Aquatic Restoration Action Plan

Six Rivers National Forest

July 2019

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Coastal Conservancy

Mid Klamath Watershed Council

Cover photo: Coho salmon rearing in constructed off-channel habitat. Photo courtesy of Mid Klamath Watershed Council.

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Introduction

The Six Rivers National Forest (SRNF or forest) has developed a programmatic *Six Rivers Aquatic Restoration Project Environmental Assessment* (*Aquatic Restoration EA*) that includes a range of activities that may be conducted in and around ponds and lakes, as well as within and on both sides of the Smith, Klamath, Salmon, Trinity, Mad, Van Duzen, and Eel rivers and tributaries. These activities would be implemented incrementally, using manual and heavy equipment methods. This *Aquatic Restoration Action Plan* (ARAP) is meant to be used as a tool for implementing restoration projects that would fall under the *Aquatic Restoration EA*. The goal of the ARAP is to synthesize the process in which the *Aquatic Restoration EA* may be used, the environmental clearance that it contains, and the sideboards that restoration proposals need to adhere to.

In developing the ARAP, the forest and its partners hope to bring interested parties to the table to discuss what would be the most useful tools to include in the document, what types of projects people would like to focus on and how best we could help make the *Aquatic Restoration EA* useful to practitioners. The ARAP is a working document and is not meant to have a "finalized" version; rather, it will be used as a place to incorporate ideas and information to help prioritize and organize restoration projects. This document is designed to be used as a digital PDF with various hyperlinks. This document is a synthesis of work identifying key areas for fisheries restoration on the SRNF.

This document currently resides on the Mid Klamath Watershed Council's (MKWC) website at *www.mkwc.org/programs/fisheries/aquatic-restoration-action-plan-arap/* and on the SRNF's website at *www.fs.usda.gov/detail/srnf/home/?cid=FSEPRD633800*.

Overview

Fisheries recovery work on the forest has been mostly focused on the headwaters since the 1990s involving upslope work including decommissioning roads and fuels reduction projects. Restoration has long been a central focus of the watershed and fisheries management programs in the SRNF. With over 400 miles of anadromous fish habitat within the forest boundary, the forest manages some of the most significant and valuable salmon and steelhead habitat on the West Coast. The following SRNF website contains information on *watershed and fisheries ecological restoration on the forest*.

The project area encompasses 1,234 miles of stream and riparian habitats that support numerous fish, amphibians, and wildlife species, including 1,156 acres of lakes and ponds. The *Aquatic Restoration EA* involves rehabilitating identified lakes, ponds, streams, rivers, and associated riparian habitat, while allowing for the identification and development of new restoration project sites within the forest.

Ground disturbing activities would occur only where there is existing equipment access, and, for the most part, along stream reaches where past heavy equipment-related restoration actions have occurred. Development of additional restoration project sites and methodology would occur collaboratively while working with a Forest Service contact and other interested parties. While it is possible to add sites that would require ground disturbance, it would entail additional work and clearance.

Endangered Species Act (ESA) consultation was completed on all areas identified on the map and can also be applied to new sites as long as the new site fits the intent of the consultation. The heritage portion of consultation under §106 of the National Historic Preservation Act (§106) was not completed programmatically. Areas that are covered for ground disturbing projects were identified in *Appendix D (Known Project Site Locations)* of the *Aquatic Restoration EA* and have been approved for the use of ground disturbing equipment. Review would still need to be done by district or contracted staff to ensure compliance with consultation. The only exception is LT-5, which was not reviewed due to access issues during the time of surveys. If a project is proposed to use heavy equipment or is outside of the identified project sites, funding would have to be included in the proposal for §106 review.

There is a wide variety of approaches available for stream improvement projects throughout the forest. Following are several references with annotated summaries for your review (summaries and details of stream processes, threats, and restoration practices). These references do not provide a critique of the various techniques for stream restoration, but rather provide the reader various perspectives that can help prepare for specific projects. Examples of these references include:

- *Large Wood National Manual* – 2015
- *Guidance for Stream Restoration* – 2018
- *California Salmonid Stream Habitat Restoration Manual (4th Edition)*
- *Low-Tech Process-Based Restoration of Riverscapes* – 2019

How to Use this Document

The goal of this ARAP is to create a collaboratively prioritized plan to facilitate implementation of projects covered under the *Aquatic Restoration EA*. This document contains links to important state and federal planning documents, priority areas for restoration identified during meetings and workshops, and key sections of the *Aquatic Restoration EA* to help with the permitting and planning process. The ARAP is meant to streamline the planning and implementation of aquatic restoration projects throughout the forest.

The first step of the process is to contact the District in which your project is located to ensure that the proposed project is within the scope of the *Aquatic Restoration EA*. All projects proposed under the *Aquatic Restoration EA* will have to go through a *checklist*, and will eventually need District Ranger or Line Officer (USFS decision maker) approval. In each basin description, there is a detailed contact list for each watershed within the forest.

Project Types

There are four broad categories that are covered in the *Aquatic Restoration EA* with 12 total project types listed below. The type of work is broken down into whether or not it will involve ground disturbing activities or non-ground disturbing activities. The purple polygons on the below map (link) represents fish bearing streams that have clearance for manual work (150 feet on each side of the creek) and the orange polygons represent where ground disturbing activities have been cleared under §106. Most lakes and

ponds (blue polygons) have only been cleared for manual work and have a lentic buffer of 150 feet, except sites listed in Appendix D, which are cleared for ground disturbing activities. Helicopter wood loading would be allowed under manual clearance areas as long as no more than one cubic yard of ground disturbance would occur during placement of logs.

The Word document entitled "Stream Layer KMZ Download Instructions" is located on the Mid Klamath Watershed Council Website. This document contains a KMZ file, which will download the layer and open in Google Earth and shows the areas covered in the *Aquatic Restoration EA*.

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 griphoist, blocks and cables, and moving rocks and boulders by hand). 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. 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 (*EA p. 50*) or brought in from off-site sources via trucks or helicopters. The following document by the Bureau of Reclamation and US Army Corps of Engineers is included to facilitate the design and discussion of LW restoration projects: *National Large Wood Manual: Assessment, Planning, Design, and Maintenance of Large Wood in Fluvial Ecosystems: Restoring Process, Function, and Structure.*
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.

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.
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 LW, 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.
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. Trees larger than 9 inches and up to 30 inches dbh would need to adhere to wildlife design features and mitigation measures (*EA pp. 53-54*). Discuss tree-cutting specifics with SRNF representatives. 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, LW 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.

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, LW 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

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 (e.g., livestock) ponds and or screening. Pond levels may be lowered to aid in removal of non-native species. 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.

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.

Projects not included in the EA

If a project needs to incorporate the types of activities not covered in the *Aquatic Restoration EA*, please discuss this with forest staff as options may be available. The options may include separately funded National Environmental Policy Act (NEPA) projects or incorporating a portion of the proposed action into different NEPA that is currently being worked on in the area of the proposed restoration activity. The hope is that there is plenty of work that is already covered and this need would be minimal.

The following project types are not covered:

- Road building or improvements. Roads not identified in the heavy equipment sites may be used as long as there is no ground-disturbance. Discuss with District.
- Culvert replacements
- Fuels reduction projects including understory burning
  - One exception is pile burning of invasive species following specific guidelines outlined in the NEPA.

Frequently Asked Questions (FAQ)

During the public meetings for the ARAP, several clarifying questions were brought to the forefront:

1. *How does California Environmental Quality Act (CEQA) fit in with the Aquatic Restoration EA?*

The SRNF worked with California Department of Fish and Wildlife (CDFW) staff so that the *Aquatic Restoration EA* would mirror the information required in CEQA (see Chapter 3 starting on page 61 of the EA and the FONSI in the final Decision) but did not go as far as to create a jointly signed document. If state funding is sought and CEQA is needed, the lead state agency would determine if the NEPA is sufficient to meet CEQA requirements.

2. *Do helicopters need to be confined to the identified ground disturbing areas since they are heavy equipment?*

The use of helicopters are not restricted to the ground disturbing sites as long as the activity does not disturb terrestrial ground for more than 1 cubic yard. Limited operating periods (LOPs) for noise would be applied according to wildlife usage, recreation, and heritage/cultural resource use (i.e. cultural gathering or ceremonies) guidelines (*EA pp. 53-55*).

3. *Would a hydraulic post pounder being used in a stream for beaver dam analogs be considered ground disturbing?*

A hydraulic post pounder would be fine as long as it is confined to the stream channel and does not disturb terrestrial ground (Up to 1 cubic yard of ground disturbance is allowed).

4. *Can existing roads be used for heavy equipment access?*

This may be OK, but would need to be reviewed on a case-by-case basis.

5. *How long will the approval process take in order to be cleared to do a project?*

The approval process is meant to be quick. It would depend on the type of project being proposed and the level of review it would need. It could be as quick as one day or more than a month. Each project would be a case-by-case basis. The higher the collaboration, communication and level of detail of a proposal the quicker it can be reviewed and approved.

6. *Does the project have to be 100 percent designed to be proposed?*

The project needs to be designed enough to know if it fulfills the sideboards listed in the *Aquatic Restoration EA* as well as the consultation with regulatory agencies (e.g., National Marine Fisheries Service (NMFS), US Fish and Wildlife Service (USFWS)) and §106.

7. *Will I have opportunity to provide input on these projects as they are being proposed to the Forest Service and being implemented?*

These projects should have multi-party collaboration for future planning and implementation, but any comments will be up to the Line Officer (District Ranger) and will be on a case-by-case basis.

8. *Is Lidar available for any of these locations?*

If you want to find out if an area has Lidar, one way to check is at the United States Interagency Elevation Inventory *website*. There are many private Lidar collections not available to the public. The website is not intuitive to use and the following YouTube lesson is helpful to get you started: *Lesson 11a: The US Interagency Elevation Inventory (USIEI)*.

9. *Are there sites that are not identified in the Aquatic Restoration EA?*

Reference the *Aquatic Restoration EA* maps (*EA pp. 43-47*). If a site-specific project is not noted on the map it does not mean that it cannot be covered by the *Aquatic Restoration EA*, but another layer of consultation is needed. To implement a ground disturbing project outside those locations listed in *Appendix D of the EA*, additional review must be completed, including archeological surveys (§106). If the proposed site is not located in either the manual or ground-disturbing polygons, §106 would need to be completed and a review would be completed to determine if the project meets the intention of the *Aquatic Restoration EA* and the ESA documentation.

10. *Are private lands covered in the EA?*

Private lands are potentially covered. For example, some have archeological surveys. There will be additional efforts to get coverage for private lands.

11. Are there opportunities to stockpile large woody debris for use in restoration projects?

This document does not address stockpiling LW, unless LW is located within the project polygon. It is important to contact the District to discuss opportunities to source LW early on in the project planning process.

12. Where do I find out more information about past restoration work conducted on the SRNF?

See contact list in basin descriptions to communicate with partners that have implemented past restoration projects.

13. Can we collaborate with the Caltrans prioritization plan?

There may be opportunities to collaborate with the Caltrans prioritization plan. Contact local Caltrans office to discuss options.

14. Are project activities permitted in designated Wilderness areas?

Non-mechanized restoration activities are permitted in wilderness areas associated with identified fish bearing streams. The use of heavy equipment is not permitted within wilderness, wild portions of wild and scenic rivers, or research natural areas (RNAs). If mechanized equipment is necessary for appropriate administration of the area, the minimum requirements analysis (MRA) may be discussed at a District level (i.e., wheelbarrows), in compliance with the Wilderness Act of 1964.

Checklist

The following section describes the steps for project design and implementation (*EA 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.

The key to smooth implementation is early and frequent involvement of Forest Service staff, local tribes, watershed restoration groups, potential funders, local landowners and other forest users (e.g., recreation, special use permits.). Identify design features to avoid any potential impact to cultural gathering locations in the project area through informal tribal consultation and plan for closures necessary for recreation or cultural practices.

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. At any time, if an individual project does not fit under the USFS/State Historic Preservation Office (SHPO) Region 5 Programmatic Agreement (R5 PA), the forest would consult with the SHPO and local tribes on a project-specific basis. The following is the anticipated process for implementing site-specific projects:

Stages of Project Development

- Iterative Process:
    - Developing the site-specific project – implementation description.
    - Collaboration with interdisciplinary team (IDT), interested publics, and tribes.
    - Refine project as needed.
- Line Officer Approval – signed compliance checklist
- Detailed Design, Funding, Permitting and Contracting
- Pre-Implementation
- Implementation
- Monitoring/Reporting

Site-Specific Project Description and Design

The project design *Implementation Process and Checklist* (*Appendix C*) is designed to help meet SRNF guidelines for the project to move from the planning phase into implementation. The key to smooth implementation is early and frequent involvement of local tribes, watershed restoration groups, potential funders, local landowners and other forest users (e.g., recreation, special use permits).

First, determine activity type with site-specific details that correlate with project types identified in the EA. Identify location with map, photos, etc. and list habitat and species targeted. During project planning, identify access roads, LW sources, etc.

Using the *Six Rivers Land and Resource Management Plan*[1], identify management areas, any Forest Service facilities potentially impacted (recreation sites, lands), and tribal use areas. Identify additional permits that may be required.

Identify site-specific design elements, surveys, and risk assessments, including General Aquatic Conservation Measures (GACM), Project Design Criteria (PDC), and additional mitigations based on site-specific conditions. Adhere to project design features identified by resource specialists, including need for surveys (*Resource Specific Design Features, Mitigation Measures and Monitoring*, *Appendix A Aquatic Design Criteria*, *Appendix B. Mitigations, BMPs, and Monitoring*). Review of all ongoing and foreseeable actions would occur to ensure no significant cumulative impacts would occur.

Determine if project fits under California Environmental Quality Act (CEQA) exemption (§15333) if necessary. The *Aquatic Restoration EA* mirrors the information required in CEQA. If state funding is sought and CEQA is needed, identify the lead state agency who will determine if the NEPA is sufficient to meet CEQA requirements. Notify landowners, potential cultural gathering in project area, and closures necessary for recreation or cultural practices.

[1] If project is in the Ukonom District, reference the *Klamath National Forest Land Resource Management Plan*.

Work with the District contact to ensure the checklist (*Project Implementation Process and Checklist*) is complete. When all specialists have approved the project elements, have the Line Officer sign-off on the design features for the project to move forward.

Approved Project Implementation

Moving into project implementation, continue coordination with IDT, landowners and stakeholders. Prior to on-the-ground implementation, the following agency coordination would occur: obtaining a waiver application or other required water-quality certifications from the North Coast Regional Water Quality Control Board and site-specific review from USFWS or NMFS when necessary.

Figure 1 is a simplified flow chart of the process to get a project through to completion. The most important aspect is to communicate with your SRNF contact in order to discuss the aspects of your project and how it fits into the NEPA, ESA and §106 consultation. Questions can be vetted and discussed up front to ensure compliance will be met before finalized project design. This will be an iterative process that will be dependent on the level of complexity of the project.

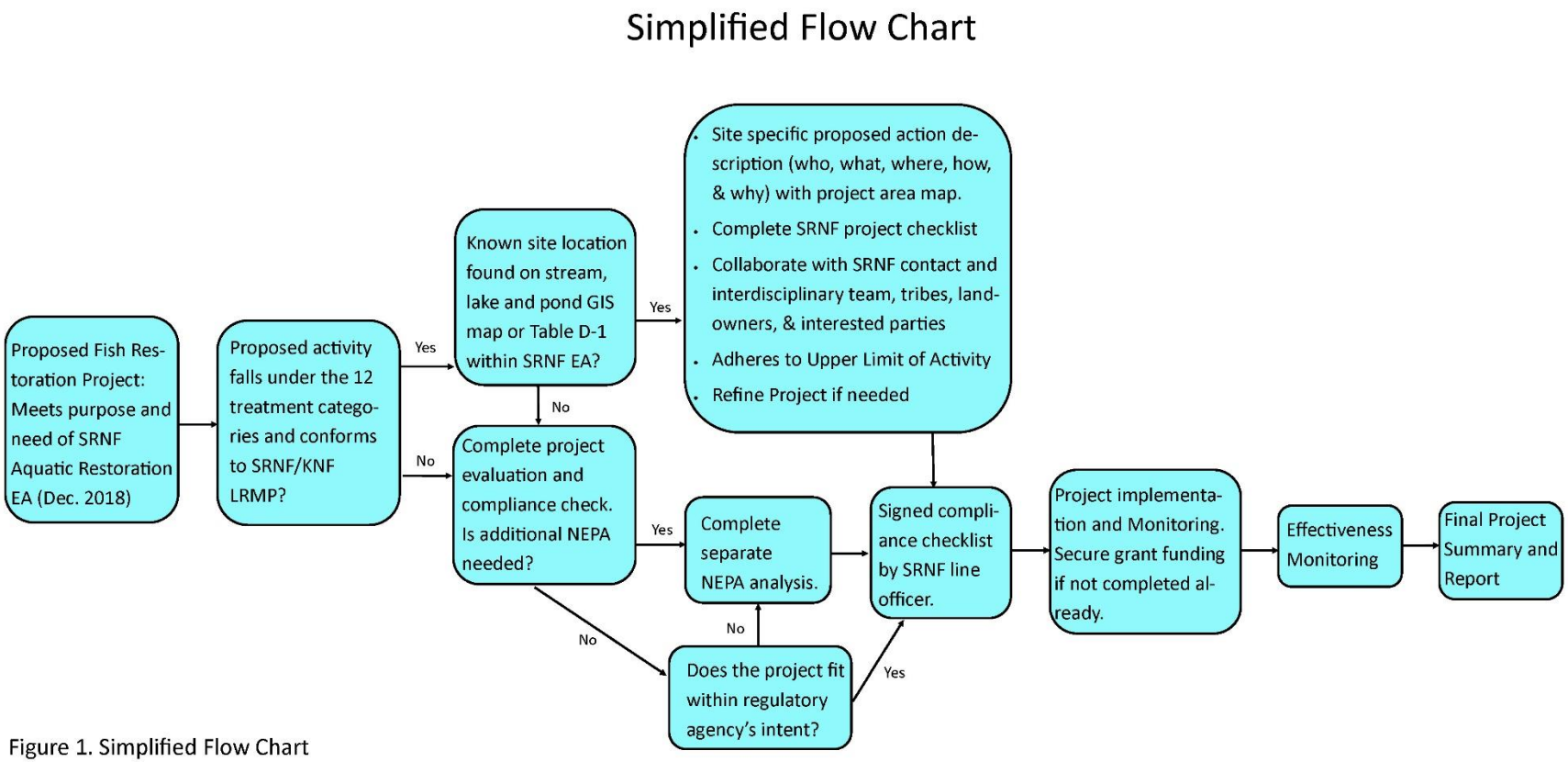

Figure 1. Simplified Flow Chart

Resource Specific Design Features, Mitigation Measures and Monitoring

Mitigation measures and design features are located throughout the document and incorporate requirements from several regulatory agencies. It is ***important*** to understand and review the following sections during project planning:

Resource Specific Design Features, Mitigation Measures and Monitoring of the Aquatic Restoration EA: This section presents a listing of various resource-specific PDFs, mitigations measures (BMPs and SOPs) and monitoring to be considered during individual project development identified in *Appendix B* of the *Aquatic Restoration EA*, 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.

Appendix A: This section describes the most recent list of Fisheries Restoration Grant Program (FRGP) measures to minimize adverse effects to the aquatic environment. Reference the CDFW FRGP *website* for more details and to find the *CDFW Restoration Manual*. These measures are integrated into the *Watershed and Fisheries Restoration Biological Assessment* and accompanying Biological Opinion (BO) from NMFS. All ESA documents will be available on the Forest Service *project record site*.

Appendix B: This section provides an integrated presentation of best management practices (BMPs) and mitigation measures to avoid, rectify, or minimize unintended operational impacts.

Upper Limits of Activities

Due to the programmatic nature of the *Aquatic Restoration EA*, 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 Biological Assessment* consultation (2015), which entails setting annual project limits of the number of projects (Table 1 (Table 2-4 in the EA)). 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 will likely be below these thresholds (Table 1 (Table 2-4 from the EA)), based on other resource design features, opportunities, current staffing levels and projected funding.

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 1. 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 onsite (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.
• 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

Watersheds

The following summarizes habitat conditions and recovery goals by watershed and administrative unit existing conditions, and the primary threats to 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 (CESA) in 2000 throughout its range in California.

Basin Descriptions and Actions

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

District Biologist: Mike McCain, *mike.mcain@usda.gov*
District Ranger: Jeff Marszal, *jeff.marszal2@usda.gov*

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

Smith River Basin Project Priorities:

Key restoration actions include:

1. Reduce riparian and aquatic invasive species,
2. Maintain or improve existing instream structures,
3. Addition of LW or engineered log jams (ELJs),
4. Beaver dam analogs (BDAs),
5. Restoring channel shape and meanders,
6. Reducing channelization and restoring connectivity to floodplains to restore natural channel processes,
7. Treating riparian forest stands to improve conifer growth and accelerate development of older stand characteristics, and
8. Planting riparian areas with desirable native species including disease-resistant Port-Orford-cedar.

Priority Streams: Hurdygurdy Creek, Siskiyou Fork, Monkey Creek, Patrick Creek, Shelly Creek, Middle Fork/Knopki Creek, Griffin Creek, Goose Creek, Rattlesnake Lake, South Fork, Craig's Creek, Muzzleloader Creek, Myrtle Creek, Rock Creek, Canthook Creek, Hardscrabble Creek.

Priority Lakes: Dry, Muslatt, Rattlesnake, Sanger, and un-named small ponds containing non-native species.

Project sites identified for heavy equipment use are located in *Appendix D of the EA*. A potential project that is currently under planning is the confluence of Middle Fork Smith and Knopki Creek channel restoration site.

Related Stream Data and Contacts

- **US Forest Service – Gasquet District:** Mike McCain, District Biologist, *mike.mcain@usda.gov*, (707) 457-3853
- **Smith River Alliance:** Document library including restoration planning reports and fisheries monitoring reports: *Smith River Alliance Document Library*.

Related Federal Recovery Plans

- *Smith River Coho Salmon Recovery Plan* – 2014
    - *Final SONCC Coho Recovery Plan* (Highest Priority Recovery Actions, p. 15-1)

Related State Recovery Plans

- *State Wildlife Action Plan* – 2015
- *Steelhead Restoration and Management Plan for California* – 1996

Other Related Recovery Documents

- *Smith River Plain Stream Restoration Plan* – 2018

Klamath River – Orleans and Ukonom Ranger Districts

District Fish Biologist: LeRoy Cyr, *leroy.cyr@usda.gov*
District Ranger: Nolan Colegrove, *nolan.colegrove@usda.gov*
Deputy District Ranger: Roberto Beltran, *roberto.beltran@usda.gov*

The Klamath River once supported diverse, abundant anadromous fish runs thought to number in the millions. Now, all 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 Clean Water Act (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, ESA-petitioned (February 27, 2019) Upper Klamath and Trinity River (UKTR) spring Chinook salmon and Forest Service Sensitive (FSS) aquatic species and UKTR Chinook salmon, Klamath Mountains Province (KMP) steelhead trout, Pacific lamprey, western brook lamprey, Klamath River lamprey, western pearlshell mussel (*Margaritifera falcata*), westernridge mussel (*Gonidea angulata*), California floater mussel, foothill yellow-legged (FYL) frog and western pond turtle.

Mid Klamath Basin Project Priorities

Key instream recovery actions include addition of side channel rearing habitat, addition of LWD or ELJs, creation of off-channel rearing habitat, enhancing thermal refugia, creek mouth enhancement, improve fish passage for juvenile and adult salmonids, increase summer and winter refugia, modify or remove barriers improve beaver habitat (i.e., beaver dam analogs (BDA/PAWS or riparian planting)), improve instream flows, improve/enhance spawning habitat, restore channel structure and complexity, and reduce or remove invasive plants and other aquatic species. Opportunities also exist to improve western pond turtle and amphibian habitat. These priorities were discussed during public meetings as well as taken from various local planning documents. The following locations were collaboratively prioritized for project planning and implementation within the next 3 to 5 years. The Mid-Klamath Candidate Action Table (MK CAT) was a collaborative document created by local federal (USFS, NMFS, USFWS), state (CDFW), tribal (Karuk) and NGO (MKWC) biologists and restoration practitioners to help guide restoration efforts in the Mid Klamath sub-basin. This table was specifically designed to address the needs and requirements to restore populations of coho salmon to the Mid Klamath. The MK CAT is available on the *MKWC website*.

Priority Locations for Restoration: Boise Creek (funded with implementation anticipated summer 2019), Aikens Creek (2016 to present project planning and implementation expected to begin 2020), Ti Bar (2016 to present project planning and implementation plan(s) under development), Red Cap Creek (2020-21 project planning and implementation anticipated 2022), Fish Lake (2020 project planning), Camp Creek (2021-22 project planning), Bluff Creek (2021-24 project planning), Slate Creek, Irving Creek, Stanshaw Creek, Sandy Bar Creek, Rock Creek, Hopkins Creek, Halverson Creek, Rogers Creek, Crawford Creek, Ullathorne Creek.

Identified Project Sites for Heavy Equipment Use from Appendix D of EA: *Appendix D. Known Project Site Locations*.

Related Stream Data and Contacts

- **US Forest Service – Orleans District:** LeRoy Cyr, District Biologist, *leroy.cyr@usda.gov*, (530) 627-3262:

- Fisheries habitat assessments, adult and juvenile salmonid surveys, rotary screw trap data, stream temperature and instream flow data.

- **Mid Klamath Watershed Council:** Jimmy Peterson, Fisheries Monitoring Program Coordinator, *jimmy@mkwc.org*, (530) 627-3202:
  - Water quality (dissolved oxygen and temperature), flow data, juvenile fish counts, stream temperature data.
- **Karuk Tribe:** Toz Soto, Lead Biologist (Fisheries Program), *tsoto@karuk.us*; Earl Crosby, Watershed Coordinator, *ecrosby@karuk.us*

  California Department of Fish and Wildlife: Mark Elfgen, Fish Habitat Specialist, *mark.elfgen@wildlife.ca.gov,* (530) 841-2560

Related Federal Recovery Plans

- *Middle Klamath River Coho Salmon Recovery Plan* – 2014
  - *Final SONCC Coho Recovery Plan* (Highest Priority Recovery Actions)
- *Coastal Multispecies Recovery Plan* – 2016: ESA §4(f)(1) requires the Services to develop and implement recovery plans for the conservation and survival of listed endangered and threatened species, unless they find that such a plan will not promote the conservation of the species (Coastal Multispecies Recovery Plan, p. 5)
- *Pacific Lamprey Conservation* – 2012
- *Forest Service Strategic Plan* – 2015-2020
  - **Strategic Objective A:** Foster resilient, adaptive ecosystems to mitigate climate change, p. 11
  - **Strategic Objective D:** Provide Abundant Clean Water, p. 18

Related State Recovery Plans

- *State Wildlife Action Plan* – 2015
- *Steelhead Restoration and Management Plan for California* – 1996
- *Recovery Strategy for California Coho Salmon* – 2004
  - **RW-III-A-01:** Coho Salmon Recovery Strategy, p. 7.3 Fish Passage
  - **RW-XIII-C-01:** Coho Salmon Recovery Strategy, p. 7.8 Stream Complexity
  - **RW-XV-A-01:** Coho Salmon Recovery Strategy, p. 7.9 Refugia
  - **RW-XVI-B-02:** Coho Salmon Recovery Strategy, p. 7.10 Habitat Fragmentation
  - **RW-XXII-A-04:** Coho Salmon Recovery Strategy, p. 7.6 Riparian Vegetation
  - **RW-XXIII-E-01** Coho Salmon Recovery Strategy, p. 7.14 Estuaries

Salmon River – Ukonom Ranger District

District Fish Biologist: LeRoy Cyr, *leroy.cyr@usda.gov*
District Ranger: Nolan Colegrove, *nolan.colegrove@usda.gov*
Deputy District Ranger: Roberto Beltran, *roberto.beltran@usda.gov*

The Salmon River is listed under §303(d) of the CWA as water quality limited (CSWRCB 2003) for temperature. Aquatic species within the project area in the Salmon River basin include ESA-listed SONCC coho salmon, ESA-petitioned (February 27, 2019) Upper Klamath and Trinity River (UKTR) spring Chinook salmon and FSS aquatic species and UKTR Chinook salmon, KMP steelhead trout, Pacific lamprey, western brook lamprey, Klamath River lamprey, western pearlshell mussel, westernridge mussel, 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.

Salmon River Basin Project Priorities

Key instream recovery actions include improving instream flows, addition of side channel rearing habitat, addition of LWD or ELJs, creation of off-channel rearing habitat, enhancing thermal refugia, creek mouth enhancement, improve fish passage for juvenile and adult salmonids, increase summer and winter refugia, modify or remove barriers, reconnect floodplains, improve beaver habitat (i.e., BDAs or riparian planting), improve spawning habitat, restore channel structure and complexity, and reduce or remove invasive plants and other aquatic species. Opportunities also exist to improve western pond turtle and amphibian habitat. These priorities were discussed during public meetings as well as taken from various local planning documents.

Priority Locations for Restoration: Merrill Creek, Wooley Creek, Three Dollar Bar, Tripp Bar, Oak Bottom and Nordheimer.

Identified Project Sites for Heavy Equipment Use From Appendix D of EA: *Appendix D. Salmon River*.

Related Stream Data and Contacts

- **US Forest Service (SRNF) – Orleans/Ukonom District:** LeRoy Cyr, District Fish Biologist, *leroy.cyr@usda.gov*, (530) 627-3262
    - The Forest Service has many years and varied data on the mainstem and adjoining tributaries. Information can be accessed by contacting the district biologist. Other more historical data may also be available.

- Habitat typing and LW counts, Chinook/coho spawning ground surveys, juvenile fish presence/absence counts, rotary screw trap data, stream temperature and flow data.

- **US Forest Service (Klamath National Forest) – Scott/Salmon District:** Maija Meneks, District Fish Biologist, *maija.meneks@usda.gov*, (530) 468-1272
  - The Ukonom Ranger District is on the Klamath National Forest, but is managed by the SRNF.
- **Salmon River Restoration Council (SRRC):** Amy Fingerle, *fisheries@srrc.org*, (530) 462-4665; Melissa Van Scoyoc, *habitat@srrc.org*, (530) 462-4665
  - The SRRC is a community-based non-profit group that works collaboratively to assess, protect, maintain, and restore the ecosystems of California's spectacular *Salmon River watershed*.
- **Karuk Tribe:** Toz Soto, Lead Biologist – Fisheries Program, *tsoto@karuk.us*; Earl Crosby, Watershed Coordinator, *ecrosby@karuk.us*

Related Federal Recovery Plans

- *Middle Klamath River Coho Salmon Recovery Plan* – 2014
  - *Final SONCC Coho Recovery* (Highest Priority Recovery Actions)
- *Coastal Multispecies Recovery Plan* – 2016: ESA §4(f)(1) requires the Services to develop and implement recovery plans for the conservation and survival of listed endangered and threatened species, unless they find that such a plan will not promote the conservation of the species. (Coastal Multispecies Recovery Plan, p. 5)
- *Pacific Lamprey Conservation* – 2012
- *Forest Service Strategic Plan* – 2015-2020
  - **Strategic Objective A:** Foster resilient, adaptive ecosystems to mitigate climate change, p. 11
  - **Strategic Objective D:** Provide Abundant Clean Water, p. 18

Related State Recovery Plans

- *State Wildlife Action Plan* – 2015
- *Steelhead Restoration and Management Plan for California* – 1996
- *Recovery Strategy for California Coho Salmon* – 2004
  - **RW-III-A-01:** Coho Salmon Recovery Strategy, p. 7.3 Fish Passage
  - **RW-XIII-C-01:** Coho Salmon Recovery Strategy, p. 7.8 Stream Complexity
  - **RW-XV-A-01:** Coho Salmon Recovery Strategy, p. 7.9 Refugia
  - **RW-XVI-B-02:** Coho Salmon Recovery Strategy, p. 7.10 Habitat Fragmentation
  - **RW-XXII-A-04:** Coho Salmon Recovery Strategy, p. 7.6 Riparian Vegetation

- **RW-XXIII-E-01** Coho Salmon Recovery Strategy, p. 7.14 Estuaries

Trinity River – Lower Trinity Ranger District

District Fish Biologist: Andrea McBroom, *andrea.mcbroom@usda.gov*
District Ranger: Nolan Colegrove, *nolan.colegrove@usda.gov*
Deputy District Ranger: Roberto Beltran, *roberto.beltran@usda.gov*

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 Salmon River basin include ESA-listed SONCC coho salmon, ESA-petitioned (February 27, 2019) Upper Klamath and Trinity River (UKTR) spring Chinook salmon and FSS aquatic species and UKTR Chinook salmon, KMP steelhead trout, Pacific lamprey, western brook lamprey, Klamath River lamprey, western pearlshell mussel, westernridge mussel, California floater mussel, FYL frog and western pond turtle.

Trinity River Basin Project Priorities

Key instream recovery actions include addition of LW for complexity, maintain or improve existing instream structures, improve riparian conditions for conifers, and reduction of sediment. 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. Projects focused on coho are a high priority within this basin.

Priority Locations for Restoration: Horse Linto, Cedar, Willow, Upper Sharber/Peckham, Old Campbell (aka Madden), South Fork Trinity Mainstem, all Lower Trinity lakes/ponds.

- **Cedar Creek:** The main restoration opportunities would involve: (**3)** legacy/existing structure improvements or removals, **(2)** LW and boulder placements, and (**8)** riparian vegetation treatments. Cedar Creek provides habitat for Chinook and coho spawning with some years having every available pool containing coho juveniles in an approximately 1.5-mile stretch. The main restoration opportunity on this section would involve re-designing legacy fish restoration sites and increasing the availability of LW. A full report on the historical restoration sites and habitat typing is available through the district biologist.
- **Sharber/Peckham Creek:** The main restoration opportunities present on Sharber Peckham Creek would be: (**4)** beaver habitat restorations, **(8)** riparian vegetation treatments and **(2)** LW and boulder placements. The lower section of this Creek is located on private property and has recently had a fish passage barrier culvert replaced. Forest Service lands are located on a spring fed portion of the creek that provides cold water to coho salmon juveniles during the summer months. Beaver have been actively building a dam made out of blackberry brambles and would benefit from having alternative building and food supplies. **Note:** Even though it was identified in

Appendix D of the EA as having been reviewed for heavy equipment, access was limited due to an active beaver pond and surveys were not completed.

- **Horse Linto Creek:** The main restoration opportunities would involve: **(2)** LW and boulder placements, **(3)** legacy/existing structure improvements or removals, and **(8)** riparian vegetation treatments. Horse Linto provides habitat for Chinook and coho spawning. Although some juvenile coho hold in Horse Linto Creek, the majority have been found holding in Cedar Creek. The main restoration opportunity would be increasing the availability of LW. A full report on habitat typing is available through the district biologist.
- **Old Campbell (South Fork Trinity):** The main restoration opportunities would involve: **(2)** LW and boulder placements, **(3)** legacy/existing structure improvements or removals, and **(8)** riparian vegetation treatments. Madden Creek provides habitat for Chinook and coho salmon with some years having only juvenile coho present with no juvenile Chinook present and some years with minimal coho and many juvenile Chinook present. This creek would benefit from an analysis of the use of spring Chinook juveniles that utilize the mouth and the lower portion of the Creek and an analysis of the need for creek mouth enhancement. A full report on the historical restoration sites and habitat typing is available through the district biologist.
- **Willow Creek:** The main restoration opportunities would involve: **(2)** LW and boulder placements, **(3)** legacy/existing structure improvements or removals, and **(8)** riparian vegetation treatments. Only a small portion of Willow Creek that has consistent salmon spawning is located on NFS lands. East Fork Willow Creek may provide some restoration opportunities for steelhead trout or Pacific lamprey. A full report on habitat typing (mouth to 3000 meters) is available through the district biologist.
- **Lower South Fork Trinity Mainstem:** The main restoration opportunities would involve: **(7)** streambank restoration and **(2)** LW and boulder placement. Western pond turtle habitat improvement would involve determining where basking sites are needed and placing LW where it would best be utilized. It would be beneficial to review legacy sediment sources and determine the need for additional planting. The following document link summarizes the available literature on the South Fork Trinity River and its tributaries in concern to spring-run Chinook salmon (Spring Chinook). Data gaps and potential limiting factors for South Fork Trinity River Spring Chinook have been identified and recommendations for next steps have been outlined.
    - *Spring Chinook in the South Fork Trinity River: Recommended Management Actions and The Status of Their Implementation* – 2012
- **Grouse Creek (South Fork Trinity River):** Grouse Creek is limited to anadromy about 1.6 miles from the confluence of the South Fork Trinity River by Devastation Slide and is a known barrier to Chinook and coho. This feature is a sediment source to Grouse Creek and has been in existence for centuries. Pacific lamprey have been found above the barrier and it is questionable whether or not

steelhead have been able to get above it. Grouse Creek would benefit from a current review and habitat typing to determine existing conditions above and below Devastation Slide.

Identified Project Sites for Heavy Equipment Use From Appendix D of EA: *Appendix D: LT*.

Related Stream Data and Contacts

- **US Forest Service – Lower Trinity District:** Andrea McBroom, District Fish Biologist, *andrea.mcbroom@usda.gov*, (530) 629-4930; LeRoy Cyr, District Fish Biologist, *leroy.cyr@usda.gov*, (530) 627-3262.
    - The Forest Service has many years and varied data on tributaries. The following is the most recent information and can be accessed by contacting the district biologist. Other more historical data may also be available.
        - Habitat typing (Forest Service Region 6 protocol): Horse Linto Creek (2012, 2018), Cedar Creek (2018), Willow Creek (2018), Old Campbell (2014, 2018).
        - Yearly Chinook/limited coho spawning ground surveys and coho juvenile presence/absence surveys. Data available for Horse Linto, Cedar, Willow, Sharber/Peckham and Old Campbell (Madden) creeks.
        - Rotary screw trap data available on Horse Linto (1991-2005) and Willow Creek (1995-2005).
        - Yearly stream temperature data available for Horse Linto, Cedar, Willow, Sharber/Peckham, Lower South Fork Trinity, Old Campbell and Grouse creeks. Ask the District biologist for Excel files.
        - Stream Condition Inventory (SCI) is similar to habitat typing except it is only taken at repeated reference sites and includes benthic macro-invertebrate composition, percent shade, as well as width-to-depth and cross-section surveys. Stream reaches are surveyed approximately every 5 years and data is compiled when it has been visited 3 times. This data is available on Horse Linto (3 locations), Cedar, Old Campbell and Grouse creeks.
- **Hoopa Tribal Fisheries:** Justin Alvarez, Habitat Biologist, *jalvarez@hoopa-nsn.gov*, (530) 625-4267 x1020
    - Interested in possibly looking at work on Cedar Creek.
- **California Department of Fish and Wildlife:**
    - Chinook spawning ground data (mega table for the Trinity River): Ken Lindke, Environmental Scientist, *Kenneth.Lindke@wildlife.ca.gov*, (707) 822-4230
    - Trinity River Project (TRP) weir trapping summary and Trinity River hatchery trapping summary: Mary Claire Kier, Environmental Scientist – Fisheries, *MaryClaire.Kier@wildlife.ca.gov*, (707) 822-5876.

    - CA DFW has data for the mainstem of the Trinity River and overall basin population information.
- **US Fish and Wildlife Service – Trinity River Mainstem Redd Survey Data (Chinook):** Steve Gough, Fish Biologist, *steve_gough@fws.gov*, (707) 825-5197
    - Salmon Spawning Survey Data – Klamath and Trinity Rivers
    - USFWS has data specific to where Chinook spawn in the mainstem of the Lower Trinity River.
- **Redwood Community Action Agency:** Susannah Manning, *susannah@nrsrcaa.org*, (707) 599-2357
    - Interested in partnering and grant writing throughout the forest.
- **Trinity River Restoration Program (TRRP)**
    - The TRRP implements the 2000 Department of Interior (DOI) Record of Decision, which directs DOI to restore the fisheries of the Trinity River impacted by dam construction and related diversions of the Trinity River Division (TRD) of the Central Valley Project.
    - The TRRP library contains many historical documents from the Trinity Basin: *TRRP Document Library*.

Related Federal Recovery Plans

- *Lower Trinity Coho Salmon Recovery Plan* – 2014
    - *Final SONCC Coho Recovery* (Highest Priority Recovery Actions)
- *Coastal Multispecies Recovery Plan* – 2016: ESA §4(f)(1) requires the Services to develop and implement recovery plans for the conservation and survival of listed endangered and threatened species, unless they find that such a plan will not promote the conservation of the species. (Coastal Multispecies Recovery Plan, p. 5)
- *Pacific Lamprey Conservation* – 2012
- *Forest Service Strategic Plan* – 2015-2020
    - **Strategic Objective A:** Foster resilient, adaptive ecosystems to mitigate climate change, p. 11
    - **Strategic Objective D:** Provide Abundant Clean Water, p. 18

Related State Recovery Plans

- *State Wildlife Action Plan* – 2015
- *Steelhead Restoration and Management Plan for California* – 1996
- *Recovery Strategy for California Coho Salmon* – 2004
    - **RW-III-A-01:** Coho Salmon Recovery Strategy, p. 7.3 Fish Passage
    - **RW-XIII-C-01:** Coho Salmon Recovery Strategy, p. 7.8 Stream Complexity

- **RW-XV-A-01:** Coho Salmon Recovery Strategy, p. 7.9 Refugia
- **RW-XVI-B-02:** Coho Salmon Recovery Strategy, p. 7.10 Habitat Fragmentation
- **RW-XXII-A-04:** Coho Salmon Recovery Strategy, p. 7.6 Riparian Vegetation
- **RW-XXIII-E-01** Coho Salmon Recovery Strategy, p. 7.14 Estuaries

- *Foothill Yellow-Legged Frog Conservation Assessment* – 2016
  - *A Summary of Potential Mitigation and Restoration Options*
  - *Future Conservation and Management*

Mad River – Mad River Ranger District

District Wildlife Biologist: Krista Smith, *krista.smith@usda.gov*
District Ranger: Dan Dill, *daniel.dill@usda.gov*

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. Northern California (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 California Coastal (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.

Mad River Basin Project Priorities

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

Priority Locations for Restoration: Pilot Creek, Bluff Creek, Salt Creek, Upper Salt Creek, Van Duzen River, Ruth Reservoir, all Mad River lakes and ponds.

Related Stream Data and Contacts

- **US Forest Service – Mad River District:** Krista Smith, District Wildlife Biologist, *krista.smith@usda.gov*, (707) 574-6849
    - The Forest Service has many years and varied data on tributaries. Information can be accessed by contacting the District Biologist. Other more historical data may also be available.
    - Temperature
- **Mad River Alliance:** *info@madriveralliance.org* or call/text Caroline Hall at (707) 205-788

Related Federal Recovery Plans

- *Mad River Coho Salmon Recovery Plan* – 2014
    - *Final SONCC Coho Recovery* (Highest Priority Recovery Actions, p. 24-1)
- *Coastal Multispecies Recovery Plan* – 2016: ESA §4(f)(1) requires the Services to develop and implement recovery plans for the conservation and survival of listed endangered and threatened species, unless they find that such a plan will not promote the conservation of the species. (Coastal Multispecies Recovery Plan, p. 5)
- *Pacific Lamprey Conservation* – 2012
- *Forest Service Strategic Plan* – 2015-2020
    - **Strategic Objective A:** Foster resilient, adaptive ecosystems to mitigate climate change, p. 11
    - **Strategic Objective D:** Provide Abundant Clean Water, p. 18

Related State Recovery Plans

- *State Wildlife Action Plan* – 2015
- *Steelhead Restoration and Management Plan for California* – 1996
- *Recovery Strategy for California Coho Salmon* – 2004
    - **RW-III-A-01:** Coho Salmon Recovery Strategy, p. 7.3 Fish Passage
    - **RW-XIII-C-01:** Coho Salmon Recovery Strategy, p. 7.8 Stream Complexity
    - **RW-XV-A-01:** Coho Salmon Recovery Strategy, p. 7.9 Refugia
    - **RW-XVI-B-02:** Coho Salmon Recovery Strategy, p. 7.10 Habitat Fragmentation
    - **RW-XXII-A-04:** Coho Salmon Recovery Strategy, p. 7.6 Riparian Vegetation
    - **RW-XXIII-E-01** Coho Salmon Recovery Strategy, p. 7.14 Estuaries
- *Foothill Yellow-Legged Frog Conservation Assessment* – 2016
    - *A Summary of Potential Mitigation and Restoration Options*
    - *Future Conservation and Management*

Eel River – Mad River Ranger District

District Wildlife Biologist: Krista Smith, *krista.smith@usda.gov*
District Ranger: Dan Dill, *daniel.dill@usda.gov*

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 Sacramento pikeminnow (*P. grandis*); however, surveys done in 2018 by the USDI Bureau of Land Management (BLM) and Eel River Recovery Project documented an adult and 66 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.

Eel River Basin Project Priorities

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

Related Stream Data and Contacts

- **US Forest Service – Mad River District:** Krista Smith, District Wildlife Biologist, *krista.smith@usda.gov*, (707) 574-6849.
    - The Forest Service has many years and varied data on tributaries. Information can be accessed by contacting the district biologist. Other more historical data may also be available.
    - Temperature
- *Friends of the Eel River*
- *Friends of the Van Duzen River*
- *Eel River Recovery Project*

Related Federal Recovery Plans

- *North Fork Eel River Coho Salmon Recovery Plan* – 2014
    - *Final SONCC Coho Recovery Plan* (Highest Priority Recovery Actions, p. 43-1)
- *Lower Eel and Van Duzen River Coho Salmon Recovery Plan* – 2014
    - *Final SONCC Coho Recovery Plan* (Highest Priority Recovery Actions, p. 26-1)
- *Coastal Multispecies Recovery Plan* – 2016: ESA §4(f)(1) requires the Services to develop and implement recovery plans for the conservation and survival of listed endangered and threatened species, unless they find that such a plan will not promote the conservation of the species. (Coastal Multispecies Recovery Plan, p. 5)
- *Pacific Lamprey Conservation* – 2012
- *Forest Service Strategic Plan* – 2015-2020
    - **Strategic Objective A:** Foster resilient, adaptive ecosystems to mitigate climate change, p. 11
    - **Strategic Objective D:** Provide Abundant Clean Water, p. 18

Related State Recovery Plans

- *State Wildlife Action Plan* – 2015
- *Steelhead Restoration and Management Plan for California* – 1996
- *Recovery Strategy for California Coho Salmon* – 2004
    - **RW-III-A-01:** Coho Salmon Recovery Strategy, p. 7.3 Fish Passage
    - **RW-XIII-C-01:** Coho Salmon Recovery Strategy, p. 7.8 Stream Complexity
    - **RW-XV-A-01:** Coho Salmon Recovery Strategy, p. 7.9 Refugia
    - **RW-XVI-B-02:** Coho Salmon Recovery Strategy, p. 7.10 Habitat Fragmentation
    - **RW-XXII-A-04:** Coho Salmon Recovery Strategy, p. 7.6 Riparian Vegetation
    - **RW-XXIII-E-01** Coho Salmon Recovery Strategy, p. 7.14 Estuaries
- *Foothill Yellow-Legged Frog Conservation Assessment* – 2016
    - *A Summary of Potential Mitigation and Restoration Options*
    - *Future Conservation and Management*

Grant Language Help

Local communities, such as Mad River, Ruth, Willow Creek, Trinity Village, Orleans 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 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.

Involvement of youth and community members in on-the-ground efforts to restore aquatic habitat provides immediate and long-term benefits to impacted watershed resources. In order to improve understanding and support for watershed restoration projects, it is crucial to provide opportunities for youth and community members to participate in projects, allowing community members to become trained in natural resource restoration skills, address concerns of area residents, and provide more opportunities to include stakeholders in restoration. By providing interactive stewardship opportunities

for youth, the next generation of aquatic restorationists have a chance to actively restore their resource base, learn the importance of collaboration and teamwork, and develop natural resource career skills. Fostering collaborative, community stewardship of watershed resources is essential to the future of restoration in SRNF basins and will support the long-term success of this restoration work.

To find stream flow statistics and spatial analysis tools for water-resources data about each watershed, visit *StreamStats*. To find water temperature information in relation to changing environments visit the *NorWest Stream Temperature Regional Database and Model*. For materials regarding projected climate change impacts and approaches to preparing for such changes, reference: *KS-Wild Hotter, Drier, No Less Wild*, *Karuk Tribe Climate Vulnerability Assessment*, *National Center for Conservation Science and Policy: Preparing for Climate Change in the Klamath Basin*.

Other Related Plans/Documents

The following documents may be useful for additional restoration project implementation and many were referenced in the EA. They are applicable across the SRNF.

- *NEPA CEQA Handbook*
- *USFS Guidance for Stream Restoration and Rehabilitation, Yochum –2018*
- *USDI Bureau of Reclamation and US Army Engineer Research and Development Center – 2016*
- *US Environmental Board and the US Environmental Protection Agency – 2014*
- *California Tribes' Fish Use: Final Report. A Report for the State Water Resources Control Board and the National Best Management Practices for Water Quality – 2010*
- *Process-based Principles for Restoring River Ecosystems – 2010*
- *Recent Water Temperature trends in the Lower Klamath River, California – 2005*
- *Recovery Strategy for California Coho Salmon – 2004*
- *Channel Suspended Sediment and Fisheries: A Synthesis for Quantitative Assessment of Risk and Impact – 1996*
- *Six Rivers National Forest Land and Resource Management Plan – 1995*
- *Large Woody Debris and Salmonid habitat in a Small Coastal British Columbia Stream – 1992*
- *Habitat Requirements of Salmonids in Streams – 1991*
- *Responses of Salmonid to Habitat Change – 1991*
- *The Influences of Inorganic Sediment on the Aquatic Life of Streams – 1961*
- *Mussel-Friendly Restoration*