winter rearing habitat and juvenile coho survival. Add LW and boulders in lower reach of Stanshaw Creek in order to maintain gradient control, step pool configuration and improve fish passage. This improvement would incorporate bioengineering techniques to improve bank stabilization and vegetative structure and diversity throughout the watershed. Integrate the use of willows, alders, big leaf maple, as well as other native plants to enhance riparian community. Work with all private landowners to improve existing water diversions, reduce water loss and demand, and return flow.

Map ID	5th-Field Watershed	Stream / Site	Description of the Proposed Activities
OR-19	Rock Creek-Klamath River	Ti Bar Flat	The construction of State Highway 96 and the Ti Creek bridge in 1965 confined lower Ti Creek into an incised, single thread channel and disconnected some complex off-channel habitat in this section of the lower-mid Klamath River. This improvement would provide connectivity to off-channel features by excavating this lower river bar to create side-channels, add LW, enhance remnant wetlands and oxbows to support salmonid habitat.
OR-20	Salmon River	Lower Salmon Mainstem	On the right bank of the Salmon River mainstem (upstream of 3 Dollar Bar), lies a right bank side channel. Improvements to this channel would include the addition of some larger diameter LW with rootwads to increase cover and complexity for juvenile fish. Some planting of native tree species along this bank would also enhance the existing riparian corridor.
OR-21	Salmon River	Middle Salmon River near Nordheimer Flat	This enhancement project proposes to reconnect the existing left bank off channel pond along the lower Salmon River located adjacent to the Forest Service group campsite at Nordheimer Campground. This proposal would reopen the mouth of the pond to allow juvenile salmonid passage and overwintering rearing habitat. Some larger diameter LW with rootwads and boulders may be added to the edge of the pond to increase structure and complexity for fish, as well as, turtle and other wildlife species habitat.
LT-1	Trinity River	Horse Linto	Project activities would improve existing fish habitat by placing additional LW to increase cover and promote scour, remove or repair old fencing and restoration debris, adjust boulders to improve off-channel connectively and habitat diversity, plant or manually release existing conifers to promote future recruitment of LW and look at utilizing beavers for creating off-channel/side channel habitat.
LT-2	Trinity River	Cedar	Project activities would improve existing fish habitat by placing additional LW to increase cover and promote scour, remove or repair old fencing and restoration debris, adjust boulders to improve off-channel connectively and habitat diversity, plant or manually release existing conifers to promote natural future recruitment of LW.
LT-3	Trinity River	Mainstem Trinity (below Willow)	Plant or manually release existing conifers to promote natural future recruitment of LW.
LT-4	Trinity River	Willow	Project activities would improve existing fish habitat by placing additional LW to increase cover and promote scour, remove or repair old fencing and restoration debris, adjust boulders to improve off-channel connectively and habitat diversity, plant or manually release existing conifers to promote natural future recruitment of LW and look at utilizing beavers for creating off-channel/side channel habitat.
LT-5	Trinity River	Upper Sharber/Peckham	Project activities would improve existing fish habitat by placing additional LW to increase cover and promote scour, plant or manually release existing riparian trees to promote future recruitment of LW. Look at effects of past gravel mining. Look at improving food sources for existing beaver population.
LT-6	South Fork Trinity River	Madden (aka Old Campbell)	Project activities would enhance existing fish habitat by placing additional LW to promote scour and increase cover. Old fencing and legacy restoration debris would be removed. Adjust boulders to improve off-channel connectively and habitat diversity, plant or manually release existing conifers to promote future recruitment of LW, and enhance the confluence of the creek to improve juvenile and adult fish access of this lower thermal refugia associated with the South Fork Trinity River.
LT-7	South Fork Trinity River	South Fork Mainstem	Reassess and treat abandoned water diversion having erosional potential within this portion of the lower mainstem.
LT-8	South Fork Trinity River	South Fork Mainstem	Look at effectiveness of all past erosion control improvements undertaken on the South Fork Trinity River. Consider Cedar Grove Ranch Slide area for tree planting and erosion control measures.
LT-Lakes	All Watersheds	All LT Lakes/Ponds	Improve basking sites for western pond turtles by placing woody material. Improve nest sites for western pond turtles by manually release of trees and brush. Research beaver analog potential in appropriate meadow habitat. Manual removal of trees due to encroachment on meadow wetlands.

Map ID	5th-Field Watershed	Stream / Site	Description of the Proposed Activities
MR-1	Mad River	Pilot Creek	Additional of large wood would provide cover in identified pools and reaches. Wood could come from existing downed wood or from selection of single trees in the area.
MR-2	North Fork Eel	Bluff Creek	Additional of large wood would provide cover in identified pools and reaches. Wood could come from existing downed wood or from selection of single trees.
MR-3	North Fork Eel	Salt Creek	Portions of these streams go subsurface, leaving steelhead in isolated pools. Presence of lamprey ammocoetes indicates year round subsurface flows. Additional of large wood would provide cover in identified pools and reaches. Wood could come from existing downed wood or from selection of single trees. No heavy equipment would be used.
MR-4	North Fork Eel	Upper Salt Creek	Stream goes dry in summer time with occasional isolated pools. Area is part of an allotment that is being rested. Past restoration activities and livestock exclusion fencing requires cleanup and removal. Addition of large wood for cover, movement of existing boulders to narrow thalweg, streambank protection measures though use of onsite materials. No heavy equipment would be used. Potential to use logs to block illegal off-highway vehicle (OHV) use.
MR-5	Van Duzen	Van Duzen River	Assess stream channel morphology and bank erosion/stability. Enhance floodplain connectivity and anadromous/resident fisheries habitat. Consider placement of LW with rootwads and bolder structures to provide low velocity rearing habitat and cover in identified pools and reaches. Wood could come from existing downed wood or from selection of single trees.
MR-6	Mad River	Ruth Reservoir	Maintain brush structures during lowest reservoir levels. Add additional manzanita brush from adjacent hillsides as approved by resource specialists. Manzanita would be cabled to cinder blocks and placed at existing sites.
MR-Lakes	Mad River	All MR Lakes and ponds	Primary opportunities are for western pond turtle basking sites, removal of invasive species and screening of outflows.

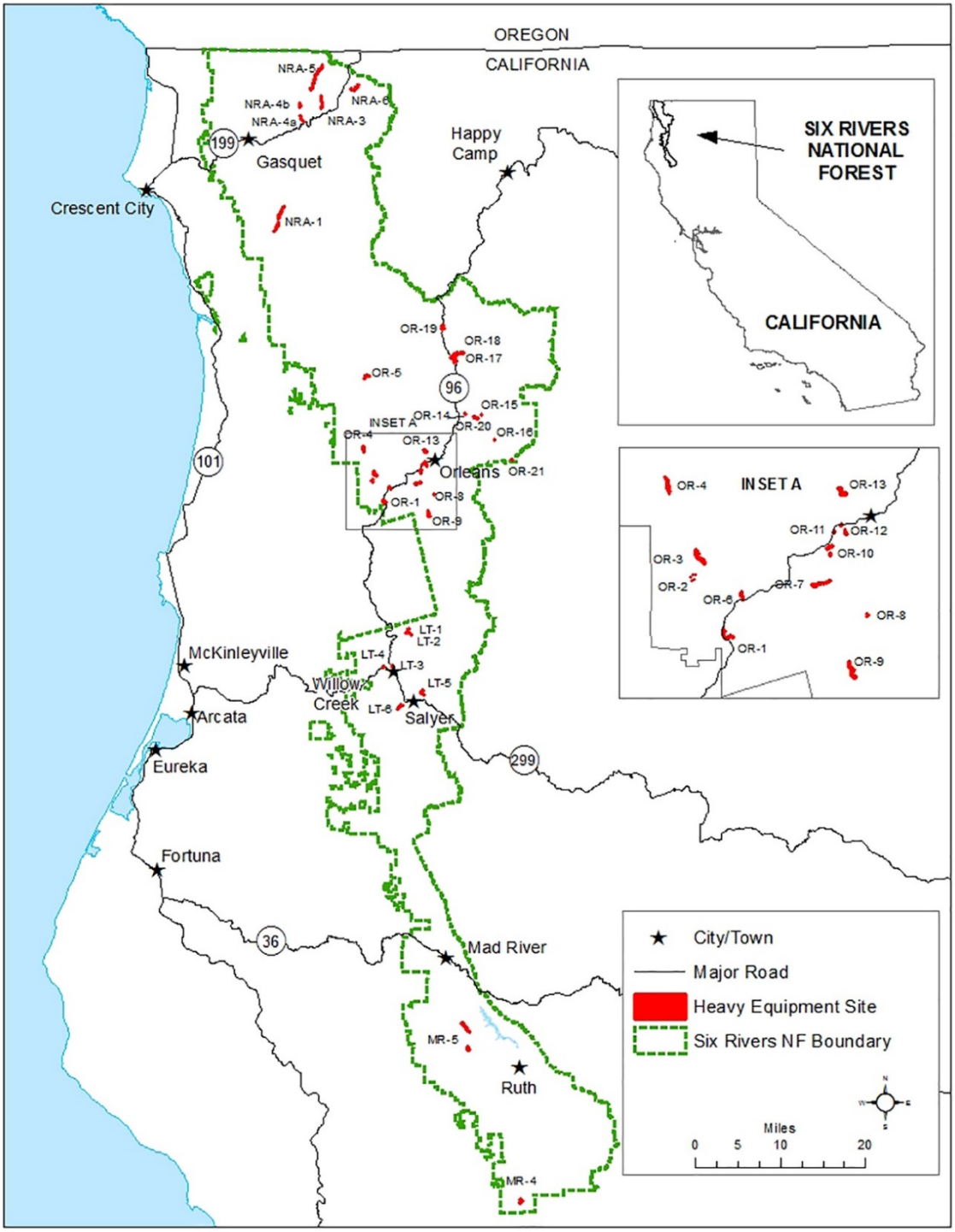

Figure D-1. Locations where the use of heavy equipment or potential ground disturbance is proposed.