



# ENVIRONMENTAL ASSESSMENT

PROJECT PROPONENT AND LEAD AGENCY  
TRINITY RIVER RESTORATION PROGRAM OFFICE  
U. S. DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION

**TRINITY RIVER WATERSHED RESTORATION PROJECT**  
**CGB-ED-2025-034**  
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**Project Proponent and Federal Lead Agency:**

U. S. Department of the Interior, Bureau of Reclamation

**Federal Cooperating Agencies:**

U. S. Department of the Interior, Bureau of Land Management

U. S. Department of Agriculture, Forest Service



**Trinity River Watershed Restoration  
Environmental Assessment  
CGB-ED-2025-034  
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Project #63121 (Forest Service)**

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## **Mission Statement**

The U.S. Department of the Interior (DOI) protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated Island Communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

The Bureau of Land Management's mission is to sustain the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations.

The U.S. Department of Agriculture (USDA) provides leadership on food, agriculture, natural resources, rural development, nutrition, and related issues based on public policy, the best available science, and effective management. The USDA provides economic opportunity through innovation, helping rural America to thrive; to promote agriculture production that better nourishes Americans while also helping feed others throughout the world; and to preserve our Nation's natural resources through conservation, restored forests, improved watersheds, and healthy private working lands.

The U.S. Forest Service's mission is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations.

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**ACRONYMS AND ABBREVIATIONS**

°F	degrees Fahrenheit
AEAM	Adaptive Environmental Assessment and Management
ACS	Aquatic Conservation Strategy
af	acre-feet
BMPs	best management practices
Basin Plan	Water Quality Control Plan for the North Coast Region
BiOp	biological opinion
BLM	U.S. Bureau of Land Management
Cal BP	calibrated years before the present
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
cfs	cubic feet per second
CM	conservation measure
cm	centimeters
CNDDDB	California Natural Diversity Database
CVP	Central Valley Project
DBH	diameter at breast height
DOI	U.S. Department of the Interior
DPS	distinct population segment
Draft SIR	Draft Supplementary Information Report
EA	Environmental Assessment
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
ESU	evolutionarily significant unit
FEIS	Final Environmental Impact Statement
ESA	Endangered Species Act
GPM	general protection measure
USFS	U.S. Forest Service
HUC	Hydrologic Unit Code
HVT	Hoopa Valley Tribe
ITAs	Indian Trust Assets
LRMP	Land and Resource Management Plan
MFF	maximum fishery flow
MWh	megawatt hours
NCIP	Northwest California Integrated Resource Management Plan

ND	Northern Division
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRIS	Natural Resource Information System
Reclamation	Bureau of Reclamation
Regional Water Board	North Coast Regional Water Quality Control Board
RSI	remote site incubation
RFO	Redding Field Office
ROD	Record of Decision
SHPO	State Historic Preservation Office
SR	seasonal restriction
STNF	Shasta-Trinity National Forest
TEK	Traditional Ecological Knowledge
TCPs	Traditional Cultural Properties
TMC	Trinity Management Council
TMDLs	Total maximum daily loads
TRD	Trinity River Division
TRFES	Trinity River Flow Evaluation Study
TRRP	Trinity River Restoration Program
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WRO	Water Rights Order

# 1 Introduction

This Environmental Assessment (EA) for the proposed Trinity River Watershed Restoration Project (Project) has been prepared by the U.S. Department of the Interior's (DOI) Bureau of Reclamation's (Reclamation) Trinity River Restoration Program (TRRP) office, the Bureau of Land Management (BLM), and the United States Department of Agriculture's (USDA) Forest Service (USFS) to meet the requirements of the National Environmental Policy Act (NEPA) and evaluate restoration activities in the Trinity River watershed (Figure 1-1). Reclamation's TRRP office is the lead federal agency for the proposed action and for NEPA authority. BLM and USFS are cooperating agencies.

The EA analyzes the environmental effects of proposed restoration activities intended to improve the ecological function of aquatic and riparian habitat for anadromous fish species. This EA would facilitate the implementation of future restoration actions within the Trinity River watershed through a streamlined NEPA process and applies to activities evaluated in this EA that have a federal nexus (projects on federal lands or funded through federal agencies or funding mechanisms), including site-specific projects on private lands. Project activities analyzed in this document may require site-specific surveys; additional decisions; permitting by regulatory agencies; coordination with the National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS) in regard to Endangered Species Act (ESA) compliance; and compliance with the National Historic Preservation Act (NHPA), including consultation with the State Historic Preservation Office (SHPO), prior to implementation (Appendix A).

Project activities and potential impacts would typically occur along roads and within areas designated as riparian reserves under the 1994 Northwest Forest Plan<sup>1</sup> (NWFP) within the Trinity River watershed, in Trinity and Humboldt counties, California. The primary objectives of the Project are to enhance habitat conditions for native anadromous fish species (i.e., salmon, steelhead, Pacific lamprey) within the Trinity River watershed and to support the attainment of objectives of the Aquatic Conservation Strategy (ACS), adopted by the BLM and USFS. The two primary objectives of the ACS that would be directly addressed by the Project, are to restore watershed function and to conserve riparian reserves.

All environmental commitments, which are measures designed to protect environmental resources, developed for this EA would be incorporated, in writing or by reference, into future agency decisions for site-specific projects (Appendix B). These are consistent with the ACS, Shasta-Trinity National Forest's (STNF) Land and Resource Management Plan (LRMP), 2012 National Best Management Practices (BMPs) for Water Quality Management on National Forest System Lands<sup>2</sup> (USFS 2012; USDA, Forest Service, Volume 1: National Core BMP Technical Guide, FS-990a) and the BLM's Northwest California Integrated Resource Management Plan (NCIP).

TRRP has collaborated on the Proposed Action with sovereign Tribal partners, including the Hoopa Valley Tribe (HVT) and Yurok Tribe, as well as federal and state regulatory agencies, including: the USFWS, NMFS, California Department of Fish and Wildlife (CDFW), and North Coast Regional Water Quality Control Board (Regional Water Board).

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<sup>1</sup> During the preparation of this document, the NWFP was in the process of being amended for USFS with the updated amendment anticipated to be completed in 2026. The NWFP, with the updated amendment, would continue to provide direction for the activities implemented by the USFS. Associated requirements of the updated NWFP would be incorporated into USFS resource and land management plans.

<sup>2</sup> The 2012 USFS BMPs are incorporated into Appendix B.

## 1.1 TRRP Background

Congress authorized construction of the Trinity River Division (TRD) of the Central Valley Project (CVP) in 1955 (Public Law 386, 84th Congress, First Session). Authorized water uses from the TRD included irrigation and beneficial uses in the Central Valley and power production. The TRD began operations in 1963, blocking 109 miles of important salmonid habitat above Lewiston Dam and exporting as much as 90% of the Trinity River's inflows into Trinity Lake to the Sacramento River Basin. In the Trinity River, fisheries resource managers had observed an almost-instantaneous decline in the numbers of naturally produced adult salmonids returning to spawn in the Trinity River basin. Returning salmon numbers declined 53 to 96%, depending on the species (USFWS and HVT 1999).

To address these precipitous declines, numerous pieces of legislation and a decades-long study led to the completion of the Trinity River Flow Evaluation Study (TRFES) by USFWS and HVT (1999) and the subsequent Trinity River EIS and 2000 Record of Decision (ROD) (DOI and HVT 2000). The 2000 ROD recognized that salmon recovery required "rehabilitating the river itself" by "restoring the attributes that produce a healthy, functioning alluvial river system" and selected a course of action that included variable annual instream flows, physical channel rehabilitation, sediment management, watershed restoration, and infrastructure improvements guided by an Adaptive Environmental Assessment and Management (AEAM) program.

Following the 2000 ROD, the U.S. Department of the Interior established the TRRP to restore the fisheries of the Trinity River affected by dam construction and related TRD diversions. Administered by Reclamation, TRRP is a partnership of federal and state resource agencies, Tribes, and Trinity County. The Program works to restore the processes and attributes of a properly functioning river and watershed to support the recovery of diminished salmon and steelhead populations while retaining the Trinity and Lewiston dams' delivery of water and power to the Trinity River and California's Central Valley.

## 1.2 Project Location

The proposed Project would take place along the mainstem and tributaries of the Trinity River, which are located both below and above the Lewiston and Trinity dams (Figure 1-1). The Project activity area includes the Trinity Alps Wilderness. The proposed restoration activities are analyzed at the hydrologic unit code 10 (HUC 10) subwatershed scale. See Table 1-1 below for HUC 10 watersheds included in the Project activity area.

**Table 1-1. Watersheds within the Trinity River subbasin.**

Subregion (HUC 4)	Basin (HUC 6)	Subbasin (HUC 8)	Watershed (HUC 10)	HUC 10 Number	Acres in Project Activity Area
Klamath-Northern California Coastal 1801	Northern California Coastal 180102	Trinity California 18010211	Big French Creek-Trinity River <sup>1</sup>	1801021111	153,325
			Browns Creek	1801021106	47,110
			Canyon Creek	1801021108	41,033
			Coffee Creek	1801021101	74,835
			East Fork Trinity River	1801021103	74,335
			Horse Linto Creek-Trinity River <sup>2</sup>	1801021112	0
			New River	1801021110	149,597
			North Fork Trinity River	1801021109	97,483
			Stuart Fork	1801021104	88,264
			Swift Creek-Trinity River	1801021105	121,055
			Tangle Blue Creek-Trinity River	1801021102	101,393
			Weaver Creek	1801021107	142,030
		South Fork Trinity 18010212	Lower South Fork Trinity River <sup>3</sup>	1801021205	44,229
			Lower Hayfork Creek	1801021203	142,161
			Upper Hayfork Creek	1801021202	105,697
			Middle South Fork Trinity River	1801021204	145,776
			Upper South Fork Trinity River	1801021201	73,634

<sup>1</sup> A portion of Big French Creek is excluded from the Project activity area, namely the Sharber Creek HUC 12 subwatershed, because it is in the Six Rivers National Forest.

<sup>2</sup> Horse Linto Creek is located in the Six Rivers National Forest and is not included in the Project activity area.

<sup>3</sup> A portion of Lower South Fork Trinity River is excluded from the Project activity area, namely Grouse, Mingo, and Old Campbell Creeks (HUC 12 subwatersheds), because they are located in the Six Rivers National Forest.

As described by the ACS (USFS 1995), Key Watersheds provide high-quality water, and a large system of refugia that are crucial to at-risk fish species and stocks. These are designated areas that either provide, or are expected to provide, high-quality habitat to be used as refugia for anadromous salmonids and resident fish species. In addition, Key Watersheds may contain degraded areas of habitat with a high potential for restoration. Key Watersheds within the Project activity area are the North Fork Trinity River, South Fork Trinity River, Canyon Creek, and New River. These Key Watersheds are prioritized for restoration activity implementation to provide aquatic and riparian habitat essential to the maintenance, recovery, or enhancement of anadromous fish populations. The Project’s compliance with the ACS is described in more detail in Appendix C. It should be noted that though restoration activities are prioritized for Key Watersheds, restoration activities are proposed for all the HUC 10 watersheds within the Project activity area.

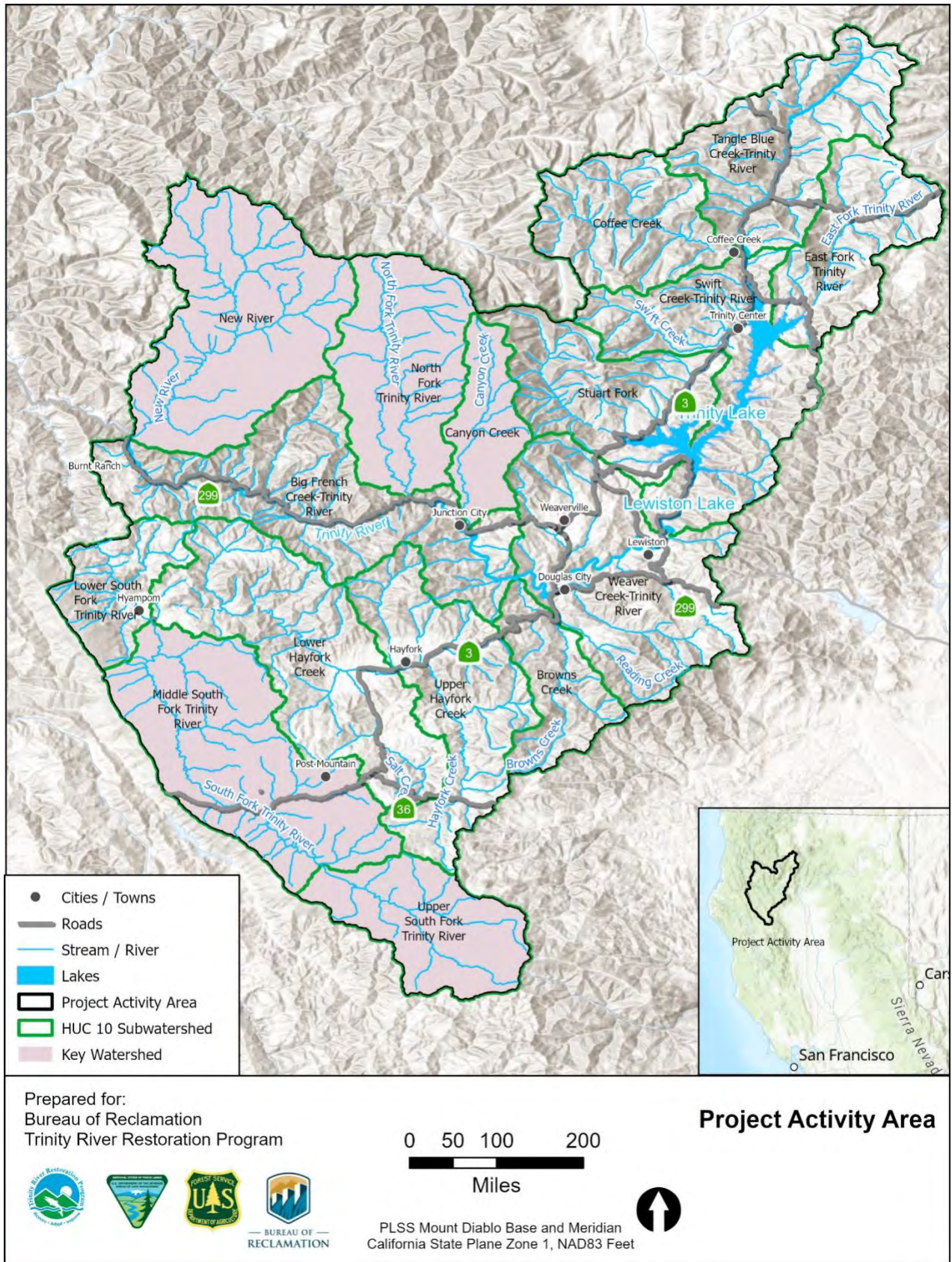


Figure 1-1. Project activity area, where restoration activities would be implemented.

## 2 Purpose and Need

As previously mentioned, TRRP was established to restore the fisheries of the Trinity River, which had precipitously declined. To that end, the purpose of the Proposed Action is to improve instream and riparian habitat to accelerate the recovery of north coast salmonid populations (coho salmon, steelhead, and Chinook salmon) and other special status aquatic species, thereby fulfilling tribal trust responsibilities and obligations to local communities as well as recreational and commercial fishing industries (per the STNF LRMP, BLM's NCIP, and state and federal recovery plan goals [NMFS 2014, CDFG 2004]).

The following describes the objectives of the Proposed Action:

- Restore and improve instream conditions sufficient to support all life stages of salmonids and other aquatic species;
- Restore upstream and downstream fish passage for all life stages of salmonids;
- Restore continuous paths for wood dispersal, nutrient cycling, sediment transport, and movement of other vegetative material essential for productive aquatic habitat;
- Maintain or restore native plant communities and vegetative structure impacted by invasive plants and pathogens, while rehabilitating eroding streambanks to improve water quality, shade conditions, and large wood recruitment;
- Repair, replace, or remove ineffective instream structures;
- Restore and improve riparian and meadow habitat to promote healthy conditions for aquatic and terrestrial wildlife populations;
- Improve late summer/fall base flow conditions through process-based restoration, water conservation improvements, and meadow restoration;
- Increase nutrient inputs through salmon carcass placement in the watershed; and
- Stabilize upslope areas around road infrastructure to minimize erosion and sediment discharges within the watershed to bring the sediment impaired watersheds into compliance with sediment reduction total maximum daily loads (TMDLs) for the South Fork Trinity and Trinity Mainstem rivers (EPA 1998 & EPA 2001).

The Proposed Action would continue TRRP's restoration efforts through implementors and would streamline future site-specific environmental reviews, which would likely increase the number of restoration activities implemented on an annual basis. In addition, the Proposed Action has broadened the types of restoration activities proposed and these would be implemented at the watershed-scale.

### 3 National Environmental Policy Act (NEPA)

This EA has been prepared in accordance with NEPA (42 United States Code [USC] 4321 et seq.) and the DOI Regulations for the Implementation of NEPA (43 CFR Part 46<sup>3</sup>). Governmental agencies are required to publicly disclose information about their proposed activities that may affect the environment and evaluate the potential environmental impacts of their proposed actions before making final decisions to utilize them or formal commitments to implement them.

The proposed Project is subject to NEPA because of the likelihood that a restoration action will occur on federal lands and/or involve federal funding; and would therefore involve one or more Federal agencies (Reclamation, USFS, and/or BLM). These agencies must consider public input as they implement projects that are consistent with the analysis, environmental commitments, and authorizations of their decision. This EA provides the basis for the Federal agencies' determination to implement the Proposed Action consistent with this analysis and environmental commitments in order to ensure that none of these site-specific restoration projects would significantly affect environmental resources.

There are many other laws and regulations that have influenced the scope of the EA including, but not limited to, the Endangered Species Act (ESA), Magnuson-Stevens Act (MSA), and the Clean Water Act (CWA). These and others are described further in regard to their relationship to this Project in Appendix D. Compliance with the Standards and Guidelines for Survey and Manage Species can be found in Appendix E The analysis for compliance with the Wilderness Act and the Wild and Scenic Rivers Act (WSRA) can be found in Appendix F

#### 3.1 Future Site-Specific Analyses within the Scope of this NEPA Document

As previously mentioned, Reclamation (through the TRRP that is part of Reclamation's Northern California Area Office [NCAO]) is the Lead Federal Agency for the NEPA process. The cooperating agencies are USFS and BLM. The nature and extent of environmental effects from the restoration activities that are included with the Proposed Action are generally well understood and documented. Therefore, these federal agencies have chosen to evaluate these activities together to gain more consistent environmental impact analyses, streamline contracting and implementation processes, and save costs, ultimately improving habitat conditions for fish and wildlife more efficiently and effectively. The environmental analysis included in this NEPA document would facilitate and streamline future site-specific project analysis and any remaining environmental compliance needs.

Site-specific restoration projects would be evaluated to determine the level of NEPA analysis required, and whether the project proposal would be within the scope of this NEPA document. The extent of future site-specific analyses would be commensurate with the size, scope, and potential environmental impacts of the specific restoration proposal. For each

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<sup>3</sup> Executive Order 14154, Unleashing American Energy (Jan. 20, 2025), and a Presidential Memorandum, Ending Illegal Discrimination and Restoring Merit-Based Opportunity (Jan. 21, 2025), require the Department to strictly adhere to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 et seq. Further, such Order and Memorandum repeal Executive Orders 12898 (Feb. 11, 1994) and 14096 (Apr. 21, 2023). Because Executive Orders 12898 and 14096 have been repealed, complying with such Orders is a legal impossibility. Reclamation verifies that it has complied with the requirements of NEPA, including the Department's regulations and procedures implementing NEPA at 43 C.F.R. Part 46 and Part 516 of the Departmental Manual, consistent with the President's January 2025 Order and Memorandum. Reclamation has also voluntarily considered the Council on Environmental Quality's rescinded regulations implementing NEPA, previously found at 40 C.F.R. Parts 1500 – 1508, as guidance to the extent appropriate and consistent with the requirements of NEPA and Executive Order 14154.

of the federal agencies, the site-specific impact analysis (if deemed to be within the scope of this NEPA document) would be documented in a particular way as summarized below:

- Reclamation (TRRP) would need to complete a Supplemental EA.
- BLM would complete a Determination of NEPA Adequacy (DNA) to ensure the associated effects of each the site-specific restoration projects do not exceed those described in this NEPA document and ensure conformance with the BLM's NCIP.
- USFS would consider future site-specific proposals with a checklist (see Appendix A) that ensures the site-specific project meets the purpose and need for this EA, includes all appropriate environmental commitments, and an interdisciplinary team has determined that the effects of the site-specific project are within those disclosed in this EA. The USFS would also provide public notification and make checklist documentation available when site-specific projects under this EA are planned to be implemented.

For further details, please refer to the Implementation Plan (Appendix A). In addition to the site-specific impact analysis, restoration projects within the scope of this NEPA document would need to incorporate all applicable environmental commitments into restoration designs (Appendix B).

## **3.2 NEPA Scoping and Public Involvement to Date**

TRRP, supported by BLM and USFS, led scoping and public involvement efforts and obtained input on the Project from tribes, stakeholders, future restoration project implementors, and the public. The intent of these efforts has been to provide these groups with information about the Project and NEPA analysis and create forums for these groups to bring forth insights, issues, and concerns. This effort has occurred alongside TRRP's ongoing outreach activities, in which TRRP staff members have met with local groups (e.g., fishing guides, whitewater rafters, and local residents) and individual landowners to obtain stakeholder input and advice and to address general concerns about watershed restoration within the Trinity River watershed. Notice of all public meetings conducted and other pertinent Project information has been announced in local newspapers and/or posted on the TRRP's website<sup>4</sup>. Included below is a summary of the scoping and public involvement efforts completed to date, specific to the Project. Please refer to Appendix G for further detail.

### **3.2.1 Tribal Consultation**

Pursuant to Section 106 of the National Historic Preservation Act (NHPA), federal agencies are required to consult with any Indian Tribe that attaches religious and cultural significance to a historic property that may be affected by an undertaking and the process for consultation is defined in the Advisory Council on Historic Preservation's regulations (36 CFR Part 800). In addition, the USFS, per executive orders and agency policy, is required to have robust and meaningful engagement with Tribes. To meet these requirements, TRRP, USFS, and BLM sent meeting notifications via email and the agencies' resource staff coordinated with their tribal representatives to discuss the Project activity area, proposed and possible restoration activities and opportunities, as well as potential effects to traditional cultural properties (TCPs), sites, practices and beliefs. Traditional ecological knowledge (TEK), which includes cultural/traditional knowledge about plants, animals, and land management practices, would be incorporated into proposed restoration designs and project implementation in part to maintain or protect TCPs.

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<sup>4</sup> <https://www.trrp.net/>

The Trinity River Watershed 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, temporary encampments for hunting/fishing or seasonal occupations, 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 Project, as a possible means to rehabilitate resource areas which have suffered in recent years.

### **3.2.2 Public Scoping**

Public scoping for the Project began on November 4, 2022, and ended on December 5, 2022. At the onset of the public scoping period, notices informing the public of the intent to begin the environmental review process were posted on TRRP, USFS, and BLM websites and at the TRRP Weaverville office. Scoping notices were also mailed and emailed to local landowners and interest groups and published in the Trinity Journal on November 16, 2022. The TRRP, BLM, and USFS hosted a virtual and in-person scoping meeting on November 17, 2022, to outline the proposed Project, receive public input, and to answer questions. During public scoping for this Project, eight individuals or organizations provided comments in response to the public scoping notice and during the public meeting.

In May 2023, the TRRP engaged restoration practitioner stakeholders to provide initial feedback on the Project scope, activities and process. The meeting was followed up with a survey to give the opportunity for these stakeholders to provide specific recommendations and concerns. The summary of public scoping and scoping input is included in Appendix G.

### **3.2.3 Draft EA Public Review**

An in-person open house for the public took place on March 1, 2025, at 4:00 p.m. Pacific Standard Time at the Weaverville Hotel in Weaverville, California. Information about the Draft EA and the public meeting is available on the TRRP's website (see <https://www.trrp.net/restoration/watershed-activities/watershed-ea/>) Trinity River Watershed Restoration Project page.

Consistent with Reclamation and BLM agency guidance, public review of the Draft EA began when the agencies posted the document to their websites on March 28, 2025. The USFS public review period began when notice was published in *Redding Record Searchlight*, which is the paper of record, on April 1, 2025. The document was circulated to local, state, and federal agencies and to interested organizations and individuals for a 30-day comment period. Public review of the Draft EA/IS ended on May 1, 2025.

Copies of the Draft and Final EA/IS are available for review on the following websites:

- TRRP's website at <https://www.trrp.net/restoration/watershed-activities/watershed-ea/>
- BLM's website at <https://eplanning.blm.gov/eplanning-ui/project/2036707/510>.

Five comment letters on the Draft EA were received, and responses to comments are provided in Appendix G

### **3.2.4 Changes to the Final EA from the Public Draft EA**

The following substantive changes have been made to the EA from the Public EA:

- The California Endangered Species Act (CESA) status of the Upper Klamath Trinity River spring-run chinook salmon has been updated throughout the EA and Appendix K to accurately reflect it as California Threatened (CT). The Public Draft EA had denoted this species as California Endangered (CE).
- The Residential Use regional effect described in Section 6.4 has been updated to include water diversions for residential use and their impact on Trinity River Watershed health. This change is reflected in Section 6 of the EA as well as in the resource technical reports (Appendix I through Appendix M).
- Where applicable, it has been noted in the EA that the Trinity County Herbicide Ordinance has been rescinded.
- The addition of “critical dips” has been added to the activities under Road Rehabilitation (Section 4.2.3.2) and Appendix H This addition does not change the analysis.
- Water Conservation Project Monitoring Metrics in Appendix H have been updated to include both water savings and also volume of water that is diverted during the wet season instead of the low-flow season, as some project objectives would be to alter the timing, rather than the reduction, of water use.

## 4 Description of Alternatives

This chapter describes the No Action and Proposed Action alternatives for the Project. The agencies are required to study and develop a no action alternative, along with action alternatives, in the event the Proposed Action involves unresolved issues or conflicts concerning alternative uses of available resources, 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 agencies developed the No Action and the Proposed Action alternatives for the EA, as described below.

### 4.1 No Action

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

Under the No Action alternative, proposed restoration activities under Proposed Action alternative would be subject to individual NEPA analysis, with no way to streamline permitting needs. The opportunity to streamline environmental compliance and thereby increase the pace and scale of restoration actions within the Trinity River basin, would be foregone. The current limited pace and scale of essential restoration activities in the Trinity River watershed to aid in the recovery of sensitive and threatened fish species would continue, as district staff develop projects and secure funding and resources to fulfill legal mandates for individual project notice and comment, NEPA/California Environmental Quality Act (CEQA) requirements, ESA consultation, and cultural review per applicable laws (e.g., Section 106, Executive Order 13007, etc.).

### 4.2 Proposed Action

The Proposed Action includes a suite of instream, riparian corridor, and upslope habitat restoration activities that are designed to maintain, enhance, and restore instream processes to benefit aquatic species, riparian and upslope habitats, and water quality. Activities include instream habitat restoration; upslope habitat restoration; and road maintenance, rehabilitation, and decommissioning activities as listed below. Appendix H also includes activity cards that clearly summarize these activity categories.

#### Instream Habitat Restoration:

1. Restoration and Enhancement of In-Channel Habitat
2. Floodplain Restoration
3. Removal or Retrofitting of Fish Passage Barriers, Small Dams, Flood Gates, Pilings and Other In water Structures
4. Water Conservation Projects
5. Salmon Carcass Placement
6. Remote Site Incubators

#### Upslope Habitat Restoration:

7. Bioengineered Bank Stabilization
8. Aquatic, Wetland, Riparian, and Upslope Habitat Enhancement

#### Road Maintenance, Rehabilitation, and Decommissioning Activities:

9. Road Maintenance

10. Road Rehabilitation
11. Road Decommissioning

Appendix H includes activity cards that clearly summarize these activity categories. Project activities are described in this EA in as much detail as possible, namely: the conditions that restoration activities would seek to enhance; the environmental commitments that are important for avoiding adverse effects; and the overall effect of those projects on the human environment. As previously mentioned, TRRP, BLM, and USFS would plan future site-specific restoration efforts within the Trinity River HUC 10 watersheds listed in Table 1-1. Site-specific analysis and public notification would be implemented as further described in Appendix A. Activity category-specific design guidelines are provided in Appendix B to help the authorizing agencies and individual project proponents: design proposed restoration projects in a manner that is appropriate and sustainable; minimize adverse effects to aquatic habitats; and maximize the ecological benefits to further support the recovery of aquatic species, habitat, and an ecologically functioning watershed.

## **4.2.1 Instream Habitat Restoration**

### **4.2.1.1 *Restoration and Enhancement of In-Channel Habitat***

The “restoration and enhancement of in-channel habitat” activity category typically applies to reaches of the mainstem Trinity River or tributaries where channel diversity is limited, and habitat complexity needs to be restored and/or enhanced. This activity category also 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.

This category includes, but is not limited to, the following activities: installation of habitat elements such as vegetation, loose large wood with and without rootwads, structured log jam (SLJ) installation using vibratory pile-driving techniques (stabilizing the SLJs with timber piles), in-stream boulders, beaver dam analogues (BDAs), post-assisted log structures (PALS), spawning gravel, and other low-tech process-based restoration (LTPBR) techniques. Also included in this category is channel excavation, grading of floodplains, the addition of weir-like tailwater control structures (constructed of logs and or rock) that do not impede fish passage, riparian vegetation removal (where necessary), construction of gravel and skeletal bars, construction of floodplain surfaces with elevations allowing periodic inundation, removal of riparian berms, bedrock fracturing (where necessary) using blasting techniques, and revegetation of restored floodplain surfaces. This activity category typically involves reconnecting and creating side-channel, alcove, oxbow, pond, off-channel, floodplain, and other habitats, and potentially removing off-channel fill and plugs. New side-channels and alcoves may be constructed in geomorphic settings that will accommodate such features. Excavators, bulldozers, dump trucks, front-end loaders, vibratory pile driver and similar equipment may be used to implement proposed restoration projects.

The restoration of in-channel habitat would result in:

- Increased instream habitat diversity and complexity;
- Increased cover and flow refugia for salmonids;
- Improved heterogeneity of flows and hydrologic connectivity;
- Long-term nutrient storage and substrate for aquatic macroinvertebrates;
- Moderation of flow disturbances;
- Increased retention of leaf litter; and
- An overall increase in the quality and quantity of instream habitat.

Proposed restoration and enhancement of off-channel and side-channel habitat projects could provide details about water supply (channel flow, overland flow, and groundwater), water quality, flow reliability, flooding risk of channel changes, and channel and hydraulic grade.

The following describes habitat features that could be installed as part of multiple activity categories.

#### 4.2.1.1.1 Large Wood

A 2011 study conducted for the TRRP recommended that 500 to 600 large wood pieces per RKM (805 to 966 pieces per RM) be present throughout the Trinity River mainstem 40-mile TRRP restoration reach (Cardno Entrix and CH2MHill 2011). During the study, large wood was characterized as having a minimum size of 20 centimeters (cm) diameter at breast height (DBH) and 2 meters (m) in length and was divided further into the following size classes:

- Size 1 – 20 to 30 cm DBH or 4 m in length
- Size 2 – 30 to 70 cm DBH and 4 to 10 m in length
- Size 3 – key pieces, larger than 70 cm DBH or 10 m in length

In 2015, an estimated 32 to 40 wood pieces per RKM (52 to 64 pieces per River Mile [RM]) were present in the Trinity River mainstem within the reaches where no rehabilitation activities had taken place, which suggests that there is a reach-wide deficit of wood. It is likely that there is a deficit of large wood in the tributaries as well.

Placement of large wood in streams is one of the most widespread and common techniques to improve instream habitat for salmonids. Wood is a naturally occurring component of stream and river systems where little or no anthropogenic alteration has occurred, wherein vegetation within the floodplain is recruited into the channel through flooding, erosion, wind throw, disease, beaver activity, or other natural mortality. The presence of wood within the river system also increases channel-floodplain connectivity, which aids in recruitment of wood that has been placed through augmentation or is naturally occurring within the floodplain (Cardno Entrix and CH2MHill 2011).

Though the geomorphic benefits of dispersed wood are often minor, such instream wood often provides shelter from flow allowing sediment to deposit and be exchanged with mobile grains during high flows. Instream wood often also creates scour holes in the river channel that help dissipate the energy of flows, which can benefit aquatic habitat by providing hydraulic diversity for benthic organisms. In addition, wood can increase stream shading, cover for predator avoidance, and floodplain complexity. The hydraulic roughness from instream wood can also increase flow access to floodplains, where salmonids can exploit food resources and grow to larger sizes in shorter timeframes to aid in their survival to adulthood (Sommer et al. 2001).

Techniques for wood placement include dispersing wood throughout the floodplain and construction of engineered instream structures such as SLJs. Large wood would be installed using either anchored or unanchored logs, or both, depending on site conditions and wood availability. Wood-loading methods would include but are not limited to direct felling; whole tree tipping/placement; tree placement by helicopters, grip hoisting, or excavator; and other techniques.

SLJs include an anchoring system, such as rebar pinning, ballast rock, or vertical posts. These structures are designed to redirect flow and change scour and deposition patterns and are patterned after stable natural log jams. They are anchored in place using rebar, rock, or piles (driven into a dewatered area or the streambank, but not in water). SLJs create a hydraulic shadow, which is a low-velocity zone downstream that allows sediment to settle. Scour holes develop

adjacent to the engineered log jam. While providing valuable fish and wildlife habitat, they also redirect flow and can stabilize a streambank or downstream gravel bar (USFWS 2025).

#### 4.2.1.1.2 Small Wood

Small wood placements are defined as those that use wood that is less than 20 cm DBH and/or 4 m or less in length. Small wood placement includes but is not limited to small, whole tree placement, BDAs, PALS, brush/willow baffles, post lines only, post lines with wicker weaves, construction of starter dams, reinforcement of existing active beaver dams, and reinforcement of abandoned beaver dams as described by Pollock et al. (2012). Small wood placement can improve habitat by flattening local stream gradients, increasing floodplain interactions and groundwater storage, capturing of fine sediment in the channel, pool formation, hyporheic exchange, and riparian habitat recovery. Structures consist of porous channel-spanning or partial spanning structures, riparian cuttings (e.g., willow cuttings) and other inert materials that are structurally reinforced with small diameter driven wood posts. Structures include interstitial spaces that allow water, sediment, fish and other aquatic organisms to move through the structure.

#### 4.2.1.1.3 Boulders

Boulders would be placed in plane-bed streams, streams where boulders had been historically, and other stream conditions where improvements to habitat complexity are warranted. Boulder placements increase instream habitat diversity and complexity, improve flow heterogeneity, provide substrate for aquatic species, and provide flow refugia for fish during elevated flows.

#### **4.2.1.2 Floodplain Restoration**

The “floodplain restoration” activity category typically applies to areas where floodplains have been disconnected from adjacent streams and rivers. This activity category is aimed primarily at restoring hydraulic connections and inundation across the floodplain to improve the diversity and complexity of aquatic, wetland, meadow, and riparian habitat, as well as ecosystem function within the watershed.

This activity category may include: the setback, breaching, modification, and removal of levees, berms, and dikes as well as floodplain lowering (e.g., mine tailing excavation) or fill in support of hydraulic reconnection across the floodplain (including restoration to stage zero, which creates streams that are fully connected with their floodplains, typically with multi-thread channels). Also included in this activity category, is rock placement (including engineered stream material, riffle ramps, or weirs); filling or reshaping of on- and off-channel gravel pits; LTPBR techniques such as BDAs and PALS; and other strategies to aggrade the channel and improve connectivity within the floodplain. Levee setback projects include construction of new levees to facilitate removal or breaching of existing levees, and creation of aquatic or riparian habitat. Levees may also be adjusted, or a low levee bench may be created to facilitate floodplain inundation or channel margin habitat. Floodplains should mimic natural or historic flooding patterns and remain flooded/inundated for long enough to activate food webs.

Meadow and floodplain restoration may involve reconnecting down-cut or incising channels to their floodplains to restore hydrologic processes and meadow health; filling incised, entrenched channels; creating new stream channels; regrading floodplains or realigning channels; or installing stabilization structures (e.g., Zeedyk structures). Projects using fill to address channel incision should also incorporate habitat elements that offset the likelihood for incision to re-occur such as adding large wood and channel roughness. These restoration actions may ultimately rely on watershed processes to complete work over time to restore a channel network and floodplain that supports wetland, meadow,

and/or grassland habitat. Excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement these restoration projects.

Floodplain restoration activities would improve ecosystem function by:

- Creating intermittent hydrologic connections between streams and floodplains;
- Increasing the diversity and complexity of aquatic, wetland, and riparian habitat within the floodplain, which would better support aquatic and terrestrial fish and wildlife species;
- Providing opportunities for sediment to deposit on the floodplain seasonally, which enhances meadow vegetation, bird and mammal use, fish rearing and spawning, and refuge from predators and physical stressors;
- Slowing runoff and absorbing excess water during flood events, thereby reducing peak flows and reducing downstream flooding impacts;
- Improving water quality, including hyporheic flow processes;
- Improving the fluvial dynamics of the watershed system, including sediment deposition and channel meander; and
- Providing flow and cold-water refugia for native fish and other aquatic species.

Similar to projects that create off-channel/side-channel habitats, proposed floodplain restoration projects could provide details about water supply (channel flow, overland flow, and groundwater), water quality, flow reliability, flooding risk of channel changes, and channel and hydraulic grade.

#### ***4.2.1.3 Removal or Retrofitting of Fish Passage Barriers, Small Dams, Flood Gates, Pilings and Other In-water Structures***

The “removal or retrofitting of fish passage barriers, small dams, flood gates, pilings and other in-water structures” activity category typically applies to locations where there are natural or manmade in-stream structures (small dams, fords, diversions, flood gates, pilings, legacy structures, etc.) that are blocking/obstructing hydrologic connectivity, fish passage, and/or habitat function.

This activity category may include: the removal or retrofitting (for fish passage) of small dams, diversions, flood gates, pilings, and legacy structures; separation of streams from artificial impoundments (e.g., ponds or lakes) by realigning and/or rerouting channels around or through these artificial waterbodies and/or through the use of vertical concrete or sheet-pile walls; fish passage enhancement at stream confluences through manual movement of deposited or placed material; and removal or retrofitting (for fish passage) of undersized, deteriorated, or misaligned culverts (culvert replacement is included in the “Road Rehabilitation” activity category) or any other sort of fish passage barrier.

These activities would improve freshwater circulation, flow, and water quality primarily by removing outdated in-stream structures. This activity category is designed to reconnect stream corridors and floodplains; improve fish and wildlife migration; restore more natural channel and flow conditions; restore fisheries access to historical habitat for spawning and rearing; and improve long-term aquatic habitat quality and stream geomorphology. All proposed restoration projects would be designed with seasonal construction considerations to minimize the potential adverse effects to water quality and aquatic species. This project type would include the opportunistic removal and/or management of nonnative fish and other nonnative species (e.g., bullfrogs) that would take place during dewatering and in-water work area isolation activities utilizing proper removal protocols.

#### 4.2.1.3.1 Removal of Small Dams

Small dams are removed to restore fish access to historical habitat for spawning and rearing, and to improve long-term habitat quality and fluvial processes. Types of eligible small dams include permanent, flashboard, debris basin, earthen, and seasonal dams that are of non-jurisdictional size, as defined by the California Division of Dam Safety. Those dams are smaller in height or impounding capacity than those defined in California Code 2002 (Division 3, Part 1, Chapter 1, 6002), where “dam” means:

*Any artificial barrier, together with appurtenant works, which does or may impound or divert water, and which either (a) is or will be 25 feet or more in height from the natural bed of the stream or watercourse at the downstream toe of the barrier, as determined by the department, or from the lowest elevation of the outside limit of the barrier, as determined by the department, if it is not across a stream channel or watercourse, to the maximum possible water storage elevation, or (b) has or will have an impounding capacity of 50 acre-feet or more.*

Implementing small dam removal projects may require the use of heavy equipment (e.g., self-propelled logging yarders, cranes, mechanical excavators, backhoes, or jackhammers). Any use of blasting techniques for small dam removal must be justified by site-specific conditions, including equipment access difficulties. Hydroacoustic effects associated with blasting would need to stay below the 207 decibel (dB)  $LEAK$  and 203 dB $SELCUMULATIVE$  sound thresholds (or the most current thresholds accepted by NMFS). It should be noted that blasting and associated conservation measures are pending the reinitiation of the NMFS 2020 Biological Opinion (TRRP BiOp, NMFS 2020a).

Eligible small dam removal projects under the Project should not result in: significant increases to environmental contaminants that exceed freshwater potable effects levels outlined in the NOAA Screening Quick Reference Table guidelines (NOAA 2008); significant release of non-native invasive fish species; or in deposition of sediment that results in significant loss or degradation of downstream spawning or rearing habitat. Dams under Federal Energy Regulatory Commission (FERC) jurisdiction are also generally not eligible for removal under the Project, because they are typically larger than the proposed size criteria described in Water Code Section 6002.

Design guidelines for this activity category include use of one of the following methods (described below) to restore the channel in a small dam removal project: natural channel evolution or “stream simulation” design (NMFS 2019). It is important to note that NMFS stream simulation design is also used in the context of removing, replacing, modifying, retrofitting, installing, or resetting existing culverts, fords, bridges and other stream crossings and water control structures. Therefore, stream simulation design may apply to other activity categories.

#### 4.2.1.3.2 Natural Channel Evolution

The natural channel evolution approach to restoring a channel bed would consist of removing all hardened portions (by hand efforts, heavy equipment, or explosives) of a dam and allowing the stream’s natural flows to naturally shape the channel through the project reach over time. This method would only be used in the following situations where:

1. Risks are minimal (or all risks can be mitigated) to any of the downstream habitats and the aquatic organisms inhabiting them (based on the amount and size gradation of the material being stored above the dam) if all of the sediment upstream of the dam is released during a single storm event;
2. The project reach has sufficient space and can be allowed to naturally adjust based on any land constraints, with minimal risk to riparian habitat;

3. Project implementation follows procedures that have been documented as having been successfully performed elsewhere under similar circumstances; and
4. Notching the dam in increments after periodic storm events to reduce the amount of sediment being released during any individual storm event, provided project funding is sufficient to allow the dam to be completely removed within the proposed project timeframe.

#### 4.2.1.3.3 Stream Simulation

Generally applied at stream crossings (culverts, bridges, etc.), stream simulation design relies on the duplication of morphological conditions observed in a natural reference reach throughout the site-specific project reach. The intent of stream simulation is to create fish passage, sediment transport, and flood and debris conveyance conditions as they would occur naturally in a similar location. Determination of the high and low fish passage design flows, water velocity, and water depth is not required for this option since the stream hydraulic characteristics within the culvert are designed to mimic the upstream and downstream hydrological and geomorphological conditions of the stream (NMFS 2023).

Stream simulation designs could also be used in extreme situations where excessive sediment releases pose a threat to downstream habitat and organisms. Specifically, the sediment upstream of the dam would be physically removed and the channel through the excavated reach would be designed using stream simulation.

Stream simulation designs would be conducted in accordance with known stream restoration and fish passage guidance documents, specifically *NOAA Fisheries Guidelines for Salmonid Passage at Stream Crossings in California* (NMFS 2023). These designs include:

- Identification of a suitable reference reach;
- Quantification of the average cross-sectional shape, bank full width, bed and bank sediment grain size distributions, and geomorphic features of the channel (e.g., pool-riffle sequences, meander lengths, and step pools); and
- Reproduction of the geomorphic features found in the reference reach in the site-specific project reach.

#### 4.2.1.4 **Water Conservation Projects**

Across the watershed, water use and associated infrastructure warrant improvement and efficiency upgrades to ensure that instream flows are available for fish and wildlife species and associated habitat. Particularly, wherever there are stream diversions that continue to withdraw water when streamflows are at low-flow conditions water conservation systems are warranted.

“Water conservation projects” may include water conservation and efficiency outreach; the Well Grant Program (designed to mitigate for adverse effects of restoration flows on water supplies of private riverside landowners), Instream Flow Dedication (changes to water rights) associated with Water Code Section 1707, storage and forbearance programs and other similar programs; monitoring to determine low-flow thresholds; designing, permitting, and implementing individualized water conservation systems and associated infrastructure (e.g., fish screens). Instream flow restoration from diversion projects would be designed to reduce water withdrawals especially during low-flow conditions. New systems may include more efficient intake hoses (i.e., better overall functioning not higher flow conveyance) and low volume pumps; the installation of slow flow systems such as trickle fill, solar, and ram pumps, water storage (off-stream storage tanks and ponds and associated off-channel infrastructure) to raise water tables and

other techniques to slow runoff; and full-season forbearance systems to eliminate stream withdrawal during lowest flow periods.

Creation, operation, and maintenance of water conservation projects would be designed to reduce low-flow stream diversions and enhance instream flows, particularly base flows that support fish and wildlife habitat during the dry season. Excavators, bulldozers, dump trucks, ditch-digging equipment, front-end loaders, and similar equipment may be used to install new and/or improved water systems.

#### **4.2.1.5 Salmon Carcass Placement**

After spawning, adult salmon die and as salmon carcasses decompose they contribute marine-derived nutrients to the watershed that support many species, including aquatic organisms such as juvenile salmonids. In streams where salmon and steelhead runs have been reduced or eliminated, so too has this component of the nutrient enhancement cycle, which is critical to the health of riverine ecosystems. Therefore, supplementation of these nutrients using salmon carcasses and/or salmon flesh analogs is necessary to support aquatic and riparian food webs.

It is worth noting that salmon carcass placement is included in the NMFS BiOp for the 4d Limit for the Trinity River Coho Salmon Hatchery Genetic Management Plan (HGMP, NMFS 2020b) as Reasonable and Prudent Measure (RPM) 3b:

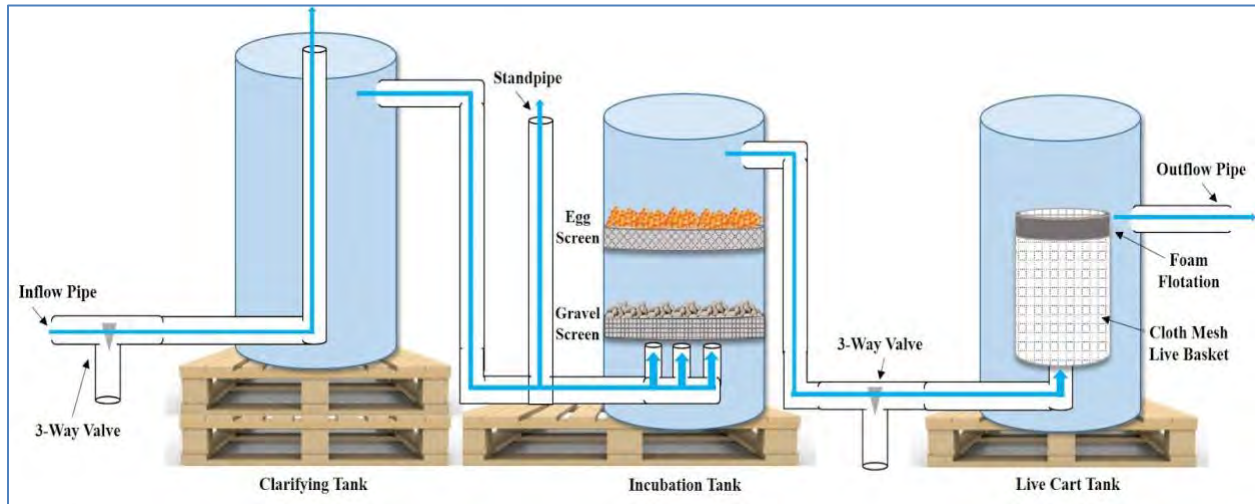
*By December 2021, Reclamation shall obtain the necessary permits required to place an amount of adult coho salmon (or adult Chinook salmon or steelhead) carcasses equal to or greater than the number or NOR [natural origin] coho salmon used for broodstock into tributary streams during each winter in order to increase MDN [marine-derived nutrients] in tributaries. By December 2022, Reclamation shall begin to supplement carcasses in tributary streams equal to or greater than the number of NOR coho salmon used for broodstock annually. In years when sufficient carcasses from salmon or steelhead are not available, salmon flesh analogs shall be utilized. Information on numbers of carcasses supplemented and locations shall be included in an annual report to NMFS.*

The salmon carcass placement activity category entails obtaining excess carcasses from the Trinity River Hatchery (TRH) and placing them throughout the Trinity River watershed, where needed. Distribution of carcasses and/or salmon flesh analogs would occur where anadromous fish are known to be present within the watershed or within areas historically accessible to anadromous fish. Carcasses/analogues would be placed randomly within aquatic and riparian areas by placing individual or small groups of carcasses/analogues on the ground, in the water, or wedging them into accumulated wood. Trucks would be used to transport the fish carcasses from the hatchery to the placement sites and hand tools would be used to distribute the carcasses/analogues at the site. This activity would occur when excess carcasses are available as determined by hatchery managers and when technicians are available to perform the carcass placement. If carcasses are not available, salmon flesh analogs would be used.

Salmonids and other fish that spend their lives in coastal streams and rivers in the Pacific Northwest can become infected with an organism called *Neorickettsia helmonthoeca*. If other animals, including dogs, ingest fish carrying this organism, they can become sick with “salmon poisoning disease,” which includes gastrointestinal symptoms and can lead to more serious issues (Oregon VMA 2025). The salmon carcasses utilized in this activity will have been treated through deep-freezing prior to placement and therefore, would not cause salmon poisoning disease.

#### 4.2.1.6 Remote Site Incubation (RSI) Supplementation

Remote site incubation (RSI) systems have been utilized throughout anadromous streams of the Pacific Coast to incubate, hatch, and stock various salmonid species as a supplementation tool in remote settings. Units consist of a clarifying tank, an incubation tank, a live cart tank, piping between the water intake and the tanks, a head box (at the upstream water intake point), and gravity-fed water (Figure 4-1). Salmonid eggs are loaded into the unit and after several weeks, fry volitionally leave the RSI system upon hatching.



**Figure 4-1. Schematic of RSI system (courtesy of NMFS).**

This technology allows for hatchery-produced fish to be stocked into remote areas, and to be exposed to their natural environment at the earliest possible life stage, thus reducing the potential for hatchery domestication and encouraging more life history strategies to be expressed. Additionally, this technology provides the opportunity for imprinting to occur within the targeted release stream at both the embryonic and presmolt life stage which would increase the likelihood of return by the adult salmon (Dittman and Quinn 1996).

This activity would be in collaboration with TRH and would be synchronized with the salmon carcass placement activities described above with the aim of providing streams with nutrients for at least one season prior to and during each season of egg supplementation (for a minimum of three consecutive seasons) to support juvenile salmonid rearing.

It is worth noting that coho supplementation is included in the NMFS BiOp for the 4d Limit for the Trinity River Coho Salmon Hatchery Genetic Management Plan (HGMP, NMFS 2020b) as Reasonable and Prudent Measure (RPM) 3a:

*Starting in March 2021, Reclamation shall provide all eggs, fry, juvenile, or adult coho salmon in excess of those needed to produce smolts released at TRH to an entity with a supplementation plan approved by NMFS, for supplementation of tributaries (in any of the three Trinity River coho salmon population units) for conservation of the populations. Reclamation shall report the number of eggs or fish provided, entity the eggs or fish were provided to, and location(s) fish or eggs were used for supplementation.*

Specific to coho supplementation, the following streams have been prioritized: Grass Valley; Indian; Weaver; Rush; and Deadwood creeks. However, this activity category would include additional streams throughout the Project activity area and would use RSIs to supplement juvenile coho, Chinook, and steelhead. At the time of the preparation of this

document, the populations of Chinook and steelhead found within the Trinity River watershed were not ESA-listed. If these populations become ESA-listed, additional ESA coverage for supplementation using these fish would be required.

## **4.2.2 Upslope Habitat Restoration**

### **4.2.2.1 *Bioengineered Bank Stabilization***

Bioengineered bank stabilization techniques are suitable for many low-order, low-gradient stream segments where streambanks are either actively eroding or at threat of eroding in locations where site conditions do not allow for natural channel meander. Streambank erosion may be a result of either scour related to streamflows or stormwater discharges from overland flows. Bioengineered bank stabilization may be incorporated into the design for a site where other restoration activity categories are proposed (e.g., culvert removal).

Bioengineered bank stabilization techniques may include the following activities individually or as in combination: bank reshaping; slope grading; coir log installation; deformable soil reinforcement (e.g., soil lifts, geogrids) using biodegradable materials; revetment consisting of trees, native plant material installation (herbaceous plants, shrubs, trees), or willow walls; willow siltation baffles; brush mattresses; brush check dams; and brush bundles. Bioengineered project types may also include the placement of large wood in combination with buried riprap, overlain with soil and native plantings and protected by livestock exclusion fencing.

Bioengineered bank stabilization techniques use a minimal amount of hard materials (e.g., rock) and are not intended to include traditional hard engineering techniques. Utilize native materials (logs, cobbles, boulders, etc.) whenever possible, particularly in steeper headwater streams where native materials are readily available. The use of boulders should be limited in scope and quantity, to the minimum necessary to stabilize the slope and protect it from expected stream or overland flows during storms. Boulder structures must be part of a larger restoration design and must include a riparian revegetation element. Guidelines for streambank stabilization techniques are described in Part VII, Project Implementation, of the California Salmonid Stream Habitat Restoration Manual (CDFW 2010: Vol. I and II) and Part XI, Riparian Habitat Restoration, contains examples of bioengineering techniques.

These activities would reduce input of fine sediment, enhance aquatic and riparian habitat, and improve water quality by integrating vegetation into bank protection measures. To improve aquatic and riparian habitats and reduce soil erosion and sedimentation of streams and wetlands, bioengineered bank stabilization integrates living woody and herbaceous materials with earthwork and recontouring of streambanks. Both organic and inorganic materials are put into place to stabilize and improve the structure of the soil where site constraints limit opportunities for natural channel meander. Bank stabilization measures that use bioengineering techniques minimize many of the impacts on aquatic resources commonly caused by traditional or conventional engineered bank structures. In addition, bioengineered bank stabilization techniques improve aquatic and riparian habitat by increasing stream shade to lower stream temperatures through revegetation, production of invertebrates, future recruitment of large wood into streams, and bank stability.

The proposed bioengineered bank stabilization techniques may require the use of handtools (when possible) and heavy equipment (e.g., self-propelled logging yarders, excavators, backhoes, or dump trucks).

### **4.2.2.2 *Aquatic, Wetland, Meadow, Riparian, and Upslope Habitat Enhancement***

This proposed activity category would occur in aquatic, wetland, meadow, riparian, and upslope areas within the watershed where the vegetative community has been disturbed by past land practices, wildfire, drought, introduction of

nonnative species, or construction activities and where habitat functions (e.g., water quality, biodiversity, etc.) are not properly functioning.

Aquatic, wetland, meadow, riparian, and upslope habitat enhancement may involve removing nonnative terrestrial and aquatic invasive plant species by manual and mechanical methods (i.e., no herbicides); removal of legacy ditches (from prior activities such as mining); removing trees where necessary for watershed restoration (and salvaging for instream placement when appropriate); and revegetating areas with native herbaceous plants (including sedges, rushes, grasses, and forbs), shrubs, and trees. In addition, this activity category includes gathering and installing willow cuttings, stakes, mats, and fences; temporary irrigation; coordination with upstream operators to control dam releases or instream flow levels to provide water during plant establishment; livestock fencing to protect, restore, or establish aquatic or riparian habitat. There are a number of manual and mechanical non-native invasive plant removal methods including prescribed burning, mowing, prescribed grazing, etc. Aquatic, wetland, meadow, riparian, and upslope habitat enhancement may be implemented in correspondence to any of the other restoration activity categories.

These activities are designed to create or improve ecological functions and create or restore the functions of wetlands, meadows, streams, and riparian areas, including upslope watershed sites that could contribute sediment to streams or disrupt floodplain and riparian functions. These actions are designed to restore species composition, structural diversity, and resilience to disturbances. Riparian vegetation helps to maintain shade and promote large wood recruitment. Where existing vegetation exceeds riparian needs and is deemed hazardous (i.e., fuel, dead or dying vegetation near road) or adversely impacts desired conditions (such as conifers encroachment on hardwoods or riparian vegetation), selective vegetation removal may occur. Removed vegetation would be retained primarily for aquatic habitat support (i.e., large wood structures), erosion control, and soil amendment (e.g., mulching).

Revegetation with native plants would mimic the area's naturally occurring wetland, meadow, riparian, or aquatic habitats and use seed or plant stock from the local watershed (as available). Revegetation may occur as a stand-alone project and/or part of larger watershed restoration activities to reduce upslope erosion from past land management practices, including timber harvest, mining, road construction, and development. Recurring wildfire also contributes to fine sediment and erosion reaching downslope aquatic habitats. Areas affected by fire would be targeted for revegetation.

Removing nonnative terrestrial and aquatic invasive species and/or revegetating with native plants improves aquatic, riparian, and wetland habitat for fish and wildlife in a variety of ways. These proposed restoration projects are designed to improve or provide composition, structure, and abundance of native biological communities important for bank stability and species habitat; stream shading, riparian canopy, and understory establishment and diversity; input of large wood and other organic material into streams; nesting and roosting habitat; reduction of soil erosion; water quality improvement; and improved soil health.

Manual and mechanical methods can be used independently or in combination to remove invasive species from aquatic and riparian areas. Sites with a variety of invasive species may receive several different types of treatments. Herbicides would not be applied as part of these watershed restoration efforts.

This project type also includes removal and/or management of nonnative wildlife species (e.g., bullfrogs), as long as the activity is associated with a site-specific restoration project and proper removal protocols are followed.

### **4.2.3 Road Decommissioning, Maintenance, and Rehabilitation Activities**

The Proposed Action includes upslope actions related to road maintenance, road rehabilitation, and road decommissioning on private and public lands within the Trinity River basin, for the reduction of sediment into the mainstem and tributaries of the Trinity River. The USFS has worked with the State Water Board to help identify these road-related activities. These activities are proposed for locations where road-cuts, fill-slopes along roads, and infrastructure (much of which is aging) are not functioning properly as well as locations where roadside drainage is inadequate as shown by rilled or rutted roads and gullied roadside ditches. These conditions have resulted in fine sedimentation, stream channel erosion, and other road-related conditions that are degrading downslope aquatic habitat. In addition, this activity category would address locations along roadways with undersized, deteriorated, misaligned, or otherwise dysfunctional culverts or bridges that warrant replacement. By improving how these roads function, fine sediment supply to the Trinity River basin could decrease over time, improving water quality, fish passage, and instream habitat for salmonids and increasing the production potential of the watershed, which could ultimately benefit a range of ecological functions within the Trinity River Basin.

#### **4.2.3.1 Road maintenance**

Road maintenance activities may include grading; rocking; and clearing, repairing, or adding drainage structures on existing roads to spread out overland flows and minimize erosion and sedimentation improving downslope hydrologic function. Road-cut, fill-slope, fine sedimentation, and stream channel erosion from aging infrastructures and practices have resulted in poorly maintained roads and are contributing to deterioration of aquatic habitats.

#### **4.2.3.2 Road rehabilitation**

Road rehabilitation activities would include out-sloping (shaping the roadway surface to drain toward the fill slope or outside edge of the hillside), roadway rocking, installing rolling dips and critical dips, the addition of water energy dissipaters, the addition of new drainage structures, addressing subsurface water (e.g., underdrains, French drains, French mattresses, permeable fills, etc.), culvert and bridge replacement, and the installation of rock buttresses to stabilize slopes (following slope failures) in an effort to improve drainage and minimize erosion and sedimentation. Constructing or installing a stream crossing, culvert, or bridge may include site excavation, formation, and pouring of a concrete foundation and walls/abutments; installation of metal piles using impact pile driving techniques (see Section 5.5.2.3.10) for permanent and/or temporary bridge structures; installation of the crossing structure; and placement of bioengineered or rock slope protection (RSP) to protect abutments, piers, and walls. New culverts or bridges would be designed to accommodate a 100-year storm.

#### **4.2.3.3 Road decommissioning**

Road decommissioning activities would entail removing stream-crossing structures, culverts, fords, and other types of stream crossings (e.g., "Humboldt crossings"). Depending on slope, soil type, and other factors, these activities could also include reshaping, ripping (the mechanical process to decompact soils), removing berms, seeding, and mulching the decommissioned road surface. If the decommissioned road surface is sloped at all, outsloping would need to occur to the extent feasible so that it self-drains. If the decommissioned road surface drains onto unstable highly erodible slopes, it is appropriate to leave a berm in this area to prevent further erosion of soils.

#### **4.2.4 Site-Specific Project Development and Design**

The Proposed Action would include the application of environmental commitments including a combination of general protection measures (GPMs), design guidelines, and conservation measures (CMs) to site-specific project designs (Appendix B). These environmental commitments were developed based on existing programmatic ESA Section 7 consultations, programmatic CEQA coverage, and other guidance documents and regulatory requirements as discussed further in Appendix B. These environmental commitments were primarily developed based on measures required by the following ESA consultations:

- NMFS 2020 Biological Opinion (BiOp) for the Trinity River Restoration Program’s Mechanical Channel Rehabilitation, Sediment Management, Watershed Restoration, and Monitoring Actions in Trinity County, California (2020 TRRP BiOp, WCRO-2019-03827)
- USFWS 2025 Programmatic BiOp for the California Statewide Programmatic Restoration Effort (2025 USFWS Statewide Restoration BiOp, FWS Reference: 2022-0005149-S7).

Each site-specific restoration project would be evaluated by an interdisciplinary team led by the federal agencies, to ensure all environmental commitments necessary to avoid significant impacts would be fully incorporated into the site-specific project designs. It is also worth noting that during the site-specific project planning process, cultural review compliant with applicable laws (e.g., Section 106, Executive Order 13007, etc.) would be required. The implementation plan in Appendix A describes the process that site-specific projects would go through to ensure that each project fits into the Proposed Action described in this EA, incorporates applicable environmental commitments into restoration designs, and enables the lead federal agency to make a streamlined NEPA decision. Each federal agency’s process for site-specific analysis is described in Appendix A.

##### **4.2.4.1 Limits on Proposed Activities Frequency and Location**

The 2020 TRRP BiOp limits instream watershed restoration projects covered by the BiOp annually to:

- 2 fish passage/dam removal projects;
- 8 channel/floodplain rehabilitation projects (4 mainstem and 4 tributary);
- 2 in-stream habitat enhancement projects;
- 3 streambank stabilization projects; and
- 4 road-related projects with in-water activities (i.e. road decommissioning with culvert removal).

TRRP is in the process of reinitiating consultation with NMFS to include all project activity categories described in the Proposed Action that were not previously analyzed in the 2020 TRRP BiOp. Project limitations will also be reviewed during the reinitiated consultation and are anticipated to change. During meetings with NMFS in regard to the ESA Section 7 consultation for this Project, NMFS recommended setting Project limits to control sedimentation and turbidity that would adversely affect ESA-listed salmonids. Preliminarily, it is being proposed that in addition to utilizing GPMs and CMs, such as erosion and sediment control BMPs, effects of turbidity would be controlled by limiting the number of floodplain reconnection projects that are over 100 acres as well as small dam removals, to one site-specific restoration project (of these specific project types) per HUC-12 watershed, per year. However, the latest applicable BiOp should be referenced, to determine current Project limits during site-specific project implementation.

Project limits would provide spatial and temporal flexibility during site-specific restoration project development and watershed planning efforts. Implementors within the watershed would continue to collaborate with the assistance of TRRP, USFS, and BLM to ensure significant regional effects would not occur.

#### **4.2.5 Typical Construction Activities and Methods**

The construction activities would be specific to each type of restoration activity, the location of the activity, and numerous other variables related to the unique characteristics of a site-specific project. The magnitude and characteristics of construction activities would vary, but construction activities for restoration projects would share many common features. The following is a general discussion of construction activities that can be anticipated to take place during implementation of the site-specific projects.

##### **4.2.5.1 Construction Timing**

The duration of construction activities for restoration projects can be as short as a few days for minor site-specific projects; or as long as several years, or only during certain months of the year, for major site-specific projects. Major construction activities are typically concentrated during the dry season (generally May through October), with some mobilization work above the ordinary high water mark (OHWM) occurring earlier in the year. Work windows may be further limited to avoid and/or minimize impacts on special-status species. Construction usually occurs only during daylight hours; however, in rare cases, continuous daytime and nighttime work may be necessary for some activities, expedited projects, and projects where the construction sequencing schedule is nearing the wet season. GPMs and CMs specific to nighttime work would be implemented to minimize effects.

Site-specific project planning applying the environmental commitments in Appendix B would address the timing of site-specific projects as it 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 vegetation and wildlife conservation measures in Appendix B).
- **Sediment:** If a construction phase extends into the following year's construction season, the site will be secured and "winterized" before the start of the flood season (typically November 15) to avoid sediment entering the stream (see geology, water quality, and hydrology conservation measures in Appendix B).
- **Flows:** Restoration, construction, fish relocation, and dewatering activities proposed within any wetted or flowing channel of tributaries to the Trinity River shall be restricted to the dry season (June 15 to October 15 for tributaries and July 15 to October 15 for the mainstem), before listed coho salmon begin spawning in tributaries. Work in intermittent streams may continue beyond November 1, as long as weather conditions permit, and the stream channel remains dry. Construction and restoration work within intermittent stream channels must be completed in the dry (see fishery resources conservation measures in Appendix B).
- **Seasonal Restrictions (SR):** Wildlife SRs may apply to all or part of a site-specific project based on location and surveys completed (see wildlife CMs in Appendix B).
- **Timing and Project Location:** Determine through federal agency review if the timing of the project at a specific location may impact cultural practices, recreational uses or other resource areas. Adjust site-specific project areas accordingly to avoid impacts (see cultural, land use, and recreation conservation measures in Appendix B).

#### **4.2.5.2 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 sharp turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils). Depending on the type and size of the site-specific project, the following are some of the types of equipment that may be used: excavators, scrapers, bulldozers, graders, dredgers, crawlers/tractors, chippers/grinders, compactors (sheepsfoot or tramping-foot rollers, roller compactors, smooth drum compactors), water trucks, haul trucks, dump trucks, front-end loaders, truck-mounted cranes, fueling trucks, pickup trucks, generators, backhoes, truck-mounted augers, hydroseeding trucks, and impact and vibratory pile drivers.

The environmental commitments for using heavy equipment include guidelines for working in or near streams, placement of and spill prevention at onsite refueling locations, road-related activities including water drafting, and considerations for noise, spreading invasive species, etc. (see Appendix B for further details).

#### **4.2.5.3 Mobilization**

Construction activities for site-specific projects would begin with a mobilization phase. This phase may involve temporary fencing and gate installation, establishing resource preservation areas, installing temporary construction offices, setting up staging areas, and transporting equipment and materials to work sites.

#### **4.2.5.4 Staging Areas**

One or more staging areas would be typically required for storage and distribution of construction materials and equipment. Staging areas would typically include previously disturbed areas to minimize effects to resources. Temporary easements may need to be obtained from landowners. All fuel and chemical storage, servicing, and refueling will be done in an upland staging area or other suitable location (e.g., barges) with secondary containment to prevent spills from traveling to surface water or drains. Site-specific project proponents will establish staging areas for equipment storage and maintenance, construction materials, fuels, lubricants, solvents, and other possible contaminants in previously disturbed upland areas whenever possible, away from areas suitable for ESA-listed species, and in coordination with resource agencies. Staging areas will have a stabilized entrance and exit and will be at least 100 feet from waterbodies, unless site-specific circumstances do not provide such a setback; in such cases, the maximum setback possible will be used. Staging areas would usually be established in or near active construction areas and may be relocated as construction progresses, especially for long linear restoration projects.

#### **4.2.5.5 Erosion Control**

Erosion control would be installed before, during, and after implementation of site-specific projects to ensure project-related sediment mobilization would not reach receiving waters. Erosion and sediment control methods and treatments would be selected to be consistent with the erosion type anticipated at a site. This is generally considered a two-step process, including the installation of short-term erosion control BMPs followed by the establishment of vegetation for long-term soil stability. Erosion control may include grading, seeding, mulching, application of appropriate rolled erosion-control products, and soil bioengineering (brush layers, stakes, etc.). Typically, exposed soils are most vulnerable to erosion during the first rainy season following construction and require short-term erosion control. Short-term erosion control involves placement of erosion control products that will not trap wildlife, to provide immediate stabilization to underlying soil and reduce erosion until new vegetation can grow into the site. Over time, erosion control materials associated with temporary disturbance would either decompose or be manually removed.

#### **4.2.5.6 Access and Haul Routes**

Access and haul routes would be designated to haul materials to and from borrow sites, staging areas, and construction sites. Access routes would also be used for construction worker commuting. These routes would typically consist of existing public roads near construction sites. New off-road routes may also be constructed but would be restored after project completion as described in “Site Restoration and Demobilization” below unless they are needed to achieve long term restoration objectives. Ingress and egress to restoration project sites would depend on the complexity and scope of the site-specific project, and the characteristics of the work site.

#### **4.2.5.7 Site Preparation**

Site preparation would typically involve clearing the ground of structures, woody vegetation, nonnative invasive plant species, and any debris (e.g., trash). The clearing operation may be followed by grubbing operations to remove additional trees and other vegetation, stumps, root balls, and below ground infrastructure. In addition to clearing, site preparation would entail salvage and preservation of desirable native plants and materials (e.g., native topsoil, willow clumps, etc.). Projects would be generally designed and implemented to achieve no net loss in wetlands and riparian vegetation and it should be noted that any wooded areas with old growth characteristics, where present, would be preserved. In addition, earthen material from the ground may be stripped as part of site preparation. Site preparation may also include installation of a temporary water diversion or dewatering to minimize impacts to sensitive species.

#### **4.2.5.8 Preparation of Borrow Sites**

Borrow sites would be prepared in a fashion similar to that used for construction sites. After structures and woody vegetation are cleared from the surface, stumps, root balls, and infrastructure are removed from below ground. Typically, the borrow area would then be disked to chop any remaining surface vegetation and mix it with the near-surface organic soils. Next, the top layer of earthen material is stripped from the borrow excavation area, and this soil is stockpiled at the borrow site. Borrow is typically respread on the surface after the site has been graded, to support reclamation. Excavation for borrow sites typically range in depth, depending on volume requirements, the quality and extent of material available, and the method of reclaiming the borrow site. Non-commercial borrow sites are restored and regraded using available topsoil, preparing the site for future uses such as farming, restoration, or other appropriate land use.

#### **4.2.5.9 Site Restoration and Demobilization**

Upon site-specific project completion, rehabilitation would take place at all disturbed areas in a manner that results in similar or better than pre-work conditions through removal of project-related waste, including flagging, and spreading of stockpiled materials (e.g., soil, LW, trees). Seeding and/or planting with native seed mixes or plants as approved by the project botanist would occur (Appendix B).

When construction activities are complete, any material stripped from the soil surface during site preparation would be placed on any temporarily disturbed areas where topsoil was removed. Temporarily disturbed areas (as appropriate) would be decompacted and then stabilized through revegetation with appropriate native herbaceous seed mixes or plantings of native trees and shrubs, as appropriate to the site and restoration goals.

Temporarily disturbed areas are defined as areas that can be recovered or restored to pre-project conditions so species recruitment is maintained. Irrigation, if necessary to promote establishment of planted woody species would be installed at this time. Erosion control materials would also be placed in areas where steep slopes are at risk of erosion

during winter rain events; such materials may include weed free straw, biodegradable mesh netting, rock support, and/or bark mulch (Appendix B).

#### **4.2.5.10 Disposal of Excess Materials**

Excess material would include construction-generated debris, such as concrete and demolition waste; excess organic materials, such as woody vegetation, grasses, and roots from borrow sites and work sites; excavated material that do not meet levee embankment criteria; and soil not used or not suitable for the earthen structures under construction. Organic materials would typically be used to restore borrow sites and disturbed areas following site-specific project completion.

Debris generated during clearing and grubbing operations would be disposed of via various means, depending on the type of material, local conditions, land ownership, and approval by federal agencies. Excess construction waste materials may be hauled off site to landfills (e.g., building demolition waste) or delivered to recycling facilities (e.g., concrete). Excess organic materials (e.g., organic soils, vegetation, and excavated material) may be sold for commercial use<sup>5</sup> (e.g., to cogeneration facilities), or salvaged to be used during site restoration activities or at upland reclaimed borrow sites (Appendix B). No excess materials generated during site preparation or other project activities would be disposed of by open burning with the exception of burning of invasive plant material.

#### **4.2.5.11 Maintenance and Monitoring Activities to Support Revegetation**

Maintenance and monitoring activities necessary to support successful establishment may include temporary installation and use of irrigation systems and equipment; mechanical weed control; replanting and reseeding; fencing and signage; adjustments to grading or soils composition; and installation and operation of monitoring equipment, including but not limited to groundwater wells, flow gauges, depth gauges, cameras, unmanned aerial vehicles, and stakes.

Activities may also include removal of temporary irrigation systems and equipment, temporary erosion control features, and temporary monitoring equipment once plants have become established, soils have been stabilized, and/or monitoring is complete, as appropriate. Temporary installations such as browse protection (e.g., protection from grazing animals such as deer), fencing, and signage may also be removed post-construction, as appropriate. The length of time these activities would continue is dependent on the circumstances of site-specific projects and cannot be predicted at this time.

### **4.2.6 Potential Site-Specific Projects**

There are a number of site-specific projects planned that would seek NEPA coverage under this EA. Table 4-2 below provides a preliminary list of these watershed restoration projects identified by Reclamation, USFS, and BLM. In addition to the site-specific projects listed below, there are more than 80 culvert repair and replacement site-specific projects that are being tracked by USFS and others in order to address sedimentation issues across the Project activity area.

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<sup>5</sup> It is worth noting that material removed from public land may not be sold for commercial use.

**Table 4-2. Potential future projects within the Trinity River subbasin.**

Activity Category	HUC 10 Watershed <sup>1</sup>	Lead Federal Agency	Project Name/Subtype
Instream Habitat Restoration	Big French Creek-Trinity River	TRRP	Evans Bar Channel Rehabilitation
		TRRP	Sky Ranch Channel Rehabilitation
		USFS	Big Ranch BDAs
			Dutch Creek Large Wood Placement
			Manzanita Creek Barrier (Dam) Removal – Fish Passage Improvement
	Lower Hayfork Creek	TRRP	Salt Creek Floodplain Restoration
		USFS	Hayfork Creek BDAs
			SF Headwaters BDAs
			Hayfork Creek Stage Zero
			Upper Tule Creek Culvert Replacement – Fish Passage Improvement
			West Tule Creek Culvert Replacement – Fish Passage Improvement
			Olsen Creek Culvert Replacement – Fish Passage Improvement
	Upper Corral Creek Culvert Replacement – Fish Passage Improvement		
	Upper Hayfork Creek	USFS	Hayfork Creek BDAs
			SF Headwaters BDAs
			Hayfork Creek Stage Zero
			Upper Big Creek Culvert Replacement – Fish Passage Improvement
			Lower Big Creek Culvert Replacement – Fish Passage Improvement
	Lower South Fork Trinity River	USFS	SF Headwaters BDAs
			Big Ranch BDAs
			Hyampom Creek Culvert Replacement – Fish Passage Improvement
	Middle South Fork Trinity River	USFS	SF Headwaters BDAs
			Silver Creek Culvert Replacement – Fish Passage Improvement
	Upper South Fork Trinity River	USFS	SF Headwaters BDAs
			White Rock Guard Station BDAs
	East Fork Trinity River	USFS	Upper Trinity BDAs
	Swift Creek-Trinity River	USFS	Upper Trinity BDAs
Tangle Blue Creek – Trinity River	USFS	Upper Trinity BDAs	
Browns Creek	USFS	SF Headwaters BDAs	
Canyon Creek	USFS	Canyon Creek Large Wood Placement	
Coffee Creek	USFS	Upper Trinity BDAs	
Weaver Creek – Trinity River	TRRP	Indian Creek Fish Passage Barrier Removal	
		Little Browns Creek – Remote Site Incubation	
		East Weaver Creek – Remote Site Incubation	
		Grass Valley Creek – Remote Site Incubation	
			Indian Creek – Remote Site Incubation

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Activity Category	HUC 10 Watershed <sup>1</sup>	Lead Federal Agency	Project Name/Subtype
			Deadwood Creek – Remote Site Incubation
			Rush Creek – Remote Site Incubation
			Canyon Creek – Remote Site Incubation
			Clear Gulch – Remote Site Incubation
			Carcass Supplementation
			Deadwood Creek BDAs
		USFS	Weaver Basin BDAs
			Little Browns Creek BDAs
			Rush Creek BDAs
			Little Browns Creek Large Wood Placement
			Rush Creek Large Wood Placement
			Deadwood Creek Large Wood Placement
			West Weaver Creek Stage Zero
			Sydney Gulch Restoration
BLM	Deadwood Creek Gravel Augmentation		
	West Weaver Creek Diversion Upgrades – Weaverville CSD		
		Yurok RSI Project	
Upslope Habitat Restoration	Big French Creek – Trinity River	USFS	Junction City Noxious Weed Removal
	Lower South Fork Trinity River	USFS	Hamptom Reach of SF Trinity Riverbank Stabilization
	North Fork Trinity River	USFS	Grizzly Creek Slide Remediation (Trinity Alps Wilderness)
	Weaver Creek	TRRP	Deadwood Carr Fire Sediment Reduction Phase II
		USFS	Weaver Basin Noxious Weed Removal
Road Maintenance, Rehabilitation, and Decommissioning Activities	Big French Creek – Trinity River	USFS	Sailor Bar – Trinity River Access Improvement
			Private Lands Acquisition and Dutch Creek Road Decommissioning
	Weaver Creek – Trinity River	USFS	East Weaver Creek Sediment Source Reduction
			Private Lands Acquisition and Dutch Creek Road Decommissioning

<sup>1</sup>Some site-specific projects would occur in more than one HUC 10 watershed.

## 5 Affected Environment and Environmental Consequences

### 5.1 Introduction

This chapter describes the affected environment within the Project activity area in the Trinity River basin and analyzes the potential environmental effects by resource associated with implementing the No Action and Proposed Action alternatives. The effects analysis for each resource topic is based on the application of the best available science and uses existing data to determine potential effects of each alternative. Each resource topic section provides a summary of Project-specific analyses or reports prepared by resource specialists at the request of the cooperating federal agencies. These documents are incorporated into the EA by reference and include the 2020 TRRP BiOp; 2025 USFWS Statewide Restoration BiOp; Water Quality and Hydrology Technical Report (Appendix I); Vegetation and Wetlands Technical Report (Appendix J); Fisheries Technical Report (Fisheries BE, Appendix K); Wildlife Technical Report (Wildlife BE, Appendix L); and Climate Technical Report (Appendix M). The intent of these technical analyses is to present a thorough analysis of the environmental effects of the Proposed Action and to discuss how unavoidable impacts would be minimized and mitigated to the extent possible, without the need to repeat this detailed analysis elsewhere.

Reclamation determined that the Proposed Action does not have the potential to cause adverse effects to the resource topics listed in Table 5-1.

**Table 5-1. Resource Topics Eliminated from Further Consideration in This EA.**

Resource Topic	Comments
Agricultural and Forestry Resources	Neither the Proposed Action or the No Action alternative occur in agriculture or farmland. In addition, neither alternative would result in a more than negligible change to forest conditions. Therefore, there would be no forestry or agricultural-related impacts.
Air Quality	Neither the Proposed Action nor the No Action alternative would involve activities that would result in a discernable increase in emissions that could result in a permanent or long-term increase in air pollutants and there would be no violation of air quality standards.
Cultural Resources	The No Action alternative would have no effect on cultural resources. Site-specific restoration projects associated with the Proposed Action may affect cultural resources and would require their own National Historic Preservation Act (NHPA) Section 106 reviews. Consequently, details of the Proposed Action's effects on properties listed, or eligible for listing, on the National Register of Historic Places is not known at this time. Cultural resources are discussed broadly across the Project activity area below.
Hazardous Materials	Neither the Proposed Action nor the No Action alternative would result in any activities that would include hazardous materials. The Proposed Action does not involve hazardous materials outside of petroleum products used for construction equipment. Water quality BMPs (Appendix B) for equipment use near waterways would be implemented during construction to avoid any spills or chemical contamination. Therefore, no hazardous materials-related effects associated with the Proposed Action are anticipated.
Indian Trust Assets	The No Action alternative would have no effect on Indian Trust Assets (ITAs). Site-specific restoration projects associated with the Proposed Action may affect ITAs and would require site-specific reviews by USFS, BLM, and/or Reclamation. Consequently, details of the Proposed Action's effects to ITAs is not known at this time and is not discussed further in the EA.

Resource Topic	Comments
Indian Sacred Sites	The No Action alternative would have no effect on Indian Sacred Sites. Site-specific restoration projects associated with the Proposed Action may affect ceremonial use of Indian sacred sites on federal lands by Indian religious practitioners or adversely affect the physical integrity of such sacred sites and would require site-specific reviews by USFS, BLM, and/or Reclamation. Consequently, details of the Proposed Action’s effects on Indian Sacred Sites are not known at this time and is not discussed further in the EA.
Land Use	The Proposed Action and the No Action alternatives are consistent with federal agency resource management plans and with both the Humboldt County and Trinity County general plans (Humboldt County California 2017; and Trinity County California 1988). Neither alternative would result in changes to land use or alter access. Therefore, there would be no land-use-related impacts.
Socioeconomics, Population, and Housing	Neither the Proposed Action nor the No Action alternative would affect socioeconomics, populations, or population growth and would not displace existing people or housing.
Visual Resources/ Aesthetics	Neither the Proposed Action nor the No Action alternative would involve activities that would result in long-term changes to visual resources or aesthetics. The Proposed Action would use native materials designed to blend into the surrounding environment thereby, not adversely affecting viewsheds in the Trinity River basin.

Effects to Wild and Scenic Rivers within the Project activity area are discussed in Appendix F. In addition to the effects analysis provided below, the Implementation Plan included in Appendix A provides details on how effects would be analyzed for site-specific projects. Each site-specific project would provide additional details on sensitive species information and any applicable conservation measures that would be incorporated into site-specific project designs.

**5.1.1 Environmental Setting**

The Trinity River originates in the rugged Salmon-Trinity Mountains of northern California in the northeast corner of Trinity County. The entire Trinity River watershed is approximately 2,861 square miles in size and is the largest Klamath River tributary. From Lewiston Dam, the Trinity River flows westward for 112 miles until it enters the Klamath River near the town of Weitchpec on the Yurok Reservation. The Trinity River passes through Trinity and Humboldt counties and the Hoopa Valley (Hoopa Tribe) and Yurok Indian Reservations. The Klamath River flows northwesterly for approximately 40 miles from its confluence with the Trinity River before entering the Pacific Ocean.

**5.1.2 Methods**

Key considerations for the analysis of potential Project effects to environmental resources include Project activity area characteristics, the scope and nature of Project activities, and the potential effects associated with those activities. This analysis looks at short- and long-term effects that could affect any environmental resources within the Project activity area.

As previously mentioned, individual restoration actions would take place in and along the mainstem and tributaries of the Trinity River (both above and below the Lewiston and Trinity dams) on both private and public lands. Key Watersheds within the restoration activity area include North Fork Trinity River, South Fork Trinity River, Canyon Creek, and New River. As mentioned previously, restoration efforts would be prioritized within these Key Watersheds. Through coordination between TRRP, BLM, and USFS, it was determined that an effects analysis performed at the HUC 10

watershed scale would be sufficient to adequately characterize Project effects. Therefore, 16 HUC 10 watersheds are analyzed for the effects analysis. See Table 1-1 for HUC 10 names and acreages and Figure 1-1 for an overview map.

For each environmental resource analyzed for the Project, the intensity of effects is generally described by the terms below. However, if more specificity is required, the intensity of effects may be further defined in the environmental consequences section for that resource.

- Negligible/No Effect: Effects would not be measurable, with no perceptible consequences.
- Minor: Effects are detectable but are small and localized.
- Moderate: Effects are detectable, can be measured, and cover a larger area (e.g., a tributary stream).
- Major: Effects are easily measured, regional, and at a larger-scale.

Effect analyses include consideration of environmental commitments (Appendix B) to lessen effects. Compensatory mitigation is not proposed for the Project since the overall intent of the Project is to restore and enhance ecosystem function to benefit fish and wildlife species. Compensatory mitigation means the restoration, establishment, enhancement, and in certain circumstances, preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts that remain after all appropriate and practicable avoidance and minimization has been achieved (33 CFR 332.2).

## 5.2 Water Quality and Hydrology

### 5.2.1 Affected Environment

#### 5.2.1.1 Water Quality

Every six years the Regional Water Board evaluates water quality information and identifies waterbodies that do not meet water quality standards and are not supporting their beneficial uses, including municipal and domestic water supply, supporting high-quality for fish, and recreation. The Trinity River basin has been listed by the Regional Water Board as impaired for several parameters as summarized in Table 5-2 below.

**Table 5-2. Impaired waterbodies within the Trinity River basin.**

Waterbody Name	Listing Extent	Parameter
Lower Trinity River HA <sup>1</sup>	Entire waterbody except: (1) the New River and its tributaries, (2) Big French Creek and its tributaries, (3) the North Fork Trinity River and its tributaries, including the East Fork North Fork Trinity River and its tributaries, and (4) Manzanita Creek and its tributaries.	Sedimentation/ Siltation
Middle Trinity River HA	Entire waterbody	Sedimentation/Siltation
South Fork Trinity HA	Entire waterbody	Sedimentation/Siltation Temperature
Trinity Lake (was Claire Engle Lake)	Entire waterbody	Mercury
Upper Trinity River HA	Entire waterbody except the Stuart Fork and its tributaries	Sedimentation/ Siltation
Upper Trinity HA, Trinity River, East Fork Trinity River	Entire waterbody	Mercury Sedimentation/Siltation

<sup>1</sup> HA: Hydrologic Area is a major subdivision of a hydrologic unit utilized by the Regional Water Board in analyzing water quality within waterbodies. Best described as major tributaries of a river, large valley groundwater basin, or a component of a stream or desert basin group.

The Project has potential to affect sedimentation and temperature, and therefore, these parameters were the focus of the water quality effects analysis (Appendix I). The Trinity River was added to the Environmental Protection Agency's (EPA's) list of impaired rivers in 1992, under the provisions of Section 303(d) of the Clean Water Act, in response to the State of California's determination that the river's water quality standards were not being met due to excessive sediment. In 1998, the EPA established a Total Maximum Daily Load (TMDL; EPA 1998) for sediment in the South Fork Trinity River and Hayfork Creek. In 2001, another sediment TMDL (EPA 2001) was issued for the Trinity River.

Since the construction of the TRD, discharges from Lewiston Dam have had a significant effect on water temperatures in the Trinity River downstream. Reservoir releases from Lewiston Dam have altered the natural temperature regime, making the river warmer in the winter and colder in the summer than under pre-dam conditions. Depending on the water year type and time of year, this effect diminishes to varying degrees with distance from Lewiston Dam.

**Table 5-3. Basin Plan and Water Rights Order (WRO) 90-05 Temperature Objectives.**

Location Measured	Dates	Target or Range
Douglas City	July 1 – September 14	≤60°F (15.5°C)
Douglas City	September 15 – 30	≤56°F (13.3°C)
North Fork Trinity River	October 1 – December 31	≤56°F (13.3°C)

Reclamation has worked to meet water temperature objectives and targets for protecting adult salmonids upstream of the North Fork Trinity River (adult holding targets) and out-migrating juvenile salmonids throughout the mainstem river, as measured at Weitchpec (outmigration targets), since the inception of TRRP in 2000. The adult holding temperature targets (Table 5-3) are implemented as part of the Basin Plan and WRO 90-05 and compliance is monitored by the Regional Water Board.

### 5.2.1.2 Hydrology

After the establishment of the TRD, flow regulation on the Trinity River eliminated nearly all high flows adequate to form and maintain the alluvial river, and reduced scour by winter floods downstream of Lewiston (USFWS and HVT 1999). At times, 90% of the Trinity River flow was diverted to the Sacramento River basin, also contributing to the decline of Chinook salmon, coho salmon, and steelhead (NMFS 2014). Following the 2000 ROD, the TRRP has been mandated by Congress to restore anadromous fisheries to pre-dam levels and implement variable annual instream flows ("ROD releases") to improve habitat-forming flows within the Trinity River. ROD release volumes from Lewiston Dam are determined by water year type and the flows are released per the recommendations of the Trinity Management Council (TMC). In addition, today, flow diversion from the Trinity River basin to the Sacramento River basin has been adjusted so that about 50% of flows are kept in the Trinity River system downstream of the dams.

## 5.2 Environmental Consequences

### 5.2.2.1 No Action

If the No Action alternative was selected, it is likely that similar restoration projects that are likely to improve water quality and hydrology in the Trinity River basin would be implemented over time in the basin. However, these projects would take longer to plan and permit compared to the streamlined approach of the Proposed Action alternative. Therefore, improvements to water quality and hydrology as a result of the No Action would be realized more slowly within the Project activity area.

**5.2.2.2 Proposed Action**

Project restoration activities that are part of the Proposed Action would have short-term adverse effects on water quality to varying degrees. However, many of the proposed activities are designed and would be implemented to restore more natural watershed processes and in the long-term, the implementation of restoration activities through the Trinity River basin would be expected to improve water quality conditions overall.

The Proposed Action would generally not affect the volume of water flowing through that stream reach; however, the “Water Conservation Project” activity category is intended to increase instream flow in the long-term, thereby improving aquatic habitat for fish and wildlife. Wherever there are stream diversions along tributary streams that continue to withdraw water when streamflows are at low-flow conditions, water conservation systems are warranted and would be proposed under this restoration activity category. Many of these water conservation projects, particularly in small tributaries higher in the subwatersheds, could increase instream flows considerably, depending on the size of stream from which water had originally been diverted. These efforts would have minor beneficial effects to hydrology throughout the Trinity River basin. Effects to hydrology in the Trinity River mainstem would likely be negligible since flow is managed with the Trinity and Lewiston dams.

Effects to water quality and hydrology are summarized in Table 5-4 below (See Appendix I for further details on effects to water quality and hydrology).

**Table 5-4. Summary of Project effects to the water quality and hydrology of the Trinity River watershed.**

Attributes	Effects Summary
Water Quality	<ul style="list-style-type: none"> <li>▪ Ground-disturbing restoration activities would have minor short-term sedimentation and turbidity effects to varying degrees. The duration of most turbidity plumes would be limited to hours or days, though large projects may continue to produce turbidity (though gradually declining) for weeks. Pulses of turbidity would be anticipated as flow is returned to the dewatered or dry channels. Turbidity may also occur during the first storm event following restoration.</li> <li>▪ Minor short-term increases in stream temperatures due to construction-related disturbance of riparian vegetation along stream channels and work area isolation/dewatering activities.</li> <li>▪ Long-term minor beneficial effects to water quality because of an increase in sediment storage capacity within Project waterways; a decrease of sediment discharge and roadway runoff as a result of the maintenance and decommissioning of roads; and improvements to water temperatures with installation of instream habitat features, aquatic and riparian habitat enhancements, and improved floodplain connectivity.</li> </ul>
Hydrology	<ul style="list-style-type: none"> <li>▪ Long-term minor beneficial effects to instream flow in Trinity River tributaries as a result of water conservation activities.</li> </ul>

**5.3 Geology and Soils**

**5.3.1 Affected Environment**

The geology of the Project activity area can be characterized as having a complex mix of ultramafic rocks of the Trinity Terrane (complex polygenetic assemblage of disrupted Cambrian, Ordovician, Silurian, and Devonian oceanic crusts). The Trinity Terrane is represented by serpentized peridotite, gabbro, diabase, and minor volcanic rock. On the western side of the Project activity area, it has been intruded by Mesozoic granitic rocks. The granitic rocks are quartz diorite rocks to

slightly more silicic rocks of quartz monazite. The eastern side of the Project activity area contains Bragdon metasedimentary shale and Copley greenstone.

The geomorphology of the Project activity area is characterized by a subsection of mountains with rounded summits, steep sides, and narrow canyons formed during the Trinity Alps glaciation period, as Quaternary glacial till and outwash occur in many areas. On the western side of the Project activity area, alluvial glacial outwash that impinged on older metavolcanic formations to the east and older ultramafic sea floor deposits to the north (elevations ranging from about 1,500 to 5,000 feet) occurs. Mass wasting and fluvial erosion are the main geomorphic processes that occur within the Project activity area.

Riparian areas of the Project activity area contain four major soil types: Aquolls, Atter, Copsey, and Xerofluvents series with minor amounts of Morical and Oval series. The soil types are summarized in Table 5-5 and further described below.

**Table 5-5. Trinity County Riparian Soil Map Units.**

Soil Map Unit	Name	Surface Texture	Depth	Hydro-Group/Runoff	Slopes (%)
6	Aquolls	gravelly clay loam	moderately deep	D - low	0-20
8	Atter	cobbly sandy loam	moderately deep	D - low	0-20
28	Copsey	clay loam	very deep	C - low	2-10
351	Xerofluvents	cobbly loamy sand	very deep	D - low	0-20

Aquolls consist of shallow to deep poorly drained soils formed in residual and colluvial material weathered from mixed rock sources. They are wet mountain meadows on level to gently sloping benches, flats, and basins. The slopes are from 0 to 20 percent. Atter soils consist of moderately deep and somewhat excessively drained soils formed in mixed cobbly alluvium. They are located on alluvial fans, low stream terraces, and in glacial outwash in mountain valleys with slopes of 0 to 20 percent. Copsey soils consist of very deep, poorly drained soils on alluvial fans. They have formed in alluvium from serpentine rock with slopes of 2 to 10 percent. Xerofluvents are brownish to dark brownish soils that have formed on flood plains, fans and terraces along streams and rivers and are subject to occasional flooding. They occur on level ground to gentle slopes. Textures range from loam fine sandy to loams and are excessively drained to well drained. The amount of coarse fragments, within the profile, varies and is without order.

The soils that formed in these varying lithologies are influenced by temperature and precipitation, organisms, relief, and time. Climatic influences of precipitation and temperature, organisms of animals, plants, insects, fungi and bacteria, slope, aspect, and time all influencing these varying lithologies creating these suites of soils found along lakes, streams, rivers, and ponds.

The STNF LRMP (USFS 1995) provides standards and guidelines for soils. The STNF LRMP provides direction for soil resources in the context of management area-specific forest goals as well as standards and guidelines. The applicable forest goals from the STNF LRMP include the following: maintain or improve soil productivity; and prevent excessive surface erosion, mass wasting and watershed impacts. In addition, the STNF LRMP includes soil quality standards that are discussed in more detail below.

### 5.3.2 Environmental Consequences

The environmental consequences are discussed within the context of potential adverse effects to soils as a result of the alternatives. These effects considered are analyzed through the lens of the STNF LRMP soil quality standards, including soil productivity, hydrologic function, and environmental health. For the effects analysis, soil stability, soil hydrology,

and nutrient cycling are the soil characteristics that directly relate to the soil quality standards, most relevant to the Project. These are described below.

### **5.3.2.1 Soil Stability**

Erosion is the detachment, transport, and deposition of soil particles by water, wind, or gravity. Vascular plants, soil biotic crusts, and litter cover are the greatest deterrent to surface soil erosion. Visual evidence of surface erosion may include rills, gullies, pedestalling, soil deposition, erosion pavement, or loss of the surface "A" horizon. Erosion models are also used to predict on-site and off-site soil loss (water erosion prediction project [WEPP] and/or the erosion hazard rating [EHR]).

Specific guidance to ensure soil stability is to maintain sufficient soil cover to prevent soil erosion from exceeding the rate of soil formation. Erosion and sediment control BMPs would be implemented so that erosion is less than or equal to 1 ton/acre for sites with parent material of a low erosion hazard rating and of a low slope angle. For steep slopes, the rate of erosion could be as much as 2 tons/acre. Soil cover in the form of rock or vegetation would be necessary to keep erosion less than 1-2 tons/acre (depending on slope):

- Granitics – 90% or greater cover necessary
- Metasediments – 50 to 70% cover necessary

### **5.3.2.2 Soil Hydrology**

Soil hydrology function is the ability of water to move through the soil in a metered way and it is assessed by evaluating or observing changes in surface structure, surface pore space, consistency, bulk density, infiltration, or penetration resistance using appropriate methods. Increases in bulk density or decreases in porosity results in reduced water infiltration, permeability, and moisture available to plants. Compaction and soil moisture are the primary concerns when altering a site during construction activities. To ensure soil hydrology functions as it should, the following are recommended:

- In regard to compaction, maintain at least 90% of the total soil porosity found under natural conditions, as measured at 4 to 8 inches below the soil surface. Soil porosity is the standard to measure compaction relative to soil type. Soil porosity is the area of the soil matrix that is occupied by soil voids (macropores) that circulate air and water through the soil. A 10% reduction in total soil porosity indicates potential detrimental soil compaction (depending on soil type).
- In regard to soil moisture, maintain soil moisture regime and drainage classes. Protect areas where plant growth or plant community composition is dependent upon hydrologic conditions (e.g., wetlands, wet meadows, etc.).

### **5.3.2.3 Nutrient Cycling**

Nutrient cycling, the exchange of elements between the of living and non-living components, within soils is assessed by evaluating the vegetative community composition, litter, duff, coarse woody material, and root distribution. These components are directly related to soil organic matter, which is essential in sustaining long-term soil productivity. Soil organic matter provides a carbon and energy source for soil microbes and provides nutrients needed for plant growth. Projects should maintain organic matter in soils sufficient to prevent significant nutrient cycle deficits, and to avoid detrimental physical and biological soil conditions by implementing the following:

- Soil organic matter in the upper 12 inches of the soil should be at least 85% percent of the total soil organic matter found under undisturbed or natural conditions.
- Fine organic matter should occur on at least 50% percent of the area, including duff, litter, and woody material less than 3 inches in diameter. Organic matter remaining at the project sites for nutrient recycling following construction should generally entail 4 to 8 tons per acre.
- After project implementation, large woody material in forested areas should entail at least 5 logs per acre in contact with the soil surface depending on existing site conditions.
- Avoid excessive topsoil disturbance within the soil profile to the extent possible.

#### **5.3.2.4 *Geology and Soil Effects Intensity***

For geology and soil affected by the Project, the intensity of effects is defined below:

- No effect: Effects would be negligible, not measurable, with no alteration to soils in the Project activity area.
- Minor: Effects to soils are detectable, minimal, and limited to specific restoration sites.
- Moderate: Effects to soils are detectable, can be measured, and are regional.
- Major: Effects to soils are easily observed, regional, and alter the character of soil map units within the Project activity area.

#### **5.3.2.5 *No Action***

Under the No Action alternative, effects on geology and soil resources would remain similar to existing conditions. Restoration efforts could still occur throughout the watershed; however, they would occur at a slower pace due to a lengthened planning process. Therefore, there would be fewer short-term effects to geology and soils but potentially a slight increase in erosion and instream sedimentation.

#### **5.3.2.6 *Proposed Action***

Many of the Proposed Action activity categories would involve the use of heavy equipment and some amount of ground disturbance. As discussed above, the primary concerns are related to soil stability (preventing erosion), soil hydrology (maintaining soil moisture), and nutrient cycling (maintaining organic matter). Therefore, several measures would be implemented to minimize effects to soils:

- Heavy equipment would be operated in a manner that minimizes adverse effects to the environment (e.g., minimally sized, low-pressure tires, minimal sharp turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils).
- During site preparation, native topsoil (typically 2-4 inches) would be protected to the extent possible. In areas where it would be disturbed, topsoil would be salvaged and desirable native plants and materials would be preserved (e.g., large wood, duff, willow clumps, etc.). In addition, areas with soil hydrology such as wetlands and wet meadows would be flagged and protected during construction activities.
- When construction activities are complete, any material stripped from the soil surface during site preparation would be placed on any temporarily disturbed areas where topsoil was removed. Temporarily disturbed areas and temporary roads (as appropriate, particularly Aquolls and Copsey soils susceptible to compaction) would be decompacted and then stabilized through revegetation with native seed and plantings, as appropriate to the site and restoration goals.

- Erosion control materials would also be placed in areas where slopes are at risk of erosion during winter rain events, including, but not limited to, weed-free straw, straw wattles, fiber rolls, or erosion control blankets (further details on erosion control BMPs are provided in Appendix B). Erosion control measures may also include grading, seeding, mulching, and soil bioengineering (brush layers, stakes, etc.).
- Existing large wood should be retained at a rate of at least 5 logs/acre (at least greater than 20 centimeters DBH) and two meters long) to prevent erosion and promote nutrient cycling.

These BMPs would be implemented during site-specific restoration projects to ensure compliance with the STNF LRMP and soil quality standards, ultimately protecting geology and soil resources.

Though many of the activities proposed as part of the Proposed Action are ground-disturbing in the short-term, in the long-term, many of the activities benefit geology and soils. The “Aquatic, Wetland, Riparian, and Upslope Enhancement” activity category is intended in part to reduce soil erosion and improve soil health by stabilizing banks and soils, improving the vegetative community, and increasing the amount of organic matter. The “Road Decommissioning, Maintenance, and Rehabilitation” activity category is intended to reduce sediment into the mainstem and tributaries of the Trinity River by stabilizing soils along upslope road systems currently in use or recently decommissioned. This activity category would minimize rutting, slope failures, side-casting, and blockage of drainage facilities which can all lead to erosion and subsequent downslope sedimentation.

In conclusion, the Proposed Action would have minor short-term adverse effects to soils based on the potential for ground-disturbing actions. These effects would be avoided and minimized through the BMPs described above implemented during site-specific restoration projects. In the long-term, the Proposed Action is anticipated to have minor beneficial effects to soils throughout the Trinity River Basin as a result of activities related to revegetation, bank stabilization, and road-related projects.

## 5.4 Vegetation and Wetlands

### 5.4.1 Affected Environment

#### 5.4.1.1 Land Cover Types

The National Land Cover Database provides land use data for environmental modelling applications and is used to describe baseline landscape types throughout the Project activity area. The 15 land cover types found within the Project activity area are described in the Vegetation and Wetland Resources Technical Report (Appendix J). Most of the Project activity area is evergreen forest (56%), followed by shrub/scrub (24%), and grassland/herbaceous (12%). The remaining land cover types are below 5% cover. Emergent herbaceous wetlands and woody wetlands have less than 1% cover but are more likely to occur in the riparian reserves where most project activities would occur.

#### 5.4.1.2 Wetlands

Cowardin classes of wetlands and other waters (Cowardin et al. 1979) that occur within the HUC 10 watersheds are summarized in the in the Appendix J. The Cowardin classification system is used in the USFWS National Wetland Inventory (NWI, USFWS 2024b) for describing and categorizing wetlands and deepwater habitats based on a variety of characteristics. The following list describes the general Cowardin classes of wetlands that are known to occur within the Project activity area:

- Freshwater emergent wetlands are classified as palustrine emergent (PEM) wetlands and are dominated by herbaceous species such as pale spikerush (*Eleocharis macrostachya*), annual rabbitsfoot grass (*Polypogon monspeliensis*), annual hairgrass (*Deschampsia danthonioides*), reed canarygrass (*Phalaris arundinacea*), and mugwort (*Artemisia douglasiana*).
- Freshwater Forested wetlands are classified as palustrine forested (PFO) wetlands and are typically dominated by woody riparian species such as cottonwood (*Populus* spp.), big-leaf maple, black walnut, and blue elderberry.
- Freshwater scrub-shrub wetlands are classified as palustrine scrub-shrub (PSS) wetlands and are typically dominated by woody riparian, such as willows (*Salix* spp.), white alder (*Alnus rhombifolia*), Oregon ash (*Fraxinus latifolia*), and Himalayan blackberry (*Rubus armeniacus*).

There area over 5,000 acres of PEM, PSS, and PFO wetlands within the Project activity area. The Trinity River, the North Fork Trinity River, and the South Fork Trinity River, all perennial streams, are considered Waters of the U.S. that are subject to the jurisdiction of the USACE. Other perennial streams located throughout the watershed would also be under USACE jurisdiction, as well as some intermittent streams, both of which would also be Waters of the State of California because of their surface hydrologic connection with the Trinity River. Wetlands adjacent to perennial and intermittent streams would also likely be subject to USACE jurisdiction because of the continuous hydrologic connection with the Trinity River.

Most but not all project activities would occur within riparian reserves, where most wetland and riparian vegetation occurs (PEM, PSS and PFO). Throughout the Trinity River, there are about 196,983 acres of riparian reserves. Many HUC 10 watersheds have over 10,000 acres of riparian reserves, including North Fork Trinity River, Upper Hayfork Creek, Stuart Fork, Middle South Fork Trinity River, New River, Big French Creek Trinity River, and two HUC 10 watersheds (Lower Hayfork Creek and Swift Creek Trinity River) have over 20,000 acres of riparian reserves . Browns Creek watershed has the lowest acreage of riparian reserves with 2,441 acres.

#### **5.4.1.3 Special Status Species**

Several special status plant species, including ESA-listed species, California Endangered Species Act- (CESA-) listed species, BLM sensitive species, USFS sensitive species, and species considered rare, threatened or endangered in California based on the California Native Plant Society Rare Plant Ranks are known to occur within the HUC 10s, many of which occur within riparian reserves or adjacent to roads. Whitebark pine (*Pinus albicaulis*), a federally listed threatened plant species, is known to occur within the Tangle Blue Creek Trinity River HUC 10 watershed at the upper elevations (USFWS 2024a). This species is also known to occur within riparian reserves. Other occurrences of this species are nearby but are outside the Trinity River watershed boundary. There are a number of other special status species with potential occurrence in HUC 10 watersheds within the Project activity area. These have all been identified in Table 9-1 of Appendix J and analyzed for potential occurrence within riparian reserves and/or within 10 feet of roads where many of the Project activities are proposed.

#### **5.4.1.4 Non-native Invasive Species**

Non-native invasive species (NNIS) occur throughout the Trinity River watershed, particularly in areas that have been subject to ground-disturbing activities (e.g., roads and recreation sites). NNIS affect the functions and values of native ecosystems. Some of these species have a California Department of Food and Agriculture (CDFA) Pest rating of either C or as a California Code of Regulations (CCR) 4500 noxious weed (Appendix J) and are listed by STNF as priority species. NNIS known to occur within the Project activity area and within riparian reserves are listed in Appendix J. NNIS can occur with greater density in areas that have been previously disturbed such as road rights-of-way, areas near parking areas,

around buildings, or bare areas from natural or human causes. Two especially prevalent species that are known to occur throughout the watershed are Himalayan blackberry (*Rubus armeniacus*) and yellow star thistle (*Centaurea solstitialis*).

Didymo is an invasive, aquatic algae that forms a slimy mass and attaches to plants and rocks along stream bottoms. This organism can cover up to 100 percent of stream bottoms and has potential to cause ecological damage and disrupt stream ecosystems by causing higher mortality rates in fish and aquatic plants (Spaulding and Elwell 2007). Didymo has been documented to occur in the Trinity River from the Trinity Dam to Helena and spreads easily through contaminated fishing gear, watercraft, or vehicles.

## **5.4.2 Environmental Consequences**

### **5.4.2.1 No Action**

Under the No Action alternative because of a lengthened planning process, the extent and quality of woody and herbaceous wetland, riparian and other native habitat would not be improved or enhanced as readily ; habitat for special status species would not be enhanced as readily; and NNIS would not be controlled at the watershed level.

### **5.4.2.2 Proposed Action**

For the purposes of analysis for vegetation and wetland resources, the intensity of effects is described using the following terms:

- Negligible/No effect: Effects would not be measurable, with no perceptible consequences.
- Minor: Effects are detectable but are small and localized.
- Moderate: Effects are detectable, can be measured, and cover a larger area (e.g., a tributary stream).
- Major: Effects are easily measured, regional, and at the population-or community scale.

Effects have been analyzed for each vegetation resource, including wetland and riparian habitat as well as special status species. Throughout the analysis, all effects are considered adverse unless otherwise stated as beneficial. Effect analyses also consider environmental commitments that would either avoid causing a particular effect or minimize the effect's intensity. Effect analyses do not consider compensatory mitigation.

For non-federally listed special status species (i.e., USFS- or BLM- sensitive species), the following determinations were also used to describe effects on species:

- Project activities will not affect special status species
- Project activities may affect individuals but are not likely to result in a trend toward Federal listing or loss of viability for the special status species.
- Project activities may affect individuals and are likely to result in a trend toward Federal listing or loss of viability for special status species.

#### **5.4.2.2.1 Land Cover Types**

Most activities within the Project activity area, including instream and side channel restoration, floodplain restoration, water conservation projects, instream structure removal, bank stabilization, habitat enhancement and road decommissioning at stream crossing would be along streams and within floodplains, which would have the greatest effect on emergent herbaceous wetland and woody wetlands land cover types, which only consist of 0.38 percent of the land cover in the HUC 10 watersheds within the Project activity areas. Effects on NWI-mapped wetlands and riparian

vegetation, which would overlap with the herbaceous and woody wetland cover types, are discussed in Section 5.4.2.2.2 and not replicated in this section.

A suite of enhancement and invasive species management projects would occur on roads or other disturbed areas. While these effects on vegetation communities along roads and in other upland areas affected by NNIS control would be temporary, effects could last for several months to up to two years before vegetation is re-established. Reducing NNIS would result in a minor beneficial effect on the vegetation communities; however, this beneficial effect may be offset by increases in ground disturbance without herbicide application, which could increase the presence of certain NNIS species. An overall reduction in ecologically important land cover types, such as herbaceous and woody wetlands is unlikely to occur since the Proposed Action would restore habitat throughout the floodplain and in upland areas where revegetation would be implemented. Some roads would be decommissioned and restored with native vegetation, resulting in a gain in native habitat and higher quality vegetation communities.

#### 5.4.2.2.2 Wetlands and other Waters

A suite of restoration and enhancement activities and invasive species management projects would occur within riparian areas and floodplains, which are typically within the riparian reserves. In-channel projects and floodplain enhancement that require heavy equipment would require removal of vegetation for access roads, staging areas, grading of floodplain areas, and re-contouring of streambanks. Effects on NWI-mapped wetlands (PEM, PSS, and PFO) and riparian vegetation within riparian reserves would occur from habitat restoration and enhancement, floodplain restoration, removal or retrofitting of fish passage barriers, small dams, flood gates, pilings, and other in-water structures, bioengineered bank stabilization, and road rehabilitation that entail access roads and staging areas and vegetation removal. While these effects would be temporary, they could last for several months to up to two years before vegetation is re-established. The overall effect of project activities would be a long-term benefit on wetlands.

Implementing water conservation measures would benefit wetland and riparian vegetation by maintaining or increasing instream flow in the long-term. Increasing instream flow levels by reducing withdrawals and increasing use efficiency would increase groundwater levels, especially during the summer and early fall when flows are lowest, providing added hydrologic support for wetland and riparian vegetation.

Project activities would ultimately increase floodplain connectivity and reactivate channel migration across floodplains, which would improve and/or increase riparian and wetland habitat. Restoration activities that target vegetation could increase the quality of wetland and riparian vegetation by increasing species and structural diversity and restoring ecological functions. Dewatering necessary during construction for restoration activities would have a temporary effect on wetlands and riparian vegetation, but no long-term effects are expected from dewatering.

Several CMs, including V-2, V-5, V-9, V-11, V-12, V-13, V-14, and V-15, would be used to avoid and minimize effects on wetland and riparian vegetation. Other CMs that provide mitigation for unavoidable impacts on vegetation communities are listed in Appendix J. With the use of CMs, short-term effects on NWI wetlands, wetland subject to USACE jurisdiction, and riparian vegetation, especially within riparian reserves and Key Watersheds, would be avoided and minimized. The Proposed Action is expected to have short-term adverse effects but would provide a net long-term benefit on wetland and riparian habitat along the mainstem and many Trinity River tributaries, which would be a moderate beneficial effect.

#### 5.4.2.2.3 Special Status Species

Many special status plant species would not be affected by the Proposed Action because they have not been documented within riparian reserves, or along or on roads, where most of the restoration activities are proposed. Special status species that do occur within the Project activity area are less likely to be affected with the implementation of CMs V-1 and V-2. Although whitebark pine, a federally threatened species, has been documented within riparian reserves, with the implementation of CM V-3, effects on whitebark pine would be avoided, and the project activities would not affect whitebark pine.

Water conservation measures that would benefit wetland and riparian vegetation by maintaining or increasing instream flow and groundwater levels would also provide benefits to special status plant species that occur in riparian habitat. Proposed activities, such as restoration and enhancement of off-channel and side channel habitat, floodplain restoration, and wetland and riparian habitat enhancement could affect species within riparian reserves. For species that have been documented within riparian reserves and/or adjacent to roads, project activities may affect individuals but are not likely to result in a trend toward Federal listing or loss of viability. With the implementation of CM V-1 and V-2, most effects on these species would be avoided. A full list of GMPs, CMs, and design guidelines is in Appendix B. These GMPs, CMs, and design guidelines would ensure that effects would not lead to a special status plant species population decline or result in a trend toward Federal listing or loss of viability. The proposed activities would result in short-term minor effects on species within riparian reserves and/or adjacent to roads but would be a long-term benefit as new habitat is created and disturbed areas are restored.

#### 5.4.2.2.4 Non-native Invasive Species

The Proposed Action would restore and enhance aquatic, wetland, riparian and upslope habitats by removing NNIS and revegetating with native plants. This activity would be a beneficial effect on native plant communities. Implementation of restoration activities could result in the spread of NNIS, some of which are listed on the CDFR noxious weed list and on the STNF priority list. Prior to any disturbance, noxious weeds would be inventoried and managed according to treatment plans for specific species. Several NNIS CMs (Appendix B) are proposed that would reduce the spread of invasive and noxious weeds before, during, and following project activities. Protocols would be followed to ensure vehicles are not spreading seeds or vegetative parts of noxious weeds.

Invasive aquatic species (e.g., didymo) could spread easily into new areas during instream activities if construction vehicles, hand tools, or contractors' boots have been in areas where these species exist and are not cleaned properly. CM NNIS-11 would eliminate the possibility of these species spreading from project activities. CMs such as educating the contractors working on restoration projects and thoroughly cleaning equipment coming from other streams would prevent the spread of didymo. With the use of CMs, the effect of the Proposed Action on the spread of invasive aquatic species would be minor.

Herbicides would not be used to control NNIS in the Project activity area. Some species, including Himalayan blackberry, scotch broom (*Cytisus scoparius*), tree of heaven (*Ailanthus altissima*), and yellow star thistle, are difficult to impossible to control without herbicides. For example, tree of heaven has been observed to come back aggressively within five years with more stems and vegetative volume when it is chopped or mowed. Management of these species would likely be labor and time intensive through manual or mechanical removal and continued monitoring and management. Without the use of herbicides, these species may spread into more areas than they currently occupy. For other species, BMPs and CMs would avoid and minimize the spread of NNIS from the implementation of project activities. The net

effect of controlling existing NNIS, using BMPs, CMs and design guidelines to prevent new infestations and replanting native species, would be an overall benefit on native vegetation communities, but the benefits may be diminished by the increase in Himalayan blackberry, tree of heaven, scotch broom, and yellow star thistle, which would be a minor adverse effect.

## 5.5 Fisheries

### 5.5.1 Affected Environment

The native anadromous fish species of interest in the mainstem Trinity River and its tributaries are Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*Oncorhynchus kisutch*), steelhead (*Oncorhynchus mykiss irideus*), and Pacific lamprey (*Entosphenus tridentatus*). There are two spawning races of Chinook salmon, spring- and fall-run, and two spawning races of steelhead, winter- and summer-run.

Per the ACS, the BLM and USFS are tasked to conserve and restore native anadromous fish habitat, and TRRP exists to re-establish anadromous salmonid populations to the Trinity River, in part through restoration activities within the tributaries. Federal and state special-status fish species of particular concern that occur within the Project activity area include:

- Southern Oregon/Northern California Coast (SONCC) coho salmon ESU<sup>6</sup> (federal and California state ESA-listed as threatened, with designated critical habitat [CH])
- Upper Klamath-Trinity rivers (UKTR) spring-run Chinook salmon ESU (federal candidate species, California state ESA-listed as threatened, USFS sensitive).

The UKTR Chinook salmon ESU, while not a federal ESA-listed species and no CH has been designated, is a stock covered under the Pacific Coast Salmon Fishery Management Plan (FMP). Therefore, its habitat within the Trinity River watershed is considered essential fish habitat (EFH). SONCC coho habitat is also considered EFH. EFH receives federal protection under the MSA.

Table 5-6 below displays all special-status fish and freshwater mussel species with the potential to occur within the Trinity River watershed according to the California Natural Diversity Database (CDFW 2024), BLM sensitive species Redding Field Office list, USFS sensitive species list for the Shasta-Trinity National Forest, University of California Davis PISCES Database fish distribution maps (CalFish 2024), and consultation with local expertise, namely TRRP. Table 5-6 includes the species status, documented HUC 10 presence within the Project activity area, and whether designated CH is present within the analysis area.

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<sup>6</sup> Evolutionarily Significant Unit

**Table 5-6. Special-status fish and freshwater mussel species with potential to occur within the Project activity area.**

Common Name	Scientific Name	Federal Status <sup>1</sup>	Other Status <sup>2</sup>	Documented HUC 10 Presence	Designated CH in the Watershed?
<b>Fish Species</b>					
Coho salmon, SONCC ESU	<i>Oncorhynchus kisutch</i>	FT	ST, S2	Big French Creek, East Fork Trinity River, New River, Stuart Fork, Swift Creek-Trinity River, Weaver Creek, Lower Hayfork Creek, Middle South Fork Trinity River	Yes
Spring Chinook salmon, UKTR ESU	<i>Oncorhynchus tshawytscha</i>	FC	ST,SSC, USFS-S, S2	Big French Creek, Browns Creek, Canyon Creek, Coffee Creek, East Fork Trinity River, New River, North Fork Trinity River, Stuart Fork, Swift Creek-Trinity River, Tangle Blue Creek-Trinity River, Weaver Creek, Lower South Fork Trinity River, Lower Hayfork Creek, Upper Hayfork Creek, Middle South Fork Trinity River, Upper South Fork Trinity River	No
Steelhead, Klamath Mountains Province DPS <sup>3</sup>	<i>Oncorhynchus mykiss irideus</i>	NL	SSC,USF S-S, S2	Canyon Creek, Coffee Creek, East Fork Trinity River, New River, North Fork Trinity River, Stuart Fork, Swift Creek-Trinity River, Tangle Blue Creek-Trinity River, Weaver Creek, Lower South Fork Trinity River, Lower Hayfork Creek, Middle South Fork Trinity River, Upper South Fork Trinity River	No
Green sturgeon, Northern DPS <sup>3</sup>	<i>Acipenser medirostris</i>	NL	SSC, S1	Big French Creek <sup>4</sup>	No
Pacific lamprey	<i>Entosphenus tridentatus</i>	NL	SSC, USFS-S, BLM-S, S3	Big French Creek, Browns Creek, Canyon Creek, Coffee Creek, New River, North Fork Trinity River, Tangle Blue Creek-Trinity River, Weaver Creek, Lower South Fork Trinity River, Lower Hayfork Creek, Upper Hayfork Creek, Middle South Fork Trinity River	No
<b>Freshwater Mussel Species</b>					
Western pearlshell	<i>Margaritifera falcata</i>	NL	S1S2	Common in the Trinity River and tributaries	No
California floater	<i>Anodonta californiensis</i>	NL	USFS-S, S2	Documented in low numbers in the Klamath and Trinity rivers	No

<sup>1</sup> FT = Federally-listed as threatened and species likely to become endangered within the foreseeable future; FC = Federal candidate for listing; NL = Not listed.

<sup>2</sup> SSC = California Species of Special Concern; SE = State-listed as endangered; ST = State-listed as threatened; BLM-S = BLM sensitive species, USFS-S = USFS sensitive species; NatureServe California State Rank S1 = critically imperiled, S2 = imperiled, S3 = vulnerable.

<sup>3</sup> Distinct Population Segment

<sup>4</sup> Green sturgeon are found outside the Project activity area in this HUC 10 watershed.

In addition to these special status species there are a number of other fish species present within the Project activity area:

- Native fish: Klamath smallscale sucker (*Catostomus rimiculus*), Klamath speckled dace (*Rhinichthys osculus klamathensis*), UKTR fall Chinook salmon, inland threespine stickleback (*Gasterosteus aculeatus microcephalus*), Klamath River lamprey (*Entosphenus similis*), chum salmon (*Oncorhynchus keta*), white sturgeon (*Acipenser transmontanus*); and
- Nonnative fish: brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), sockeye (Kokanee) salmon (*Oncorhynchus nerka*), green sunfish (*Lepomis cyanellus*), golden shiner (*Notemigonus crysoleucas*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), brown bullhead (*Ameiurus nebulosus*), western mosquitofish (*Gambusia affinis*), and bluegill (*Lepomis macrochirus*).

### 5.5.1.1 Aquatic Habitat

Historically, the Trinity River functioned as a dynamic river reach that provided quality spawning and rearing habitat for anadromous fish. In 1960, the Trinity River Division (TRD) began operations, blocking 109 miles of important salmonid habitat above the Lewiston Dam and exporting as much as 90% of the Trinity River's inflows into Trinity Lake to the Sacramento River Basin. In addition to the development of TRD, logging practices, road construction, mining, and floodplain development within the Trinity River watershed also contributed significantly to instream habitat degradation (USFWS and HVT 1999). Clear-cut logging, along with hundreds of miles of unpaved roads and skid trails, promoted increased sediment loading in the Trinity River and its tributaries, and removal of streamside vegetation increased water temperatures. This has reduced the biological productivity and fish-carrying capacity of much of the Trinity River Subbasin (USFWS and HVT 1999; EPA 2001).

Critical habitat for SONCC coho was designated on May 5, 1999 (64 FR 24049) and includes the mainstem Trinity River and accessible tributary reaches that are occupied by freshwater life stages of coho and also provide certain physical and biological features (PBFs). SONCC coho PBFs include all the water, riverbed, and bank areas as well as adjacent riparian areas within the ESU boundaries (with the exception all tribal lands in northern California and areas that are above certain dams). Adjacent riparian area is defined as, "the area adjacent to a stream that provides the following functions: shade, sediment, nutrient, or chemical regulation, streambank stability, and input of large woody debris or organic matter" (64 FR 24049, May 5, 1999). PBFs essential to the conservation of SONCC coho include juvenile summer and winter rearing areas, juvenile migration corridors, areas for growth and development to adulthood, adult migration corridors, and spawning areas (64 FR 24049, May 5, 1999).

In addition to critical habitat, waters and substrates necessary for spawning, breeding, feeding, or growth to maturity for coho and Chinook salmon (within the Trinity River basin) are protected as EFH per the MSA.

One of the most critical features of aquatic habitat to anadromous fish species (e.g., coho, Chinook, Pacific lamprey, steelhead) as well as other species is the accessibility of habitat, also known as "fish passage." There are numerous fish passage barriers and diversions within the Project activity area. In the SONCC coho recovery plan (NMFS 2014), dams and diversions were identified as a key limiting factor for populations of SONCC coho in the Trinity River. Numerous small-scale wells and diversions for domestic uses, stock watering, and small agricultural operations occur throughout the watershed and reduce streamflows during critical low-flow periods in the late summer and fall.

**Table 5-7. Fish passage within the Project activity area.<sup>1</sup>**

Natural Partial Barriers	Natural Total Barriers	Partial Barriers	Total Barriers	Unscreened Diversions	Unknown/Unassessed	Remediated Barriers <sup>2</sup>
21	150	110	115	125	512	26

<sup>1</sup> CalFish 2023.

<sup>2</sup>Fish response unconfirmed.

Table 5-7 shows the number and type of in-water structures affecting fish passage within the Project activity area. With 512 unknown or unassessed in-water structures (e.g., culverts) and 225 manmade partial and total barriers, there are many opportunities to improve fish passage throughout the basin. There are also 125 unscreened diversions that have the potential to cause fish stranding deaths.

## 5.5.2 Environmental Consequences

Key considerations for the analysis of potential Project effects to fish and freshwater mussel species include the presence of a species in or near the Project activity area, the scope and nature of Project activities, and the potential effects associated with those activities. Specific to fish and freshwater mussel species, short-term construction-related effects are those that result in immediate physical harm or death to individuals, or the disruption of key behaviors that also harm individuals. Long-term effects include impacts to habitat (e.g., flow, water quality, riparian and aquatic vegetation, etc.) or that occur later in time (e.g., a decrease in foraging opportunities) that would affect individuals and populations.

### 5.5.2.1 Fisheries Effects Intensity

For the purposes of the fisheries analysis for this Project, the intensity of effects is described using the following terms:

- Negligible/No effect: Effects would not be measurable, with no perceptible consequences.
- Minor: Effects are detectable but are small and localized.
- Moderate: Effects are detectable, can be measured, and cover a larger area (e.g., a tributary stream).
- Major: Effects are easily measured, regional, and at the population-scale.

### 5.5.2.2 No Action

Under the No Action alternative, fish and freshwater mussel populations as well as associated aquatic habitat would be maintained at the current condition generally. That is, the poor aquatic habitat conditions that currently exist within the Trinity River basin as a result of flow management, logging practices, road construction, mining, and floodplain development would remain unaltered. These conditions would continue to impact the biological productivity and fish carrying capacity within the Trinity River basin. Some restoration projects could occur over time and would improve aquatic habitat at a local level; however, this restoration would occur at a slower pace lengthened planning process compared to the Proposed Action.

### 5.5.2.3 Proposed Action

The Proposed Action includes eleven categories of restoration activities. Each activity entails a certain amount of construction. The table below summarizes the potential construction components or construction impacts by restoration activity category that could affect individual fish and their habitat. Effects of particular concern are described in more detail below in Table 5-8.

**Table 5-8. Construction-related effects on special-status fish per activity category.**

Restoration Activity Category	Potential Construction-Related Effects with CMs Implemented
1. Restoration and Enhancement of In-Channel Habitat	Construction impacts to riparian vegetation, in-channel heavy equipment use, turbidity, incidental chemical contamination, bedrock fracturing hydroacoustic noise, dewatering, fish relocation, hydroacoustic noise from installation of wood
2. Floodplain Restoration	Construction impacts to riparian vegetation, in-channel heavy equipment use, turbidity, incidental chemical contamination, dewatering, fish relocation, hydroacoustic noise from installation of wood
3. Removal or Retrofitting of Fish Passage Barriers, Small Dams, Flood Gates, Pilings, and Other In-water Structures	Construction impacts to riparian vegetation, in-channel heavy equipment use, sedimentation, incidental chemical contamination, dewatering, fish relocation, blasting hydroacoustic noise
4. Water Conservation Projects	Turbidity, incidental chemical contamination, potential for dewatering/fish relocation associated with fish screen installation
5. Salmon Carcass Placement	No adverse construction effects anticipated
6. Remote Site Incubators	Minor streambed disturbance during install of system and demobilization.
7. Bioengineered Bank Stabilization	Construction impacts to riparian vegetation, incidental chemical contamination, sedimentation, hydroacoustic noise from installation of wood
8. Aquatic, Wetland, Riparian, and Upslope Habitat Enhancement	Construction impacts to riparian vegetation, incidental chemical contamination, sedimentation, hydroacoustic noise from installation of wood
9. Road Maintenance	Incidental chemical contamination, sedimentation
10. Road Rehabilitation	Construction impacts to riparian vegetation, in-channel heavy equipment use, sedimentation, incidental chemical contamination, dewatering, fish relocation, hydroacoustic noise from pile driving
11. Road Decommissioning	Incidental chemical contamination, sedimentation

Specific construction elements that are known to cause adverse effects to fish and freshwater mussel species are listed and summarized below. Additional details can be found in the Fisheries Technical Report in Appendix K.

#### 5.5.2.3.1 Dewatering and Fish Relocation

This work would take place during seasonally low flow, and salmonids are likely to be exposed to potential adverse effects. Any pumps used during dewatering would be required to use fish screens per NMFS guidance. Adults are physically able to avoid work activity and are not expected to be present during fish removal, but in the unlikely event that adults are found in the work areas, they will be safely removed via herding to the extent possible. Electrofishing may be necessary if seining or herding is not successful. See Section 5.5.2.3.5 below for a summary about electrofishing.

#### 5.5.2.3.2 Desiccation or Mechanical Crushing During In-Channel Heavy Equipment Use

In-channel construction activities would be conducted during the summer to early fall low-flow conditions (June 15 through October 15), avoiding the potential for construction-related effects on spawning coho salmon and alevins, since this period is outside the adult migration, spawning, and egg incubation season in the action area (Shaw et al. 1997). Heavy equipment would also operate in a slow, deliberate manner, allowing fish to avoid contact with equipment in an open channel. Seining would be employed at some sites to herd fish out of the site before block nets are placed, preventing reentry of juvenile fish into the work area.

#### 5.5.2.3.3 Increased Suspended Sediment Concentrations

Fish would be exposed to increased sediment mobilization by Project activities, but several measures would reduce the potential impact of suspended sediment. Erosion and sediment control BMPs would be maintained to ensure compliance with the turbidity thresholds specified by the Project's Section 401 water quality certification (i.e., more than 20 NTUs at 500 feet downstream of in-river construction when background turbidity is less than or equal to 20 NTUs, and more than a 20% increase in turbidity at 500 feet downstream when background is greater than 20 NTUs). If standards are not met, construction activities would cease temporarily until turbidity is within threshold.

#### 5.5.2.3.4 Bank Stabilization

Bank stabilization prevents a stream channel from migrating and therefore, typically reduces both habitat quantity and habitat quality for salmonids over the long term. The long-term effect of channelizing a stream through bank stabilization is a reduction of the number of fish that the Project activity area can support (NMFS 2020a), which means the continuation of impaired juvenile salmonid abundance over successive generations, relative to what would be expected under natural stream conditions and channel function. However, the bioengineered bank stabilization approach (e.g., riparian planting and instream wood placement that create natural cover elements) proposed would improve habitat conditions relative to what currently exists within the channelized Project activity area (Zika and Peter 2002). These improved habitat conditions do not fully offset the ongoing impact to habitat function and future juvenile population growth caused by extending channelization into the foreseeable future, but adverse effects would be minimized to the extent possible (NMFS 2020a).

#### 5.5.2.3.5 Electrofishing

Electrofishing can cause a suite of effects ranging from disturbance to mortality. The amount of unintentional mortality attributable to electrofishing varies widely depending on the equipment used, the settings on the equipment, and the expertise of the technician. Conservation measures for the Project require that all technicians follow NMFS electrofishing guidelines (Appendix B). In all cases, electrofishing is used only when other relocation methods are not feasible. ESA-listed fish would be handled with extreme care and kept in cold water to the maximum extent possible. During relocation operations, a healthy environment must be provided. Electrofishing is not permitted if water temperatures exceed 64 degrees Fahrenheit (NMFS 2020a).

#### 5.5.2.3.6 Construction Impacts to Riparian Vegetation

During implementation of some activity categories, riparian vegetative cover would be disturbed or removed temporarily, which would result in a temporal reduction of cover and shading, reduced nutrient cycling, and reduced terrestrial invertebrate production on a localized and temporary scale. Temporary displacement of salmonids from

preferred habitat may also result in an increased predation risk or reduced feeding efficiency through the loss of cover (Michney and Hampton 1984; Michney and Deibel 1986). However, in the long-term, no net loss of riparian vegetation would occur, and new plantings would offset the temporal loss of riparian function. The addition of large wood structures would provide cover and shade adjacent to pools and encourage natural sediment build-up next to the wood structures, allowing the bank to fill in and recruit more vegetation for improvement of long-term streambank functions and development of habitat features.

#### 5.5.2.3.7 Activities Taking Place in Dry Conditions

Certain activities, including road maintenance and Stage Zero channel restoration, would take place under dry conditions and are consequently expected to have little adverse impact on fish or habitat. Effects to fish would be limited to a surge of mobilized sediment (first flush) that would potentially occur when seasonal flows and rains return to these areas in the winter or spring following construction, but the increase in turbidity is expected to be short-lived and minimal with the use of erosion and sediment control BMPs.

#### 5.5.2.3.8 Instream Flow Restoration from Diversions

Implementing water conservation measures would benefit salmonids and other fish species by maintaining or increasing instream flow such that rearing and migration conditions would be improved.

#### 5.5.2.3.9 Incidental Chemical Contamination

Negligible effects to individual fish and their habitat as a result of contamination by petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain polycyclic aromatic hydrocarbons (PAHs) as a result of heavy equipment use would be anticipated. These instances would be anticipated to be rare but could kill salmonids at high levels of exposure and can cause sub-lethal adverse effects at lower concentrations (Meador et al. 2006). Emergency spill control measures and other BMPs would be employed to prevent spills into waterways (Appendix B).

#### 5.5.2.3.10 Pile Driving

For the Project, timber piles will be used to construct and stabilize some structured log jams and would typically be installed using a vibratory hammer. Therefore, installation of these timber piles would result in minor acoustic effects compared to the installation of metal piles. Metal piles would likely be required for the replacement of bridges as part of the Project, either for temporary construction bridges or for the main bridge structures themselves. Environmental commitments would be incorporated into site-specific designs to ensure that all Project activities with pile driving would stay below injury effect thresholds (Appendix B). With the incorporation of these environmental commitments into site-specific restoration projects, pile driving is anticipated to have minor effects to fish species in the Project activity area.

#### 5.5.2.3.11 Blasting

Blasting is proposed as a technique to remove bedrock as part of the “Restoration and Enhancement of Off-Channel and Side-Channel Habitat” activity category. It is seen as a potential tool for channel restoration in case a bedrock area needs to be removed in order to meet design and grade criteria, and there is no other reasonable alternative. In addition, blasting could be used to removed fish passage barriers as part of the “Removal or Retrofitting of Fish Passage Barriers, Small Dams, Flood Gates, Pilings and Other In-water Structures” activity category.

Because the hydroacoustic effects of blasting are similar to those of pile driving, the Project would use similar environmental commitments for proposed blasting activities (Appendix B). Hydroacoustic effects as a result of blasting would need to stay below injury effect thresholds. In addition to effects to individual fish, detonation of explosives in or near fish habitat may also result in the physical and/or chemical alteration of fish habitat. However, with the incorporation of the environmental commitments to site-specific project designs, the effects of blasting are anticipated to be minor.

#### 5.5.2.3.12 Beneficial Effects

In addition to effects associated with proposed construction activities, in the long-term, the Project would also enhance or restore the following aquatic habitat functions: stream structure/complexity, stream sinuosity and length, bank stability, floodplain connectivity, and riparian vegetation structure and diversity. These improvements would promote conditions that maintain or decrease stream temperature, reduce turbidity and sediment discharges (via stable streambanks, improved sediment retention through increased channel structure, riparian areas, and floodplains), and improve nutrient input (via improved riparian conditions) and retention (via increased channel structure, sinuosity, and floodplain areas). Removing or repairing in-water structures would restore fish passage for spawning, migrating, and rearing fish, and would increase aquatic habitat area. Restoration of riparian vegetative communities would improve shade along streambanks in the long-term, which would help maintain water temperatures.

Large wood and boulder placement would enhance habitat elements for migrating and rearing fish. A literature review by Roni et al. (2015) reported that the vast majority of studies on wood placement have reported improvements in physical habitat (e.g., increased pool frequency, cover, and habitat diversity) with most evaluations of fish response showing a positive response from salmonids. The resulting effect of large wood on fish habitat is significant. Crispin et al. (1993) also noted increased salmon spawning activity in an area where gravels accumulated behind large wood. Bjornn and Reiser (1991) cited several studies that documented an increase in fish densities with higher levels of large wood, and Fausch and Northcote (1992) documented that coho salmon and cutthroat trout production was greater in large wood-dominated streams.

Restoring 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 rearing juvenile fish.

#### 5.5.2.3.13 Effects on Freshwater Mussels

Mussels are relatively immobile, and an individual mussel may have been present in a certain location for decades. Mussels are present year-round, and in-channel work windows for salmonids do not protect freshwater mussels (Blevins et al. 2017). Any freshwater mussel beds would be identified during the planning process for each site-specific restoration action that is part of the Project. To the extent practicable, construction effects would be minimized through implementation of erosion and sediment control BMPs and/or avoidance of physical disturbance to any freshwater mussel beds using a buffer of 5 meters from any construction activities or any scour as a result of construction activities (Blevins et al. 2019). If avoidance is not possible, freshwater mussel salvage and relocation BMPs described in “Conserving the Gems of Our Waters” (Blevins et al. 2017) would be considered during Project actions. Incorporating these environmental commitments into site-specific designs would entail minor effects to freshwater mussels within the Trinity River watershed. Benefits to freshwater mussels would entail an increase in aquatic habitat complexity that could provide more locations within floodplains where mussel beds could be established in the long term.

## 5.6 Wildlife

### 5.6.1 Affected Environment

The Trinity River Watershed offers a variety of habitats that are important to numerous wildlife species. Whether or not wildlife habitat is suitable for any given species is based on factors including latitude, vegetation communities, topography, proximity to water features including wetlands, streams, lakes, oceans, anthropogenic influences, and natural disturbances, including wildfire and increases in average temperatures and prevalence of drought.

To determine what wildlife species needed to be analyzed for the Project, five special status groups were reviewed: Federal ESA-listed, California ESA-listed, USFS Sensitive, BLM Sensitive, and California Fully Protected species. Table 3.1 in Appendix L displays those species with special statuses and with the potential to occur within the Project Activity Area according to the California Natural Diversity Database (CNDDDB), BLM sensitive species list provided by RFO, Natural Resource Information System<sup>7</sup> (NRIS), USFS sensitive species list within Trinity County, and consultation with local expertise.

The wildlife of interest that have high potential to occur within the Trinity River Watershed and project activity areas include the northern spotted owl (*Strix occidentalis caurina*), American goshawk (*Accipiter atricapillus*), bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), pallid bat (*Antrozous pallidus*), fringed myotis (*Myotis thysanodes*), Townsend's big-eared bat (*Corynorhinus townsendii*), Pacific/American marten (*Martes caurina*; aka *M. americana*), Fisher (*Pekania pennanti*), ringtail cat (*Bassariscus astutus*), Northwestern pond turtle (*Actinemys marmorata*), California mountain kingsnake (*Lampropeltis zonata*), foothill yellow-legged frog (*Rana boylei*), Cascades frog (*Rana cascadae*), coastal giant salamander (*Dicamptodon tenebrosus*), Big Bar [Pressley] hesperian snail (*Vespericola pressleyi*), Trinity bristlesnail (*Monadenia infumata setosa*), Western bumblebee (*Bombus occidentalis*), and monarch butterfly (*Danaus plexippus*).

### 5.6.2 Environmental Consequences

Key considerations for the analysis of potential Project effects to wildlife species include the presence of a species in or near the Project activity area, the scope and nature of Project activities, and the potential effects associated with those activities. Specific to wildlife species, construction-related effects may result in immediate physical harm or death to individuals, or the disruption of key behaviors that also harm individuals. Long-term effects may include impacts to habitat (e.g., flow, water quality, riparian and aquatic vegetation, etc.) or those that occur later in time (e.g., a decrease in foraging opportunities) that would affect individuals and populations.

#### 5.6.2.1 Wildlife Effects Intensity

For the purposes of the wildlife analysis for this Project, the intensity of effects is described using the following terms:

- Negligible/No effect: Effects would not be measurable, with no perceptible consequences.
- Minor: Effects are detectable but are small and localized.
- Moderate: Effects are detectable, can be measured, and cover a larger area (e.g., a tributary stream).

<sup>7</sup> NRIS is an internal tool that USFS staff has access to.

- Major: Effects are easily measured, regional, and at the population-scale.

### **5.6.2.2 No Action**

Under the No Action alternative, wildlife populations as well as associated aquatic habitat would be maintained at the current condition. That is, the poor aquatic habitat conditions that currently exist within the Trinity River basin as a result of flow management, logging practices, road construction, mining, and floodplain development would remain unaltered. These conditions would continue to impact the biological productivity of the northwestern pond turtle and other highly aquatic species within the Trinity River basin. Some restoration projects could occur over time and would improve aquatic habitat at a local level; however, this restoration would occur at a slower pace due to a lengthened planning process compared to the Proposed Action.

### **5.6.2.3 Proposed Action**

The Proposed Action includes eleven categories of restoration activities. Each activity entails a certain amount of construction. Table 5-8 in Section 5.5.2.3 above summarizes the potential construction components or construction impacts by restoration activity category that could affect individual fish and their habitat. Similar effects could occur to wildlife species based on the proposed action and are generally discussed below. For species-specific effects, see Appendix L.

During project implementation and post implementation, proposed activities could have effects on wildlife species. Project environmental commitments specific to wildlife would be implemented to reduce effects to species and their habitat. This section discusses general effects that could occur from Project activities. As discussed in Section 4.2 most activities would require the use of heavy equipment and hand tools to complete site-specific designs, which would cause ground disturbance, noise, impaired air and water quality, and temporary loss of native vegetation.

Short-term effects to wildlife species could potentially occur during project implementation. Project implementation is more likely to affect species with relatively small home ranges that are reliant and well adapted to freshwater habitats of the Trinity River and its tributaries including species such as the northwestern pond turtle, foothill yellow-legged frog, and Big Bar hesperian snail. Effects to wildlife as a result of Project activities could include loss of nesting habitat, potential take of ESA-listed species, direct harm (injury or death) of individuals, interference with habitat use, interruption to foraging activities, noise disturbance, and reduced air and water quality.

Short-term effects to wildlife as a result of airborne noise could result from activities such as use of heavy construction equipment, pile driving during bridge replacement, large wood placement via helicopters, bedrock fracturing, and instream structure removal. Airborne noise effects would likely affect nesting birds if migratory birds were using habitat in or in the vicinity of the site-specific project areas for nesting and rearing during implementation. Preconstruction surveys would be performed to identify specific wildlife activity areas and either applicable SRs would be applied or noise-generating activities would be deferred until after the nesting season is complete or until a qualified biologist has determined the young have fledged their nest. Noise effects could have adverse effects to wildlife; however, these effects would be temporary and localized and minimized with the implementation of CMs (see Table 4-5 in Appendix B).

Native and nonnative vegetation removal would occur during site-specific project implementation, inducing temporary habitat alteration associated with construction activities. Heavy equipment would also produce exhaust and dust, affecting air quality and potentially affecting wildlife during implementation. Sedimentation from earth-moving activities and project activities within streams and floodplains could increase turbidity within project waterways temporarily and

potentially long-term, which could affect aquatic wildlife species. To reduce effects to protected species, Project environmental commitments would be incorporated into site-specific activities including SRs, preconstruction surveys, species salvage and translocation, and biological monitoring. These measures would ensure that effects would not lead to long-term adverse effects on wildlife species.

In terms of beneficial effects, habitat enhancement and revegetation with native species would take place in aquatic areas, meadows, wetlands, riparian areas, and upslope habitats within the watershed where the vegetative community has been disturbed by past land practices, wildfire, introduction of nonnative species, or construction activities and where habitat functions are impaired. ACS objectives would be incorporated into site-specific project designs to 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, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability (Appendix C). In addition, restoring riparian habitat to support well-distributed populations of native plant, invertebrate, and vertebrate species, site-specific would further address ACS objectives. Coordination with upstream operators to control dam releases or instream flow levels to provide water during plant establishment would occur to ensure revegetation success. Site-specific design, timing, and duration would ensure reduced effects to wildlife species reoccupying habitat following project implementation with the goal of improving habitat long-term.

Long-term benefits to wildlife species include improvements to habitat as a result of proposed activities with increased foraging opportunities (with expected increases to fish populations), improved vegetative community with a higher percentage of native species, and improvements to upslope habitats (wetlands, meadows, floodplain areas, etc.) that may be more resilient and provide refugia during periods of temperature extremes and wildfire. Other improvements include nutrient cycling within project waterways, which would increase instream biodiversity. For more information on positive regional effects on wildlife species, see Section 6.7 in Appendix L.

Habitat use, within the Project activity area, by wildlife species is anticipated to return to pre-project levels post implementation and potentially reduce nonnative wildlife species. Long-term beneficial effects to water quality through native vegetation establishment, bank stabilization, and upslope roadway decommissioning and improvements are expected to occur. Long-term negative effects are not anticipated or likely to occur.

## 5.7 Temperature and Precipitation Changes

### 5.7.1 Affected Environment

The incremental addition of GHG emissions from millions of individual sources has been shown to collectively have a large impact on a global scale on temperature and precipitation patterns and trends. Reclamation recognizes that these changes are not attributable to any single action but are exacerbated by a series of actions. Thus, this analysis addresses impacts to temperature and precipitation with that concept in mind. A detailed analysis of temperature and precipitation impacts on the affected environment and as a result of the Proposed Action and the No Action Alternative is outlined in Appendix M.

Temperature and precipitation impacts in the Klamath Basin region and the Trinity River watershed have been observed as increases in temperature; prolonged and at times severe drought; increased stream, reservoir, and Trinity River water temperatures; and effects to the ecological conditions including to forest, wetlands, and riparian communities.

Substantial increases to temperatures and water temperatures have been observed in the region and the watershed over the last century, which are attributed to increases in average temperatures and prevalence of drought (Butz R.J. et al. 2022; Asarian et al. 2023). Warmer temperatures reduce the snowpack and alters the seasonality and runoff volumes of the hydrograph; the result of which is larger runoff events occurring earlier in the year due to a shift in precipitation falling as rain rather than snow (CAPCOA 2021). The altered hydrograph patterns strain the ability of reservoir water managers (in this case, Reclamation) to provide cold-water releases for salmonids because of reduced cold water storage. Anadromous salmonids are dependent on cold water to support their life cycle; therefore, the lack of cold water further stresses these vulnerable fish populations. Simultaneously, human demands for water are increasing at a time when streams are at all-time low-flow levels. Water warms more rapidly in shallow streams that have been depleted from water use demands, reducing and sometimes eliminating suitable cold-water aquatic habitat that is critical for fish survival.

Temperature and precipitation impacts both exacerbate and are exacerbated by increasingly severe wildfire and ecological conditions in the watershed. Historic management of forests on federal lands has resulted in an ecology prone to insects, disease, and wildfire. Ecosystem damage is inevitable when wildfires occur under these conditions. Over the last 36 years, an average of 0.5% (6,566 acres) of the watershed has burned per year. The most severe and damaging fire events were during the 2015 to 2020 period. Severe and catastrophic wildfire that is not similar to ecological fire regimes contributes to temperature and precipitation changes by both releasing sequestered carbon into the atmosphere and by destroying ecological functions that healthy forests and ecosystems provide.

Wetland, aquatic habitats, and riparian areas have and will continue to experience increased use and pressures as many wildlife species are seeking water sources in wetland and aquatic areas that are subject to physical shrinkage and water quality impacts as a result of these changes, such as air and water temperature increases. Increased temperatures and drought are identified as a major threat to wetlands. Compared to terrestrial ecosystems, wetlands have the highest carbon density, which makes them play an important role in global biogeochemical and carbon cycles, which have temperature effects (Kayranli et al. 2010). Warmer air temperature effects will increase evaporation from wetland areas and could promote drying around perimeter of wetland features. More extreme precipitation events along with increased air temperatures are expected to promote photosynthesis that could maintain wetlands as carbon sinks. Decreased precipitation, however, could have the opposite effect and wetlands may become sources of carbon loss.

Riparian areas and the associated microclimate are highly sensitive to environmental changes. Disruptions occur commonly after high flow events or loss due to wildfires that can cause riparian system nutrient accumulations to reach disruptive thresholds that suddenly change the system from a carbon sink to a source. Maintaining and promoting continuity of healthy functioning riparian zones is key to providing refuge for aquatic and terrestrial wildlife species during transitional climatic stress.

## **5.7.2 Environmental Consequences**

### **5.7.2.1 No Action**

Under the No Action alternative, the localized and regional effects of temperature and precipitation changes would continue to occur and would likely contribute to worsened watershed conditions. That is, the poor aquatic habitat conditions that currently exist within the Trinity River basin as a result of increased temperatures and prolonged drought in combination with flow management, logging practices, road construction, mining, and floodplain development would remain unaltered. These conditions would continue to impact the environmental conditions within the Trinity River

basin. Some site-specific restoration projects could occur over time and would improve aquatic habitat at a local level; however, this restoration would occur at a slower pace lengthened planning process compared to the Proposed Action.

**5.7.2.2 Proposed Action**

**5.7.2.2.1 GHG Emissions**

To determine the effect of the Proposed Action, a “carbon footprint” was developed based on the Project activities potential generation of GHGs (primarily carbon dioxide [CO<sub>2</sub>]). The Road Construction Emissions Model Version 9.0.0 was used to estimate GHG emissions for combustible fuel using assumptions of how many and what types of vehicles and machinery would be used to complete construction of proposed restoration activities (CAPCOA 2021). Typically, a rehabilitation project would involve the following heavy equipment:

- Water trucks – up to 2
- Crushing and processing equipment – up to 3
- Excavators – up to 3
- Graders and off-highway tractors – up to 3
- Other heavy equipment/machines – up to 5

Project activities that would offset potential impacts were weighed into the equation. For minor site-specific projects, the calculation is based on up to 1 week of construction and one piece of equipment. Medium-sized site-specific projects would require up to a month of construction, and large site-specific projects would be extensive restoration efforts that would take up to a year. The calculation is based on up to 50 projects of varying sizes and complexity being completed in a year. Emissions would be limited to the project construction period and GHG emissions and any effects on temperature increases and drought conditions would be at least partially offset in the long-term by the benefits from restoration activities that increase the amount of riparian and upland vegetation. Based on the analysis, a maximum 1,837 tons of CO<sub>2</sub> would be released as a direct result of construction activities if 50 site-specific projects of various sizes were completed in a single year, which is roughly equivalent to one transatlantic commercial airline flight between New York and London.

**Table 5-9. Assumptions and estimates for GHG emissions by site-specific project size.**

Size	Description	Estimated CO <sub>2</sub> per Site (tons)	Potential Number of Projects per year	Estimated Maximum CO <sub>2</sub> (tons)
Small	May take up to a week to complete not including restoration and monitoring; smaller than 1 acre; example: culvert replacement, remote site incubator installation, road maintenance activities	2.7	35	95
Medium	May take up to a month to complete not including restoration and monitoring; smaller than 10 acres; road decommissioning, road rehabilitation, small instream or upslope habitat restoration projects	22.1	10	221
Large	May take up to six months to complete not including restoration and monitoring; larger than 10 acres; large tributary or mainstem in-stream or upslope restoration project	304.2	5	1,521
<b>All</b>			<b>50</b>	<b>1,837</b>

Environmental commitments outlined in Appendix B would apply to all projects to reduce the temporary effects of GHG emissions from construction activities. Emissions would be limited to the project construction period and GHG emissions and any effects on temperature and would be at least partially offset in the long-term by the benefits from restoration activities that increase the amount of riparian and upland vegetation.

#### 5.7.2.2.2 Temperature and Ecological Effects

The proposed action would have a potential beneficial effect on stream and river temperatures that are being adversely impacted by an increase in average temperatures and prevalence of drought. Restoration of rivers and streams creates complex stream morphology and can lead to increased habitat availability for cold water fish species and amphibians. Lowering floodplains, restoring and creating wetlands and riparian areas, and restoring stream geomorphic processes can help to improve conditions that are exacerbated by increases in average temperatures and prevalence of drought, by creating conditions that allow for water to be retained in the watershed for longer periods of time, sequestering atmospheric carbon in both soils and vegetation, providing refugia for wildlife species during temperature extremes and wildfire, and providing habitat for rearing and spawning cold water fish species.

These activities would promote resilience within these aquatic ecosystems and help to promote microclimate habitats that support and sustain aquatic species and cold water fish populations. In addition to in-channel and upslope restoration, proposed water conservation activities would augment streamflow during high water temperatures and/or low streamflow can enhance likelihood of survival for a few aquatic T&E individuals of which there are already low in numbers. With the Proposed Action, sixteen HUC 10 watersheds would be targeted for restoration activities focused on riparian reserves. The proposed action would include restorative treatments that would improve health of the riparian and aquatic habitats and the connectivity to neighboring habitats for refuge from inhospitable changes from increases in average temperatures and prevalence of drought. Long-term beneficial effects are expected as a result of restoration within the riparian reserves that enhance floodplains and develop or restore access to diverse aquatic habitats would provide some of the most desirable long-term effects that enhance riparian and aquatic habitat and floodplain connectivity.

## 5.8 Recreation

### 5.8.1 Affected Environment

In order to describe the affected environment for recreation resources, information about trails, campgrounds, and river and water access points was obtained from TRRP, USFS, and BLM records as well as local knowledge of other recreational use within the Trinity River watershed. The Trinity River watershed includes federal lands managed by the BLM, USFS, and Reclamation; as well as private lands. Of the approximately 1.6 million acres of land within the watershed, the vast majority are federal lands administered by the USFS.

The Trinity River and its tributaries provide year-round recreational opportunities, including boating, kayaking, canoeing, rafting, inner tubing, fishing, swimming, camping, gold panning, wildlife viewing, picnicking, hiking, and sightseeing. Fishing for Chinook salmon, steelhead, and rainbow and brown trout is a major recreational activity on the Trinity River throughout the year. Fishing intensity varies between years but is prevalent between August and April. The USFS and BLM manage and maintain several campgrounds and picnic facilities within the watershed, and public access to BLM- and USFS-administered lands is present throughout the Project activity area. The USFS and BLM maintain system trails and trailheads in the watershed for both motorized and non-motorized recreational use.

The North and South Forks of the Trinity River include 203 miles of designated Wild and Scenic River (WSR). In addition, the New River within the Project activity area is a designated WSR. The Outstandingly Remarkable Value (ORV) for both the Trinity and New rivers are their anadromous fisheries. Six additional rivers on the STNF have been identified by the USFS as “suitable rivers” under WSRA Section 5(d)(1), meaning they were found suitable for potential future addition to the National WSR System. These include portions of Canyon Creek, Hayfork Creek, Upper North Fork Trinity, Upper South Fork Trinity, and Virgin Creek. The WSR analysis for the Project is included in Appendix F. The Trinity Alps Wilderness Area, which includes approximately 537,000 acres of USFS lands and 550 miles of maintained system trails, 17 of which are part of the Pacific Crest Trail.

In addition to designated wilderness and WSR, the Lewiston and Trinity lakes, located above each of the Lewiston and Trinity dams along the Mainstem Trinity River, provide recreational opportunities, including camping, fishing, boating, and kayaking. Both public lands and private lands that include resorts and residences are located in the vicinity of the reservoirs. Several small communities that provide tourist and recreational services are located along the lakes, as well as along the Mainstem and North Fork Trinity River. The BLM and the USFS issue up to 100 permits for commercial fishing guides along the Mainstem Trinity River. The USFS also issues 13 rafting permits for the river.

## **5.8.2 Environmental Consequences**

### **5.8.2.1 No Action**

Under the No Action alternative, recreation resources and uses in the watershed are expected to remain similar to existing conditions. Watershed restoration projects would still occur but at a slower pace since there would be no streamlined process for environmental reviews. Therefore, there would be no additional effects to recreation resources or disruption of recreational uses as defined in the CCR, Title 14, Division 6, Chapter 3, Section 15382.

### **5.8.2.2 Proposed Action**

Effects on recreation resources were determined qualitatively by determining the extent that recreational facilities and activities would be effected by proposed activities. Noise effects to recreation are analyzed below in Section 5.9

The proposed Project activities would require construction in active river and stream channels, floodplains, and adjacent upland areas, as described in Section 4. Construction activities could result in temporary disruption at river access points and fishing spots; however, disruptions would be temporary and river access and recreational opportunities would continue to be available at other locations. Very rarely would proposed Project activities interrupt access to upland trails or trailheads. Because disruptions to recreational activities would be temporary, these effects would be minor.

Flows that typically contribute to good fishing tend to have high water clarity (little to no turbidity). Temporary increases in turbidity as a result of the Proposed Action may affect the recreational experience of anglers and the aesthetic values held by other recreationists downstream from site-specific project areas. The amount that turbidity is increase would be a function of the flow regime at the time, the level of instream disturbance at the site-specific project area, and particle size of the substrate/soil disturbed. For example, fine-grained sediments like silts and clays could be carried several thousand feet downstream of the site-specific project area, while larger-sized sediments like sands and gravels tend to drop out of the water column within several feet downstream of the extent of construction. Table 4-1 of Appendix B includes several CMs designed to ensure that turbidity is monitored and minimized to the extent possible. With the implementation of these CMs as well as the localized and temporary nature of these turbidity increases, this effect is expected to be minor.

Construction activities associated with the Proposed Action could pose a temporary physical hazard to recreational users of the river (e.g., boaters) and cause short-term resource damage to lands used for recreational activities in and adjacent to the site-specific project areas. Potential physical hazards to recreationists include the presence of temporary river crossings, operation of construction equipment and vehicles in and around the restoration sites, changes to sediment deposition patterns, the addition of instream large wood, and an increased potential for chemical contamination (e.g., diesel and hydraulic fluid) from construction equipment and vehicles operating in and adjacent to the river.

Short-term disruptions to recreation resources, turbidity effects that could diminish recreation values, or physical hazards to recreational users within the Project activity area, including, but not limited to, the Trinity Alps Wilderness, private or public recreation facilities in proximity to Lewiston or Trinity lakes, water access points, or other recreation sites are anticipated to be minor as a result of the Proposed Action. Effects to upland trails or limited access to upland trailheads have a low likelihood to occur. Furthermore, adverse effects would be minimized through incorporating recreation resource CMs included in Table 4-6 of Appendix B into site-specific project designs.

In addition, the Proposed Action would have long-term beneficial outcomes for recreation resources across the watershed, through increased recreational fishing opportunities as a result of fisheries habitat recovery; improved long-term water quality conditions; and re-establishment of native vegetation communities.

## 5.9 Noise

### 5.9.1 Affected Environment

Sensitive receptors are specific geographic points, such as residences or recreational facilities, where people could be exposed to unacceptable levels of noise. Noise-sensitive areas in the Trinity River watershed include residences, assisted living facilities, motels and hotels, schools, libraries, places of worship, community centers, hospitals, local parks and sensitive wildlife habitats. The main sources of noise in the watershed consist of traffic noise on major roadways and county roadways, industrial and commercial uses such as lumber mills, and aircraft from county airports and local airfields. Noise levels at site-specific project areas could be the result of road noise from local residential traffic, occasional commercial traffic (e.g., logging trucks), and other miscellaneous sources (e.g., chainsaws, lawn mowers, overhead aircraft, barking dogs, children at play, etc.). Site-specific project areas may be in proximity to private property, residences, businesses, wildlife habitat, and recreation facilities/sites. In addition, recreational use of the stream corridors by boaters (i.e., anglers and rafters) occurs throughout the year. Recreational users may be close to site-specific project areas during the construction period as they boat or fish on the Trinity River and its tributaries; however, the duration of their exposure to construction noise would depend on the type of recreational activity undertaken. For instance, a boat floating along a stream may take as long as an hour to get through an area where a restoration activity is taking place.

Baseline noise levels within much if not all of the HUC 10 watersheds are likely below 70 dB Ldn<sup>8</sup>, which is typical of small communities and rural areas. Maximum noise levels are generally caused by local automobile traffic and heavy

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<sup>8</sup> dB Ldn = The average equivalent sound level during a 24-hour day, obtained after the addition of 10 A-weighted decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.m.

trucks (Brown-Buntin 2002, Trinity County 2024). Background noise levels in the absence of these maximum noise-generating causes are largely attributable to distant traffic, wind, birds, and insects.

## 5.9.2 Environmental Consequences

### 5.9.2.1 No Action

Under the No Action alternative, noise effects to sensitive receptors would remain similar to existing conditions. There would continue to be effects to sensitive receptors as a result of on-going restoration efforts within the watershed that are not part of the Proposed Action. These efforts would be fewer in number and would occur over a broader period of time, because of the lack of streamlined environmental reviews.

### 5.9.2.2 Proposed Action

Noise from site-specific project-related construction activities and transportation of materials to and from site-specific project areas would temporarily dominate the noise environment in and adjacent to project areas for varying periods of time. Construction activities would generate maximum noise levels ranging between 65 to 105 dB  $L_{\max}$ <sup>9</sup> at a distance of 50 feet (WSDOT 2017), although intervening terrain and vegetation could reduce these noise levels for sensitive receptors such as residents, businesses, and recreationists in the vicinity. Construction noise would be temporary and is expected to primarily occur during daytime while site-specific projects are being implemented.

It is not anticipated that ground vibration created by site-specific projects would be detectable at any sensitive receptor location, nor would the Proposed Action result in structural damage. Noise impacts to fish and wildlife are analyzed in Section 5.5 and Appendix K (fisheries) and Section 5.6 and Appendix L (wildlife). Recreational users in the general vicinity of the site-specific project areas could encounter an increase in ambient noise levels during construction activities. While such an increase in noise could be disruptive, its impact would be temporary and localized and would be minimized with the implementation of noise-related CMs (Table 4-6 in Appendix B). With the incorporation of these CMs into site-specific project designs and the localized nature of construction activities, noise effects to sensitive receptors would be minor.

## 5.10 Cultural Resources

### 5.10.1 Affected Environment

There is a deep history of anthropological study in northern California, beginning with an emphasis on ethnography and then continuing forward with both ethnography and archaeology (King et al. 2016). Most of the ethnographic studies were published during the early 1900s and these were largely synthesized in Kroeber's (1925) epic *Handbook of the Indians of California*. Some of these studies extended through the 1930s (e.g., DuBois 1935), 1940s (Gifford 1940), and 1950s (Goldschmidt 1951), with a major flurry of activity between 1934 and 1939 as part of the Culture Element Distributions Survey of Native North America where many of the most knowledgeable Native American consultants were revisited to collect ethnographic information using more systematic, quantitative methods than were used by the original researchers (Kroeber 1935; King et al. 2016). After the 1930s, most of the primary information had been collected, and subsequent publications largely relied on existing data sets in their analyses (e.g., Baumhoff 1958;

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<sup>9</sup>  $L_{\max}$  is the maximum value of a noise level that occurs during a single event.

Kroeber and Barret 1960), culminating with publication of the California volume of the *Handbook of North American Indians* in 1978.

### **5.10.1.1 Cultural Chronology**

Summaries of the cultural chronology of the region began with work by Meighan (1955) and elaborated on by Fredrickson (1973, 1974) with local application by Hildebrandt and Hayes (1983, 1984, 1993) based on their field work in sites on South Fork Mountain and Pilot Ridge. The cultural chronology of the area is summarized below.

#### **5.10.1.1.1 Paleoindian Period (13,400–8,850 calibrated years before the present [cal BP])**

The Paleoindian Period is the earliest cultural period in the North Coast Range (13,400 to 8,850 cal BP). Although this period is generally illustrated by fluted projectile points and stone crescents, there is no well-defined diagnostic project point type for the Paleoindian period within the project area as evidence from this period is rare (King et al. 2016). Some of the earliest radiocarbon dates are 7,945 cal BP from Pilot Ridge (Fitzgerald and Hildebrandt 2002).

#### **5.10.1.1.2 Borax Lake Pattern (8,850 to 5,700 cal BP)**

The Lower Archaic period, commonly defined by the Borax Lake Pattern (8,850 to 5,700 cal BP), is characterized by hunter-gatherer groups, who followed seasonal rounds of hunting large game and gathering local plant foods. The pattern is characterized by wide-stemmed projectile points with indented concave bases (Sundahl 1992) along with serrated bifaces, ovoid flake tools, handstones, millingslabs, and edge-flaked spalls (King et al. 2016). This diversified assemblage is commonly found across a wide range of environmental contexts, such as high elevation ridgetops and river terraces (Hildebrandt and Hayes 1993; Sundahl and Henn 1993).

#### **5.10.1.1.3 Mendocino Pattern (4,500–1,500 cal BP)**

The Mendocino Pattern has been identified in a small number of places in northwestern California starting 5,000 years ago but is not common until after about 4,000 cal BP (King et al. 2016). Artifacts common to the pattern include side-notched, corner-notched, and concave-base dart points including the Willits and Mendocino series, handstones and millingslabs, various types of flake tools including McKee unifaces, and cobble tools (ibid.). Some of the earliest manifestations of the Mendocino Pattern in the more northerly areas come from a variety of coastal and interior settings (Gould 1966; Eidsness 1993; Hildebrandt and Levulett 2002; Levulett 1985). The majority of the sites were thought to represent hunting camps; this is a distinct change from the Borax Lake Pattern where uplands mostly consisted of residential sites (King et al. 2016).

#### **5.10.1.1.4 Shasta (also known as Tuluwat Pattern, formerly Gunther) Complex (post-1,500 cal BP)**

Following the Mendocino Pattern, significant changes occurred in northwestern California starting around 1,500 cal BP, which is linked to the arrival of the Wintu into northern California (Hildebrandt and Levulett 2002; Hildebrandt and Darcangelo 2008; Tushingham 2009). The frequency of sites greatly increased as large villages were established along various rivers in northern California, with entirely new sets of artifacts (Hildebrandt and Darcangelo 2008; King et al. 2016). Bow and arrow technology appear at this time as well (Hildebrandt and Darcangelo 2008).

#### 5.10.1.1.5 Contact Period (AD 1700s to 1850s)

Unlike the southern and central parts of California, contact between Native and non-native peoples occurred much later in the northwestern part of the state (Tushingam 2013). In 1828, the Jedidiah Smith Party ventured through southern Trinity County near Hyampom and Burnt Ranch (TM 2025). In the 1830s, it is possible that a few Euro-American trappers may have explored the area in search of furs (TM 2025). Major Pierson Reading names the Trinity River while trapping in 1845 with a company of United States soldiers out of San Francisco camping near Lewiston in 1846 (TM 2025). While there does not appear to be numerous contacts between Euro-Americans during this time period, that does not mean that the Native Americans were not affected. Diseases such as cholera, smallpox, and measles could travel through adjoining tribes through trade even though they never actually met a Euro-American. Projectile points from this time are from bow and arrow technology and consist of Desert side-notched, Rattlesnake, Cottonwood, Tulawat/Gunther barbed, and Clear Lake corner-notched.

#### **5.10.1.2 *Ethnographic Context***

A number of people groups are connected to the Project activity area through the watersheds and resources, such as salmon and steelhead, contained within it. The ethnography of these groups are summarized broadly below.

##### 5.10.1.2.1 Hoopa

The Hoopa are Athapaskan speakers who occupied the Trinity River watershed from Hoopa Valley south to Grouse Creek at the time of contact. The name is sometimes spelled Hupa in the literature, however the tribe themselves use “Hoopa” on their website (Hoopa Valley Tribe Northern Division [N.D]), and this is therefore the correct spelling. Their ancestral territory centers in the Hoopa Valley, where the main villages were located (Theodoratus 1980), however the language studies indicate that they came from significantly further north approximately 900-1700 years ago (Wallace 1978). The six-mile-long (Wallace 1978) Hoopa valley and the mountains that enclose it became a reservation first in Treaty of 1851, and again in the Treaty of 1864 (Theodoratus 1981).

Permanent Hoopa settlements were traditionally situated along the banks of the Trinity River, with temporary camps set up during the summer hunting and gathering season. Privately owned hunting preserves were scattered throughout the valley and slopes of nearby mountains (Theodoratus 1980). The area is hard to access, with everything but the small valley being heavily vegetated, and as such they had little contact with outsiders. None the less they shared similar lifeways with the nearby Yurok and Karuk, with whom they are known to have intermarried. This seclusion meant that they came into contact with white settlers and miners later than other groups in the area, and this combined with the early treaties that removed such outsiders meant that they fared better than many other groups (Wallace 1978).

##### 5.10.1.2.2 Karuk

The name of this group is often spelled “Karak” in the literature. However, the tribe itself spells their name Karuk on their website (Karuk ND), as does the Quartz Valley Reservation in Siskiyou County California, which has Karuk members (Native Ministries ND). Therefore, the correct spelling is “Karuk.” They are a Hokan-speaking people who inhabit the "middle reaches" of the Klamath River thought to be the earliest inhabitants of the Northwestern California culture area (King et al. 2016). The Karuk are similar in cultural pattern to their Northwestern California neighbors, particularly the Yurok, who inhabit the lower area of the Klamath River and the coast in the vicinity and to the south of the mouth of the Klamath, and the Hoopa, located to the south on the Trinity River (Theodoratus et al 1980).

#### 5.10.1.2.3 Lassik

Lassik were an Athapaskan-speaking group whose territory was drained by the main Eel River between the mouths of Dobbyn and Kekawaka creeks, located immediately south of the Nongatl. The crest of South Fork Mountain marked their eastern boundary and separated them from the Wintu (Elsasser 1978). Boundaries between Athapaskan tribes were usually along the ridges of mountains which separated valleys; however, Lassik boundaries were also marked by the location of tributary streams (Kroeber 1925). They enjoyed amicable relations with the Wintu and the two groups often intermarried (Theodoratus 1981).

#### 5.10.1.2.4 Chimariko

James Peabody Harrington's (1928 and 1931, published in 1983) interviews with Chimariko elders point to Chimariko tribal people living in the Project activity area vicinity as well. According to Harrington's studies, conducted in the 1930s, many places claimed as Chimariko camp sites along the Trinity River corridor suggested that earlier Chimariko territory was dozens (if not hundreds) of miles larger than described by Alfred L. Kroeber in his 1925 Handbook of the Indians of California. By 1849, according to Kroeber, there were only about 250 members of the Chimariko tribe living in a "twenty-mile stretch of the canyon of Trinity River from above the mouth of South Fork to (Big) French Creek." The Chimariko people were heavily affected by the Gold Rush, which threatened salmon as well as their camp sites, and faced near extinction. Chase-Dunn and Mann (1998) postulate that a high number of paired place-names, that is the meaning of the words translated from one language to another between Wintu and Chimariko indicate very peaceful relationships between the two groups and that the expansion of the Wintu in to Chimariko territory was a result of intermarriage leading to complete assimilation.

#### 5.10.1.2.5 New River Shasta

Extraordinarily little is known about the New River Shasta, largely because most of the information we have about them is secondary- meaning ethnographers such as Dixon and Merriam got it from other groups who had interacted with them or had heard stories of them dating from before contact with Euro-Americans. Everything else is gleaned from whatever scraps of language the ethnographers could find. As such some ethnographers question of the New River Shasta ever existed at all, and due to the lack of information 4 out of the 6 Shastan Peoples are simply lumped together (Shasta, New River Shasta, Konomihu, and Okwanuchu) (Silver 1978, Theodoratus 1981).

The New River Shasta were first identified by Dixon in 1905, who at the time was describing his "Shasta-Achomawi" linguistic stock (Shasta, Konomihu, New River, Okwanuchu, Achomawi and Atsugewi). Dixon encountered this previously unrecorded dialect spoken by the rumored Shastan occupants of the Upper Salmon, living between the two forks above the Konomihu. They spoke a language markedly divergent from the Shasta proper and Konomihu, and their territory extended over the divide onto the head of the New River (Merriam 1930, Theodoratus 1981).

What happened to the New River Shasta is lost to time, although it can be inferred that many of the same forces which affected the Chimariko (near extinction as a result of the effects of the Gold Rush) must have affected this group and contributed to its disappearance. New River and Canyon Creek were thoroughly explored and exploited for mining resources in the early days of the Gold Rush. Several large claims and operations were established in that area, particularly at the forks of the New River and the mouth of Quinby Creek. No one knows if the New River group fled across the Salmon Mountains (possibly to the area of the Scott Valley Shasta or with the Konomihu) or if they met the same fate as the Chimariko. In either case, the group is not mentioned specifically until Powers (1872) recorded

information about the Chimalakwe, a group living on the New River above the Chimariko (Powers 1877). Merriam and others have subsequently speculated that the Chimalakwe may represent the New River Shasta at a point close to the end of their tribal existence (Theodoratus 1981).

#### 5.10.1.2.6 Nomlaki

The Nomlaki are Penutian-speakers whose territory lies immediately south of the Wintu. Kroeber (1925) referred to this group as the Central Wintun, a name which reflects their geographic location between the Wintu (Northern Wintun) and the Patwin (Southern Wintun). The Nomlaki language is closely related to that spoken by the Wintu and may be a dialect of the same language (Theodoratus 1981). They had friendly relationships with both their northern and southern Wintun neighbors and shared a number of cultural elements with them (Kroeber 1925). The Yana were Nomlaki neighbors to the east and the Yuki were neighbors to the west. Their relationship with the Yuki was uneasy and generally hostile, but the two groups engaged in a limited trade relationship, mostly in the form of trading salt for yewwood, a raw material for making bows (Theodoratus 1981).

The Nomlaki are divided into two groups: the Hill Nomlaki, who lived in the foothills west of the Sacramento River and south of Cottonwood Creek to the upper waters of Stony Creek; and the River Nomlaki of the Sacramento River drainage from its confluence with Cottonwood Creek to a point below Thomes Creek. Daily life was centered around the village, led by a hereditary chief (Goldschmidt 1978).

#### 5.10.1.2.7 Wintu

The Wintu are part of a larger group known as the Wintun, which also includes the Nomlaki and Patwin, both located to the south of the Wintu. These groups fall into the broader Penutian language stock, which includes a number of northern and central California languages including Maidu, Miwok, Costanoan, and Yokuts (King et al. 2016, Kroeber 1925, Theodoratus 1981). The Wintu language has nine known dialects as the McCloud River, Trinity County, Shasta County, Upper Sacramento, Bald Hill, Hayfork, Keswick, Stillwater, and French Gulch dialects (King et al. 2016, Theodoratus 1981). The Wintu were (and remain) a comparatively large and widespread group with their tribal headquarters located in the City of Shasta Lake (Wintu ND).

The Wintu territory borders the traditional territories of several other groups including the Chimariko, Yuki, Nongatl, Nomlaki, Achumawi, Okwanuchu, Shasta, and New River Shasta within the counties of Shasta and Trinity, with some lands in the areas of Tehama and Siskiyou counties (Theodoratus 1981). Many of their direct descendants are still present today (Wintu ND). As such, even though the Wintu suffered the same atrocities as other native groups in California with the same levels of mortality, their ethnographic record is more complete due to a larger number of survivors living to tell their tales. Many of the adjacent groups (Chimariko, New River Shasta, Okwanuchu) were completely wiped out or left with so few survivors that they could not function as a society (Theodoratus 1981).

#### 5.10.1.2.8 Yurok

The Yurok are Algonquian speakers who prior to contact occupied the lower Klamath River and a stretch of Pacific Coast near the mouth of the river, to the south of the Tolowa Dee-ni'. As such, Yurok culture is described in the literature as a southerly extension of the cultural patterns of the northwest coast of the United States, British Columbia, and Southern Alaska. Yurok cultural forms are closely related to their neighbors the Hoopa, Tolowa, and Karok who are also a part of this culture group (Kroeber 1925; Pilling 1978). However, not all scholars agree with this assessment: Pilling supports Sapir's contention that Yurok is an Algonquian language, like that of the neighboring Wiyot (Pilling 1978).

The traditional territory of the Yurok is described as the lower portion of the Klamath River from approximately Red Cap and Bluff Creeks to the Pacific Ocean and along the coast between the towns of Crescent City to the north and Trinidad to the south (Kroeber 1925, Theodoratus et al 1980). The Resighini Rancheria, one of two federally-recognized Yurok Tribes in the area, describe their traditional territory as “lower Klamath River and tributary watersheds, high country, coast and lagoons along the Pacific Ocean, and the ocean off this coastline west to the horizon (Resighini Rancheria ND, Who We Are)”. The Yurok Tribe (on their website) show and describe a similar area, calling the Klamath “the lifeline of our people” (Yurok Tribe ND, Our History).

### **5.10.1.3 Historical Overview of Mining in Trinity County**

The first gold discovered in Trinity County is attributed to Pierson Barton Reading in 1848. He, along with several others, and sixty Sacramento Valley Indians worked a bar now called Reading’s Bar along Reading Creek, just downriver from the present Douglas City. The Reading discovery opened the flood gates for early gold miners, coming from all over the United States and from many countries around the world, and they spread out from Reading’s Bar to other parts of Trinity County during the latter half of the nineteenth century (Rich 2023).

Mining technology evolved and by 1898, a dredge associated with placer mining had been set up at Poker Bar along the mainstem Trinity River. In the years following, other dredges were installed in several places throughout Trinity County, including at Carrville, Trinity Center, Lewiston, and Weaverville. These dredges were “built locally and were a steady source of employment for residents of Lewiston, Douglas City” and other communities. By 1898, there were 327 hydraulic mines “working or claimed” in Trinity County (Adkins 2007).

Archaeological surveys in the vicinity of Trinity County have recorded associated resources ranging from scattered prospect pits and small tailings piles to huge complexes of mine workings, support facilities (blacksmith shops, powder houses, etc.), workers’ housing, hydraulic cuts, waste rock, and extensive ditch/reservoir systems. French Gulch in Shasta and Trinity counties has been considered a “Principal Gold District” (Clark 1970). Within the French Gulch district, Clark identified several other major mining areas including Weaverville. The largest and best-known of the hydraulic mines in the Weaverville area was the LaGrange Mine, which is one of the largest in California and is located in Oregon Gulch just west of Weaverville. It was said to have produced \$3,500,000 in gold between 1893 and 1918 (King et al. 2016, Wee and Costello 2001).

Mining continued to be an important part of the economy of this region through the early 20<sup>th</sup> century and until around World War II, with the enormous placer dredges wreaking havoc on the fragile ecosystems in and surrounding the Trinity River. The outbreak of World War II pulled people and resources away from this effort, and gold mining at an industrial scale was not attempted thereafter in the Trinity River. Mining of gold and other metals is still practiced by residents and visitors on a smaller scale, although modern environmental regulations have put a stop to dredging and most other intensive gold extraction techniques (Rich 2023).

### **5.10.1.4 Known Cultural Resources**

Cultural resources that are present within the Trinity River basin include archeological sites; isolated finds; buildings/structures/objects (e.g., buildings, bridges, etc.); National Register districts; and traditional cultural properties (TCPs) or sites of religious and cultural significance. Generally, these resources are classified by their age: precontact or historic-era.

Precontact cultural resources include or may include the following:

- Lithic scatters: These sites contain only flaked stone debitage and/or tools and are typically small and shallow, representing only short-term activities during which lithic tools were manufactured or repaired.
- Milling stations: These sites contain bedrock milling features and/or portable milling tools typically associated with food processing, with little if any other associated precontact materials.
- Simple habitations: These sites, in addition to flaked stone, also contain bedrock or portable milling equipment; and/or a midden deposit; and/or accumulations of dietary remains such as shell or animal bone.
- Complex habitations: These sites contain the constituents of simple habitations but also have unambiguous evidence of residential structures (e.g., house pits or large rock rings).
- Rock art: The rock art in the planning area mostly consists of cupules and petroglyphs (and at least one or two pictograph locations), either isolated or in association with other archaeological remains.
- Rock features: This site type includes cairns, walls, and small rock rings, some interpreted as hunting blinds or storage features, others lacking an obvious function.
- Quarries/prospects: Quarries are sites where raw material was obtained for making stone tools.
- Sacred Sites: These sites may include prayer locations, places of religious/spiritual importance, traditional gathering areas, or burials.

Historic-era resources are more difficult to classify into a few categories, as they cover a much wider range of themes and configurations than do precontact resources (King et. al 2016). In the vicinity of the Project activity area historic-era resources largely correspond to: infrastructure (i.e., transportation, water development, and communication); government-related sites and facilities; extraction economy (i.e., mining and logging); oversees Chinese; settlement/agriculture; Native resistance/Indian wars; the new century (i.e., wartime and hydroelectric development).

Unlike other cultural resource types, TCPs, landscapes, burial locations, and use areas are generally not discoverable by cultural resources professionals other than via consultation with local traditional communities. Furthermore, there is a possibility of buried cultural deposits, such as terrace deposits, in certain geomorphic areas.

## **5.10.2 Environmental Consequences**

### ***5.10.2.1 No Action***

If the No Action alternative was selected, it is likely that restoration projects that are similar to what is part of the Proposed Action would be implemented over time within the basin. However, these projects would take longer to plan and permit compared to the streamlined approaches of the Proposed Action alternative. Therefore, effects to cultural resources as a result of the No Action alternative would be realized more slowly within the Project activity area as compared to the Proposed Action. Regardless of whichever alternative is chosen, federal actions would be subject to compliance with the requirements of Section 106 of the NHPA and other relevant laws and regulations.

### ***5.10.2.2 Proposed Action***

The Proposed Action includes eleven categories of restoration activities which could affect cultural resources. Each activity entails a certain amount of construction or ground disturbance. The table below summarizes the potential construction components or construction impacts by restoration activity category that could adversely affect cultural resources. Effects of particular concern are described in more detail below in Table 5-10.

**Table 5-10. Potential construction effects on cultural resources per activity category.**

Restoration Activity Category	Potential Construction Effects with CMs Implemented
1. Restoration and Enhancement of In-Channel Habitat	Ground disturbance related to the development of temporary access roads, staging areas, and the use of heavy equipment; and alteration of streambanks related to large wood placement and excavation. Potential damage or destruction of historic mining-related features.
2. Floodplain Restoration	Ground disturbance related to the development of temporary access roads, staging areas, and the use of heavy equipment; modification or excavation of levees, berms, and dikes; and modification to streambanks related to installation of LTPBR. Potential damage or destruction of historic mining-related features.
3. Removal or Retrofitting of Fish Passage Barriers, Small Dams, Flood Gates, Pilings, and Other In-water Structures	Ground disturbance related to the development of temporary access roads, staging areas, and the use of heavy equipment; streambank modification with the removal of in-water structures; and removal/repair of culverts. Potential damage or destruction of historic mining-related features and stream-side heritage resources.
4. Water Conservation Projects	Ground disturbance related primarily to installation of water conservation structures and infrastructure and modification of streambanks through installation/repair of fish screens.
5. Salmon Carcass Placement	No adverse effects anticipated
6. Remote Site Incubators	Ground disturbance related to minor streambank disturbance during install of system and demobilization.
7. Bioengineered Bank Stabilization	Ground disturbance related to the development of temporary access roads, staging areas, and the use of heavy equipment; and alteration of streambanks related to grading, excavation, and installation of natural materials. Potential damage or destruction of historic mining-related features and stream-side heritage resources.
8. Aquatic, Wetland, Meadow, Riparian, and Upslope Habitat Enhancement	Ground disturbance related to the development of temporary access roads, staging areas, and the use of heavy equipment; manual and mechanical removal of invasive plants; removal of trees where necessary for watershed restoration; fence installation; and planting efforts.
9. Road Maintenance	Ground disturbance related to the use of heavy equipment and minor maintenance activities along roads. May need to assess integrity of historic roads and their values.
10. Road Rehabilitation	Ground disturbance related to the development of temporary access roads, staging areas, and the use of heavy equipment; streambank modification with the removal/replacement/repair of bridges and culverts; and installation of drainage features along roads.
11. Road Decommissioning	Ground disturbance related to the use of heavy equipment; removal of roadway infrastructure and stream-crossing structures; and excavation of roadways.

Site-specific restoration projects associated with the Proposed Action would require their own NHPA Section 106 reviews and adherence to other heritage-related laws and regulations by the federal agencies in order to avoid and minimize adverse effects to cultural resources or complete necessary mitigative measures. Based on restoration activities proposed by implementors during the design phase for each site-specific project, an Area of Potential Effects (APE) would be determined. The APE would include, but will not be limited to, areas where the site-specific project would cause construction-related effects, particularly as a result of ground-disturbing activities, to cultural resources (i.e., disturbance areas, staging areas, material storage, temporary roads, etc.). A cultural resource field inventory along with tribal review would be performed at an agency-approved professional level within the APE and would be utilized in support of the Section 106 (and other legal or regulatory) review to determine if there would be adverse effects to cultural resources. The lead federal agency would determine any applicable CMs necessary to avoid adverse effects to cultural resources to the extent possible. Recommended CMs specific to cultural resources are included in Appendix B. If

any adverse effect to a cultural resource is identified with the potential to occur as a result of a site-specific project, the lead federal agency would determine cultural mitigation (on a project-by-project basis) that is appropriate to offset the adverse effect. In extreme cases, that site-specific project could be determined to be unfeasible.

## 6 Regional Effects

In addition to effects that result only from the Proposed Action, effects that result from other activities at a regional level were also analyzed to determine if the effects could amount to a level of significance. This analysis looked at other regional activities that have affected or could affect the same resources as the Proposed Action alternative; in this case watershed resources, which include water quality and hydrology; geology and soils; vegetation and wetlands; fisheries; wildlife; temperature and precipitation changes, recreation, noise, and cultural resources. The effects of past actions are reflected in the descriptions of current existing conditions. Lands in the vicinity of the Project activity area include USFS-, BLM-, and privately-owned land.

### 6.1 Flow Management

As previously mentioned, flows are highly managed on the Trinity River mainstem. ROD flows are released from the Lewiston Dam to mimic natural Trinity River flows and interact with downstream areas to enhance conditions for all life stages of fish and wildlife. However, about 50% of Trinity River flows are still diverted to the Sacramento River basin. Lower flows cause degradation of aquatic habitat within the Trinity River due to loss of deep-water habitats and a limited ability to maintain water temperatures required for cold-water fish survival. Over time, much of the mainstem between Lewiston and the North Fork Trinity River confluence has been confined to a narrow channel bordered by dense riparian berms. TRRP, upon the recommendations of the TMC, continues to strive toward managing flows in the river to support aquatic habitat downstream of the dams.

### 6.2 Hatchery Influence

Hatchery influences are substantial in the Trinity River watershed. Each year, TRH releases approximately 300,000 coho smolts, 448,000 steelhead, and 4.3 million Chinook, and currently, returns are dominated by hatchery fish (USFWS and HVT 1999). In recent years, hatcheries in California have stopped all inter-basin stock transfers, limited out-planting (e.g., all TRH coho smolts are released voluntarily at the hatchery), marked outplants, and placed limits on production levels. Therefore, the current level of impact of hatchery fish on natural fish may be significantly less than in the past (CDFG 2002). No hatcheries or artificial propagation occur in the Lower Klamath River coho population area, but there are two hatcheries in the Klamath River Basin that influence fisheries: TRH and the Fall Creek Hatchery (which replaced the Iron Gate Hatchery).

### 6.3 Cannabis Farming

In 2018, the State of California legalized the recreational use of cannabis, as well as the cultivation and manufacture of cannabis plants and products. In Trinity and Humboldt counties, there are many cannabis farms which cumulatively reduce flow volume and increase discharge of waste and pollutants in streams, which adversely affects water quantity and quality in the Project activity area. Presently, there is no watershed-scale evaluation of the effects of cannabis farming on aquatic habitat in the Trinity River or particular streams (NMFS 2020a).

### 6.4 Residential Development

Residential development as a result of human population growth in the Project activity area is expected to remain relatively stable over the next 10 years. Once development and associated infrastructure (e.g., roads/trails, drainages,

powerlines, and water development) are established, the effects to the landscape are typically permanent. Anticipated effects on watershed resources include loss of riparian vegetation, changes to channel morphology and dynamics, altered hydrologic regimes (e.g., increased storm runoff), increased sediment loading, and elevated water temperatures where shade-providing canopy is removed (NMFS 2020a).

## 6.5 Resource Extraction

Resource-based industries are likely to continue to have an influence on environmental conditions within the Project activity area for the indefinite future. Logging continues to be conducted on both public and private lands throughout the tributaries of the Trinity River, except in Canyon Creek (Reclamation 2019). STNF's vegetation management projects include those for forest health/thinning and fuels reduction. Some mining for gravel, aggregate, and minor precious metals occurs on the Trinity River floodplain and a few tributary watersheds. Mining operations can affect coarse sediment supplies and impair water quality via contaminated and sediment-laden runoff from operations. The lack of protective measures in existing regulatory mechanisms, including land management plans (e.g., State Forest Practice Rules), contributes in varying degrees to the decline of salmonids. Sedimentation and loss of spawning gravels associated with poor forestry practices and roadbuilding are particularly chronic problems that can reduce the productivity of fisheries. However, resource extraction industries have adopted management practices that reduce many of their most harmful impacts, which were unknown or not commonly used until recently (NMFS 2020a). The STNF regularly implements forestry projects using resource protection measures and BMPs to reduce sedimentation into streams and otherwise reduce effects to environmental resources.

## 6.6 Wildland Fire Control

Control of wildland fires may include the removal or modification of vegetation due to the construction of firebreaks or setting of backfires to control the spread of fire. This removal of vegetation can trigger post-fire landslides as well as create chronic sediment erosion that can negatively affect aquatic habitat. In addition, the use of fire retardants may adversely affect aquatic habitat if used in a manner that does not sufficiently protect streams, with the potential for aquatic organisms to be exposed to lethal amounts of the retardant (NMFS 2020a).

## 6.7 Aquatic Habitat Restoration

Since 2009, TRRP has implemented Trinity River mainstem channel rehabilitation projects at all the Phase 1 channel rehabilitation sites named in the 2000 Master EIR and at nine of the Phase 2 sites. The Deep Gulch and Sheridan sites were constructed in 2017. The Bucktail site, constructed in 2008, was expanded in 2016 to include additional areas. The Dutch Creek project was constructed in 2020. The Chapman Ranch Phase A site was constructed in 2019 and the Phase B site was completed in 2021. The Oregon Gulch project was completed in 2023. These mainstem projects have improved anadromous fish spawning and rearing habitat throughout the extent of the Trinity River.

TRRP continues to add sediment within the 40-mile reach downstream of the Lewiston Dam. In addition, TRRP-managed flows have been implemented yearly since 2004. Ongoing monitoring efforts by TRRP partners continue to document improvements in aquatic habitat use, alluvial processes, and riparian vegetative communities along the mainstem. Continued sediment and wood augmentation projects are intended to improve anadromous fish spawning and rearing habitat in the Trinity River mainstem.

Beyond TRRP's mainstem channel rehabilitation and sediment augmentation projects, there have been several restoration and road sediment reduction projects implemented by various agencies and organizations throughout the Trinity River watershed. While some of these were considered in the 2009 Master EIR, the USFS, Five Counties Salmonid Conservation Program, Northwest Resource Conservation and Development Council, Watershed Research and Training Center, Trinity County Resource Conservation District, Yurok Tribe, Hoopa Valley Tribe, Nor Rel Muk Wintu Nation, and other local nonprofits and governments have been funded for and/or completed additional projects intended to improve watershed conditions, restore aquatic habitat, improve aquatic connectivity, and reduce road-related sediment delivery to streams and rivers. These watershed restoration projects are intended to improve water quantity and quality as well as rearing and spawning habitat in the Trinity River watershed.

## 6.8 Proposed Action

The Proposed Action is a continuation and expansion of the watershed restoration efforts that have already been accomplished to date. The Project is an effort to streamline design and planning processes, including environmental compliance, for proposed restoration actions across the watershed, thereby increasing the number of restoration actions that can be implemented over time. Ultimately, as previously discussed, the Proposed Action intends to improve instream and riparian habitat to accelerate the recovery of north coast salmonid populations (coho salmon, steelhead, and Chinook salmon) and other special status aquatic species through site-specific restoration actions implemented to address the following objectives:

- Restore and improve instream conditions sufficient to support all life stages of salmonids and other aquatic species;
- Restore upstream and downstream fish passage for all life stages of salmonids;
- Restore continuous paths for wood dispersal, nutrient cycling, sediment transport, and movement of other vegetative material essential for productive aquatic habitat;
- Maintain or restore native plant communities and vegetative structure impacted by invasive plants and pathogens, while rehabilitating eroding streambanks to improve water quality, shade conditions, and large wood recruitment;
- Repair, replace, or remove ineffective instream structures;
- Restore and improve riparian and meadow habitat in order to promote healthy conditions for aquatic and terrestrial wildlife populations;
- Improve late summer/fall base flow conditions through process-based restoration, water conservation improvements, and meadow restoration;
- Increase nutrient inputs through salmon carcass placement in the watershed; and
- Stabilize upslope areas around road infrastructure to minimize erosion and sediment discharges within the watershed to bring the sediment impaired watersheds into compliance with sediment reduction TMDLs for the South Fork Trinity and Trinity Mainstem rivers (EPA 1998 & EPA 2001).

Each of the regional activities mentioned are discussed in the context of effects relative to the Proposed Action below.

### 6.8.1 Flow Management

Flow management in the Trinity River, including flow diversion into the Sacramento River basin, limits aquatic habitat-forming hydraulic processes and alters water temperature regimes. The Proposed Action would have minor long-term

benefits to instream flows in the Trinity River tributaries as a result of water conservation activities. Because the effects of flow management are primarily realized in the mainstem Trinity River, the Proposed Action is not anticipated to affect the hydrology of the mainstem Trinity River at a watershed level.

### **6.8.2 Hatchery Influence**

Salmonid populations are highly managed in the Trinity River basin, which is anticipated to continue. The Proposed Action is anticipated to affect salmonid populations by improving available aquatic habitat, nutrient cycling through salmonid carcass placement, and survival of juvenile salmonids through the use of RSIs in the basin. Both the existing hatchery production and the Proposed Action are anticipated to increase salmonid populations within the Trinity River basin.

### **6.8.3 Cannabis Farming**

Cannabis farming in the Trinity River basin is known to have minor adverse effects to water quality and hydrology. The Proposed Action through water conservation activities would have beneficial effects to hydrology within tributaries that may improve hydrologic conditions along tributaries where cannabis farming diversions are an issue. The site-specific projects that are part of the Proposed Action would have short-term water quality sedimentation effects; however, in the long-term, the Proposed Action would provide increased sediment storage and decrease of sedimentation as a result of roadway runoff that may help address some of the sediment inputs from cannabis farming.

### **6.8.4 Residential Development**

Residential development results in riparian vegetation removal, changes to channel morphology and dynamics, altered hydrologic regimes because of increases of stormwater runoff, and increased sediment loading due to ground disturbance. The Proposed Action would restore riparian vegetation, but it is unlikely that this would occur in areas developed for residences. The Proposed Action would improve habitat within the floodplain, including instream areas, which could address some of the adverse impacts that residential development has had to channel morphology and hydrologic regimes. The site-specific projects that are part of the Proposed Action would have short-term water quality sedimentation effects; however, in the long-term, the Proposed Action would provide increased sediment storage and decreased sedimentation as a result of roadway runoff that may help address some of the sediment inputs from residential development.

### **6.8.5 Resource Extraction**

The primary concerns with resource extraction in the Trinity River basin is sedimentation and consequent loss of spawning gravels associated with poor forestry practices and roadbuilding. The site-specific projects that are part of the Proposed Action would have short-term water quality sedimentation effects; however, in the long-term, the Proposed Action would provide increased sediment storage and decrease of sedimentation as a result of roadway runoff that may help address some of the sediment inputs from resource extraction.

### **6.8.6 Wildland Fire Control**

The primary concerns with wildland fire control include sediment discharges (as a result of erosion) and chemical contamination (by fire retardants) to waterways within the Trinity River basin. The site-specific projects that are part of the Proposed Action would have short-term water quality sedimentation effects; however, in the long-term, the

Proposed Action would provide increased sediment storage and decrease of sedimentation as a result of roadway runoff that may help address some of the sediment inputs from wildland fire control. The Proposed Action would not increase chemical contamination within the basin, nor would it address the chemical contamination added by wildland fire control efforts.

### **6.8.7 Aquatic Habitat Restoration**

The Proposed Action would increase the number of site-specific restoration projects at a watershed-scale, which would increase beneficial effects associated with aquatic habitat restoration. These benefits include, but are not limited to, improvements to aquatic habitat, geomorphic processes, riparian vegetative communities, and water quality.

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