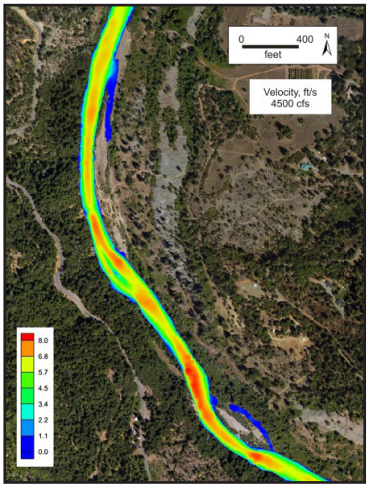
Trinity River Channel Rehabilitation Site: Deep Gulch (River Mile 82.4–82.9) and Sheridan Creek (River Mile 81.6–82.4)

Environmental Assessment/Initial Study

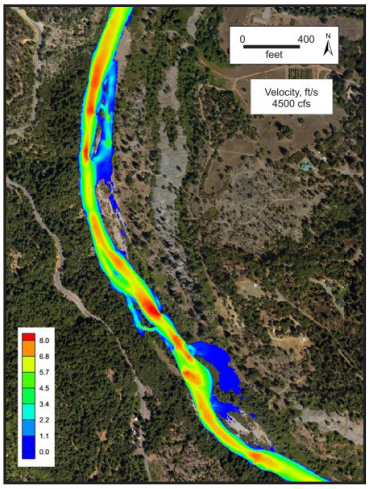
DOI-BLM-CA-N060-2017-014-EA and TR-EA0117

March 2017

Sheridan Reach



Deep Gulch Model, Existing Conditions



Deep Gulch Model, Design Conditions

California Lead Agency for CEQA
North Coast Regional Water Quality Control Board

Project Proponent and Federal Lead Agency for NEPA
Trinity River Restoration Program
U. S. Department of the Interior, Bureau of Reclamation

Federal Co-lead Agency for NEPA
U. S. Department of Interior, Bureau of Land Management

Project Proponent's Consultant
North State Resources, Inc.

Cover photos (from left to right):
Sheridan Creek reach, courtesy of Ken DeCamp;
Deep Gulch model, existing velocity at 4,500 cfs (top), and
design velocity at 4,500 cfs (bottom).

Trinity River Channel Rehabilitation Site:
Deep Gulch (River Mile 82.4–82.9) and Sheridan Creek (River Mile 81.6–82.4)

Environmental Assessment/Initial Study
DOI-BLM-CA-N060-2017-014-EA and TR-EA0117

Acronyms and Abbreviations ..... **iv**

Chapter 1. Introduction and Background **1-1**
1.1 Location of Rehabilitation Sites 1-1
1.2 Trinity River Restoration Program Background 1-3
1.3 Purpose and Need/Project Objectives 1-4
1.4 Purpose of This Document 1-5
1.5 Other Regulatory Requirements 1-7
1.6 Scoping and Public Involvement 1-8

Chapter 2. Description of Alternatives **2-1**
2.1 Proposed Action 2-1
2.1.1 Activity A (Recontouring and Vegetation Removal) 2-1
2.1.2 Activities B, C, and D (Construction of Inundated Surfaces) 2-2
2.1.3 Activities E and F (Side Channels) 2-2
2.1.4 Activity G (Alcoves) 2-2
2.1.5 Activity H (Grade Control Removal) 2-3
2.1.6 Activity I (Sediment Management, Coarse and Fine) 2-3
2.1.7 Activity J (Placement of Excavated Materials) 2-3
2.1.8 Activity K (Staging/Contractor Use Areas) 2-3
2.1.9 Activities L and M (Roads, Existing and New) 2-4
2.1.10 Activity N (Temporary Channel Crossings) 2-4
2.1.11 Activity O (Revegetation) 2-4
2.1.12 Detailed Master EIR Activities Described to Provide Additional Clarity Beyond That in Table 2-1 2-5
2.1.13 Design Considerations 2-6
2.1.14 Rehabilitation Activities 2-10
2.1.15 Revegetation Activities 2-26
2.1.16 Access and Other Associated Activities 2-28
2.1.17 Construction Methods and Schedule 2-32
2.1.18 Environmental Commitments 2-33
2.1.19 No Action Alternative 2-44
2.2 Alternatives Considered but Eliminated from Further Evaluation 2-45

Chapter 3. Affected Environment and Environmental Consequences **3-1**
3.1 Introduction to the Analysis 3-1
3.2 Land Use 3-3
3.2.1 Affected Environment 3-3
3.2.2 Environmental Consequences 3-4
3.3 Recreation and Wild and Scenic Rivers 3-5
3.3.1 Affected Environment 3-5
3.3.2 Environmental Consequences 3-6
3.4 Visual Resources/Aesthetics 3-7
3.4.1 Affected Environment 3-7
3.4.2 Environmental Consequences 3-9

3.5 Cultural Resources 3-10
3.5.1 Affected Environment 3-11
3.5.2 Environmental Consequences 3-12
3.6 Transportation and Circulation 3-13
3.6.1 Affected Environment 3-13
3.6.2 Environmental Consequences 3-14
3.7 Air Quality 3-15
3.7.1 Affected Environment 3-15
3.7.2 Environmental Consequences 3-16
3.8 Noise 3-18
3.8.1 Affected Environment 3-18
3.8.2 Environmental Consequences 3-18
3.9 Geomorphology and Soils 3-20
3.9.1 Affected Environment 3-20
3.9.2 Environmental Consequences 3-22
3.10 Hydrology and Flooding 3-23
3.10.1 Affected Environment 3-23
3.10.2 Environmental Consequences 3-24
3.11 Water Quality 3-26
3.11.1 Affected Environment 3-26
3.11.2 Environmental Consequences 3-29
3.12 Fishery Resources 3-30
3.12.1 Affected Environment 3-31
3.12.2 Environmental Consequences 3-33
3.13 Vegetation, Wildlife, and Wetlands 3-36
3.13.1 Affected Environment 3-36
3.13.2 Environmental Consequences 3-39
3.14 CEQA Significance 3-46

Chapter 4. Cumulative Impacts and Other CEQA and NEPA Considerations 4-1
4.1 Cumulative Impacts 4-1
4.1.1 Methodology and Analysis 4-1
4.2 Irreversible and Irretrievable Commitments of Resources 4-4
4.3 Relationship between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity 4-5
4.4 Growth-Inducing Impacts 4-5
4.5 Environmental Commitments and CEQA Mitigation Measures 4-6
4.6 Significant Impacts under CEQA 4-6
4.7 Connected Actions 4-7

Chapter 5. List of Preparers

Chapter 6. References

Tables

Table 2-1. Overview of Activity Areas at Deep Gulch and Sheridan Creek Rehabilitation Sites 2-10
Table 2-2. Material Types 2-14
Table 2-3. Processed Material by Size Class 2-14
Table 2-4. Woody Material Used for Rehabilitation Activities 2-15
Table 2-5. Environmental Commitments 2-34

Table 3-1. Summary of Resource Topics Considered or Eliminated from Further Consideration in This EA/IS 3-2
Table 3-2 Existing Condition WUA for Fry and Presmolt Habitat – Deep Gulch and Sheridan Creek Sites 3-32
Table 3-3. Proposed Action WUA for Fry and Presmolt Habitat – Deep Gulch and Sheridan Creek Sites 3-35
Table 3-4. Increase in WUA Habitat Under the Proposed Action– Deep Gulch and Sheridan Creek Sites 3-35
Table 3-5. Wildlife Habitats in the Project Area 3-37
Table 3-6. Summary of Waters of the U.S. Within the Project Area 3-38
Table 3-7. Summary of Resource Topics Considered in This EA/IS 3-46

Table 4-1. Summary of Cumulative Impacts Considering Past, Present and Reasonably Foreseeable Actions in the Trinity River Basin 4-3

Figures

Figure 1-1. Location of Rehabilitation Sites 1-2

Figure 2-1. Deep Gulch and Sheridan Creek Sensitive Areas 2-7
Figure 2-2. Proposed Rehabilitation Activities 2-29

Figure 3-1a. Impacts on Waters of the United States 3-41
Figure 3-1b. Impacts on Waters of the United States 3-42
Figure 3-2a. Impacts on Riparian Habitat 3-43
Figure 3-2b. Impacts on Riparian Habitat 3-44

Appendices

Appendix A1 Environmental Screening Checklist
Appendix A2 Environmental Checklist Form
Appendix B Mitigation Monitoring and Reporting Program and Project Design Features
Appendix C Aquatic Conservation Strategy Consistency Evaluation
Appendix D Compliance with Standards and Guidelines for Survey and Manage Species
Appendix E Wild and Scenic River, Section 7 Analysis and Determination

Acronyms and Abbreviations

AEAM	Adaptive Environmental Assessment and Management
af	acre-feet
APE	Area of Potential Effect
Basin Plan	Water Quality Control Plan for the North Coast Region
BDA	beaver dam analog
BFE	base flood elevation
BLM	U.S. Bureau of Land Management
BMI	benthic macroinvertebrate
BMP	best management practice
BO	Biological Opinion
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO_2	carbon dioxide
CWA	Clean Water Act
CWHR	California Wildlife Habitat Relationships
CY	cubic yard
dB	logarithmic decibel
DPS	distinct population segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ELJ	engineered log jam
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESL	environmental study limit
ESU	evolutionarily significant unit
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
GHG	greenhouse gas
IS	Initial Study
L_{dn}	day-night average sound level
MMRP	Mitigation Monitoring and Reporting Program
msl	mean sea level

NAHC	Native American Heritage Commission
NCUAQMD	North Coast Unified Air Quality Management District
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NSR	North State Resources, Inc.
NTU	nephelometric turbidity unit
ORV	outstanding remarkable value
PA	Programmatic Agreement
PM10	particulate matter less than 10 microns in aerodynamic diameter
PM2.5	particulate matter less than 2.5 microns in aerodynamic diameter
PRC	Public Resources Code
Reclamation	U.S. Bureau of Reclamation
Regional Water Board	North Coast Regional Water Quality Control Board
RM	River Mile
RMP	Resource Management Plan
ROD	Record of Decision
SMARA	Surface Mining and Reclamation Act
SONCC	Southern Oregon/Northern California Coast
SR	State Route
SWPPP	Storm Water Pollutant Prevention Plan
TMC	Trinity Management Council
TRD	Trinity River Division
TRRP	Trinity River Restoration Program
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VRM	visual resource management
WSE	water surface elevation
WSRA	Wild and Scenic Rivers Act
YT	Yurok Tribe

Chapter 1. Introduction and Background

This Environmental Assessment/Initial Study (EA/IS) for the proposed Trinity River Channel Rehabilitation Sites – Deep Gulch (River Mile [RM] 82.4-82.9) and Sheridan Creek (RM 81.6-82.4) was prepared by the United States Department of the Interior (USDI), Bureau of Reclamation (Reclamation) and USDI Bureau of Land Management (BLM) to meet the requirements of the National Environmental Policy Act (NEPA) and by the North Coast Regional Water Quality Control Board (Regional Water Board) to meet the requirements of the California Environmental Quality Act (CEQA). Reclamation is the lead agency under NEPA, and BLM is a federal land manager at the sites and federal co-lead under NEPA. These federal agencies worked with the Regional Water Board to analyze the potential impacts of the proposed activities under NEPA (40 Code of Federal Regulations [CFR], Section 1508.9(a)) and CEQA (California Public Resources Code Sections 21000 et seq.).

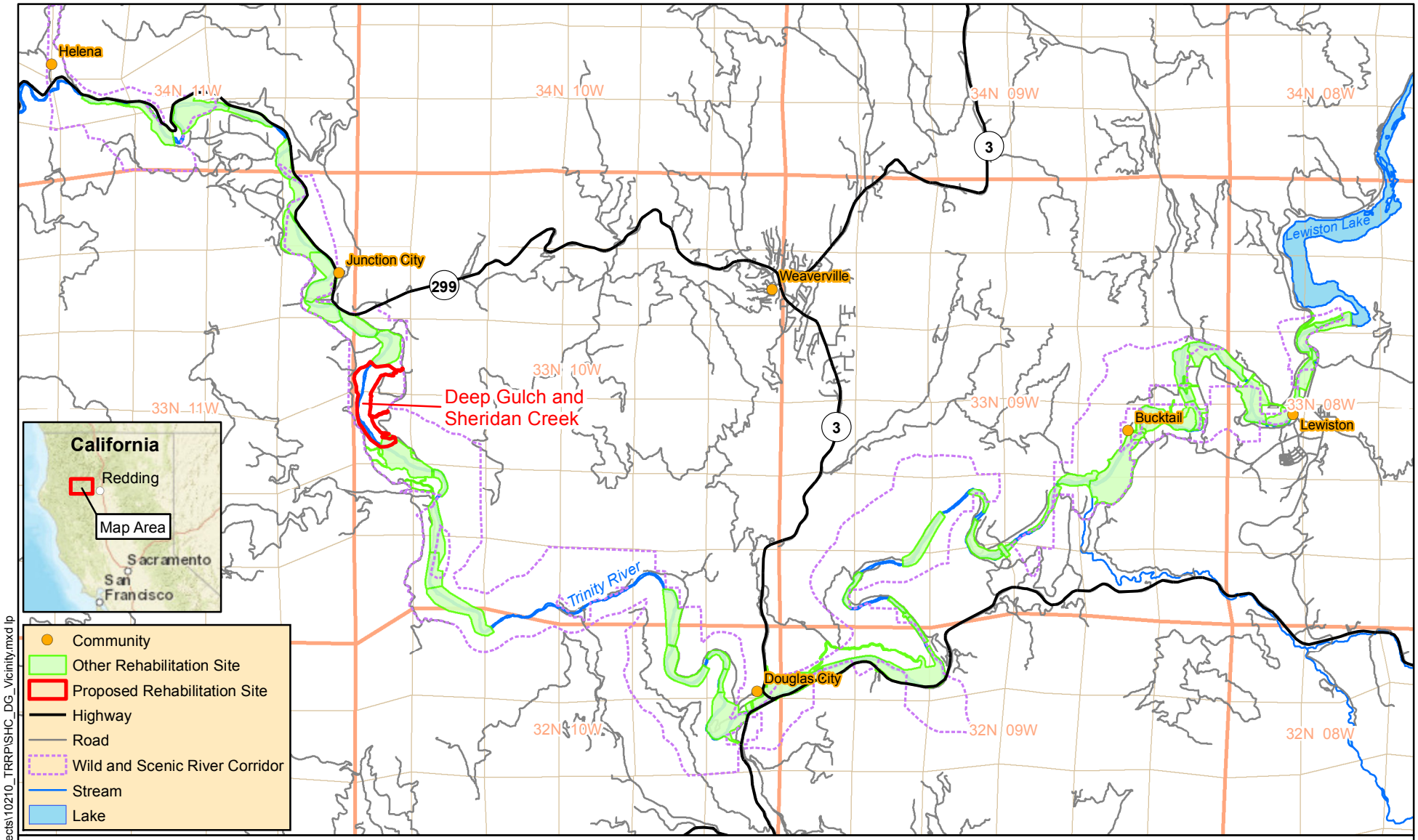
Appendix A1 to this EA/IS was prepared as an initial screening mechanism to identify the resource topics that were addressed in the *Channel Rehabilitation and Sediment Management Activities for Remaining Phase 1 and Phase 2 Sites, Part 1: Final Master Environmental Impact Report and Part 2: Environmental Assessment/Final Environmental Impact Report (Master EIR and EA/EIR, Regional Water Board and Reclamation 2009)* and considered in this document. Appendix A2 to this EA/IS is the CEQA environmental checklist prepared to partially satisfy CEQA requirements.

This EA/IS incorporates by reference, and is tiered from, two previous joint NEPA/CEQA documents, the *Trinity River Mainstem Fishery Restoration Environmental Impact Statement/Report* (Trinity River EIS/EIR; U.S. Fish and Wildlife Service et al. 2000) and the Master EIR and EA/EIR. The proposed Deep Gulch and Sheridan Creek Rehabilitation Sites (collectively referred to as the project area in this EA/IS) were identified in the Master EIR as Phase 2 sites and discussed at a programmatic level. The purpose of this EA/IS is to provide a site-specific analysis of the proposed rehabilitation activities at the two sites.

BLM is considering issuance of a Right of Way to Reclamation pursuant to Title V of the Federal Land Policy and Management Act (43 USC 1761 et seq.) for implementation of the rehabilitation activities on BLM-managed lands. BLM is also considering issuance of a Free Use Permit (FUP) pursuant to 43 CFR 3604 that would authorize Reclamation to use mineral materials for restoration activities at the Deep Gulch and Sheridan Creek rehabilitation sites. All environmental commitments, project design features, mitigation measures, and best management practices (BMPs) developed for this EA/IS would be considered for incorporation into the BLM authorization.

1.1 Location of Rehabilitation Sites

Reclamation proposes to conduct mechanical channel rehabilitation activities on the mainstem Trinity River downstream of Lewiston Dam in the project area, as illustrated on Figure 1-1. The Deep Gulch and Sheridan Creek rehabilitation sites share activity areas and have been combined into one project area for purposes of the analysis. The project area encompasses approximately 177 acres, which include 138 acres of BLM-managed land and 39 acres of private land.



Document Path: T:\Projects\10210_TRRP\SHC_DG_Vicinity.mxd lp

Prepared by:

North State Resources, Inc.
5000 Bechelli Lane, Suite 203
Redding, CA 96002
(530) 222-5347

Prepared for:

Bureau of Reclamation
Trinity River Restoration Program

PLSS Mount Diablo Base and Meridian
California State Plane Zone 1, NAD83 Feet

0 0.5 1 2 Miles

N

Public Land Survey: T33N, R10W, Sec 18 & 19

USGS 7.5 Quad: Junction City - 1982

TRINITY RIVER RESTORATION PROGRAM
Deep Gulch and Sheridan Creek Rehabilitation Sites

Figure 1-1
Location of Rehabilitation Sites

Throughout this document, the terms river left and river right are used to refer to the river banks when looking downstream. For this project, the left is the west side of the river and the right is the east side.

The Deep Gulch rehabilitation site is located about 1.6 miles south of Junction City, California. This site is in Section 19 of Township 33 North, Range 10 West on the *Junction City, California* 7.5-minute U.S. Geological Survey (USGS) quadrangle, Mount Diablo Base and Meridian. The 0.5-mile-long reach of the Trinity River at this site is characterized by a relatively wide alluvial valley bottom, relatively low water-surface slopes, low sinuosity, and simple channel geometry. The river elevation at the site is approximately 1,480 feet above mean sea level (msl). Access to the site is via dirt roads west of Sky Ranch Road, which intersects State Route 299 southeast of Junction City and north of the site and through the Sheridan Creek site to the north.

The Sheridan Creek rehabilitation site abuts the downstream (northern) boundary of the Deep Gulch rehabilitation site. This site is in Section 18 of Township 33 North, Range 10 West on the *Junction City, California* 7.5-minute USGS quadrangle, Mount Diablo Base and Meridian. The 0.8-mile-long reach of the Trinity River at this site is characterized by a relatively wide alluvial valley bottom, relatively low water surface slopes, low sinuosity, and simple channel geometry with a major riffle feature that supports salmonid spawning. Access to the site is via a dirt road, referred to as Dredger Lane, off the west side of Sky Ranch Road at the northeast corner of the site. The road continues into the Deep Gulch site to the south.

1.2 Trinity River Restoration Program Background

The fundamental purpose of the Trinity River Restoration Program (TRRP) is to restore historic river processes to the Trinity River through implementation of the 2000 Record of Decision (ROD) for the Trinity River EIS/EIR. It is the intent of the TRRP to restore a properly functioning river through rehabilitation activities at multiple locations in order to increase naturally spawning anadromous fish populations to levels that existed prior to construction of the Lewiston and Trinity Dams. The target reach for Trinity River restoration is the approximately 40-mile length of river downstream of Lewiston Dam to the confluence of the North Fork Trinity River.

For this reach, the ROD outlined six integral components for execution:

- implementation of a variable annual flow regime according to recommendations provided in the Trinity River Flow Evaluation Report prepared by the U.S. Fish and Wildlife Service (USFWS) and Hoopa Valley Tribe in 1999,
- mechanical channel rehabilitation,
- fine and coarse sediment management,
- watershed restoration,
- infrastructure improvement, and
- adaptive environmental assessment and management.

In general, the TRRP approach to channel rehabilitation is to reconnect the river with its floodplain. This reconnection requires selective removal of terraces and riparian berms (i.e., berms that are anchored with woody vegetation and consolidated sand deposits) that developed after the Lewiston and Trinity Dams were completed and peak scouring flows that occurred prior to completion of the dams were lost. Along with berm removal, the approach involves physical alteration of floodplains

so that they become inundated more frequently, placement of large wood, and removal of riparian vegetation at strategic locations to promote the alluvial processes necessary for the restoration and maintenance of complex riverine habitats. The ROD for the Trinity River EIS/EIR specified that mechanical channel rehabilitation activities would be implemented at 47 sites on the mainstem Trinity River between Lewiston Dam and the North Fork Trinity River. Since issuance of the ROD, the TRRP has completed rehabilitation activities at 32 sites and is currently planning activities at several other sites, including the upstream Dutch Creek rehabilitation site.

The Master EIR includes a brief chronology summarizing the most pertinent management actions that have occurred relevant to the Trinity River Basin between 1938 and 2008 (Section 1.4.4., pages 1-8). Additional details concerning the legislative and management history can be found in the Trinity River EIS/EIR and the EA/Final EIRs for TRRP projects constructed between 2005 and 2008[1]. These documents are on file at the TRRP office in Weaverville, California, and available on the TRRP website (www.trrp.net) and at the Weaverville public library. The Master EIR (Section 1.4.5, pages 1-10 through 1-15) also contains a summary of the various restoration activities that have been undertaken since the signing of the ROD, as well as brief discussions of other watershed restoration programs and activities occurring within the basin; additional information is available on the TRRP website[2].

1.3 Purpose and Need/Project Objectives

NEPA regulations require that an EA briefly specify the need that the agency is responding to in proposing an action (40 CFR 1508.9(a)). Similarly, a CEQA lead agency must describe the objectives to be achieved by a proposed project (California Code of Regulations, Title 14, Division 6, Chapter 3, Section 15124(b)).

The TRRP is working to provide increases in habitat for all life stages of naturally produced anadromous fish native to the Trinity River in the amounts necessary to reach congressionally mandated goals. The strategy is to create habitat for native anadromous fish, while also ensuring that habitat complexity and quantity increase as the alluvial processes of the Trinity River are enhanced or restored in a manner that would perpetually maintain fish and wildlife resources (including threatened and endangered species) and the river ecosystem. The proposed rehabilitation activities at Deep Gulch and Sheridan Creek are needed to support the TRRP's goals of restoring fish populations to pre-dam levels and restoring dependent fisheries, including those held in trust by the federal government for the Hoopa Valley and Yurok tribes, in compliance with the 2000 ROD.

Specifically, the primary rehabilitation objective for the Deep Gulch rehabilitation site is to re-establish a functioning, topographically complex floodplain, while also increasing in-channel habitat diversity. The existing pool-riffle features at the site provide opportunities to increase channel and hydraulic complexity by expanding the channel, excavating adjacent overbank areas, adding large woody material to support rearing habitat, and installing log jams to interact with river flows that can increase bed topography and create eddies. The rehabilitation activities are needed to increase optimal habitat over a wide range of flows for fry and presmolt fish above existing conditions. This

[1] Hocker Flat (Reclamation and California DWR 2004), the Canyon Creek Suite (Reclamation and the Regional Water Board 2006), Indian Creek (Reclamation and TCRCD 2007), and Lewiston-Dark Gulch (Reclamation and TCRCD 2008).
[2] On the TRRP website, go to http://www.trrp.net/?page_id=409.

site provides a source of alluvial materials necessary for improving aquatic habitat, increasing habitat complexity, and constructing submerged fords to access activity areas on river left.

For the Sheridan Creek rehabilitation site, the primary rehabilitation objective is also to increase habitat diversity, including riparian and aquatic habitat, while also promoting dynamic river processes. The existing riffles and multi-story riparian vegetation provide opportunities to enhance the existing habitat, increase the functional floodplain area, and protect existing high-use spawning riffles above Sheridan Hole. The rehabilitation activities are needed to increase rearing habitat for juvenile fish, reduce the wood storage deficit, and improve continuity between the existing riparian vegetation patches. This site also provides a source of alluvial materials necessary for improving aquatic habitat, increasing habitat complexity, and constructing submerged fords to access activity areas on river left.

1.4 Purpose of This Document

Both NEPA (42 USC 4321 et seq.) and CEQA (California PRC, Section 21000 et seq.) require that governmental agencies disclose information about proposed activities that may affect the environment, evaluate the potential environmental impacts of their proposed actions before making formal commitments to implement them, and involve the public in the environmental review process. This site-specific EA/IS for the proposed action at the Deep Gulch and Sheridan Creek sites has been prepared to comply with NEPA and CEQA. This combined NEPA/CEQA document evaluates the environmental impacts of the proposed action, recommends project design features or mitigation measures to minimize impacts, and is designed to facilitate lawful implementation under all applicable laws.

Tiering, which is recognized under both NEPA and CEQA, refers to the practice of covering general matters in broader-scope environmental documents and focusing subsequent documents on the issues germane to the site-specific actions (40 CFR 1508.28). Tiering is appropriate when a sequence of analyses progresses from a broad, conceptual, or planning-level review over a wide area or program to a project-specific and site-specific analysis. Tiering helps the lead agencies focus on issues that are "ripe" for decision, while excluding from consideration issues already decided or not yet ripe (California Code of Regulations, Title 14, Division 6, Chapter 3, Section 15385). The general analysis in the broader document is incorporated by reference into the subsequent documents, meaning that the information in the broader document does not need to be repeated in subsequent documents.

This site-specific EA/IS for the proposed action at the Deep Gulch and Sheridan Creek sites is tiered to the previous analysis in the *Trinity River Mainstem Fishery Restoration Final EIS/EIR* (FEIS/EIR; USFWS et al. 2000a). It also incorporates by reference the analyses in the Master EIR and EA/EIR (Regional Water Board and Reclamation 2009).

The Trinity River FEIS/EIR serves as a NEPA analysis from which site-specific projects may tier. NEPA allows for tiering, as described in Sec. 1508.28 of the Council on Environmental Quality (CEQ) regulations. This section of the CEQ regulations states that tiering "refers to the coverage of general matters in broader environmental impact statements…with subsequent narrower statements or environmental analyses (i.e., regional or basinwide program statements or, ultimately, site-specific

statements), incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared."

In 1994, the USFWS as the NEPA lead agency and Trinity County as the CEQA lead agency began the public process for developing the EIS/EIR for the Trinity River Mainstem Fishery Restoration Program. The FEIS portion of the Trinity River FEIS/EIR (published in October 2000) functions as a project-level NEPA document for policy decisions associated with managing Trinity River flows and as a programmatic NEPA document providing "first-tier" review of other potential actions, including the proposed action. However, because the Trinity County Board of Supervisors—the CEQA lead agency for the Trinity River FEIS/EIR—never certified the EIR portion of the 2000 FEIS/EIR, the EIR portion was not available to tier from for the CEQA portion of this document or for other earlier TRRP CEQA documents. Consequently, four joint EA/EIRs were completed to analyze TRRP channel rehabilitation projects between 2004 and 2008[3]. Based on the similarity of these projects and their environmental impacts and agreement that future TRRP projects would have similar impacts, a separate programmatic document, the Master EIR, was developed. The EA portion of the Master EIR – EA/EIR tiers from the Trinity River Mainstem Fishery Restoration FEIS/EIR (USFWS et al. 2000a). The ROD, dated December 19, 2000, for the FEIS/EIR directed USDI agencies to implement the Flow Evaluation Alternative, which was identified as the Preferred Alternative in the FEIS/EIR.

CEQA allows for preparation of a Master EIR that analyzes a series of related actions that are characterized as one large project or program, such as the channel rehabilitation and sediment management activities proposed by TRRP. A Master EIR evaluates at a programmatic level the direct and indirect environmental impacts, cumulative impacts, growth-inducing impacts, and irreversible significant effects on the environment of subsequent site-specific projects. A Master EIR forms the basis for analyzing the effects of subsequent projects (CEQA Guidelines, Section 15175, et. seq.). The Master EIR meets the elements required for a Program EIR pursuant to California Code of Regulations, Title 14, Division 6, Chapter 3, Section 15168. Therefore, the Master EIR provides programmatic CEQA level review, from which the Deep Gulch and Sheridan Creek project—a subsequent site-specific project—is tiered.

The Regional Water Board acted as the lead agency for the Master EIR (State Clearinghouse #2008032110) and for the initial study portions of subsequent site-specific EA/ISs. The Master EIR provides a discussion of the existing conditions, environmental impacts, and mitigation measures required to comply with CEQA (California PRC, Section 21000 et seq.). In addition to addressing direct and indirect impacts associated with the proposed project and alternatives, the Master EIR addresses cumulative and growth-inducing impacts that could be associated with activities at the remaining Phase 1 and Phase 2 sites. The Regional Water Board certified the Master EIR on August 25, 2009.

Because the Master EIR provides programmatic level review from which site-specific projects may tier, the analysis of the proposed action required under CEQA is tiered from that document. In addition, the EIS portion of the Trinity River FEIS/EIR functions as a project-level NEPA document for policy decisions associated with managing Trinity River flows and as a programmatic NEPA

[3] Hocker Flat (Reclamation and California Department of Water Resources 2004), the Canyon Creek Suite (Reclamation and Regional Water Board 2006), Indian Creek (Reclamation and Trinity County Resource Conservation District 2007), and Lewiston-Dark Gulch (Reclamation and Trinity County Resource Conservation District 2008).

document providing "first-tier" review of other potential actions, including the proposed action. This EA/IS focuses only on site-specific activities for the proposed action and serves as a joint NEPA/CEQA document for project authorization by both federal and California state regulatory agencies.

Under 14 CCR, Section 15177, after a Master EIR has been prepared and certified, subsequent projects that the lead agency determines as being within the scope of the Master EIR will be subject to only limited environmental review. The California Code of Regulations, Title 14, Division 6, Chapter 3, Section 15177, subd. (b)(2)) states that the preparation of a new environmental document and new written findings will not be required if, based on a review of the IS prepared for the subsequent project, the lead agency determines, on the basis of written findings, that no additional significant environmental effect will result from the proposal, that no new additional mitigation measures or alternatives are required, and that the project is within the scope of the Master EIR. Whether a subsequent project is within the scope of the Master EIR is a question of fact to be determined by the lead agency based on a review of the IS to determine whether there are additional significant effects or new additional mitigation measures or alternatives required for the subsequent project that are not already discussed in the Master EIR.

This EA/IS for the proposed action provides site-specific details for the environmental impact analyses and has been prepared to comply with NEPA (42 USC, Section 4321 et seq.) and CEQA (California PRC, Section 21000 et seq.). This EA/IS focuses only on site-specific activities for the proposed action and serves as a joint NEPA/CEQA document for project authorization by both federal and California state regulatory agencies. This EA/IS contains a site-specific project description and other information required to apply for enrollment under General Water Quality Certification R1-2015-0028 (or subsequent reissued Certification) for Trinity River channel rehabilitation activities, which the Regional Water Board will consider in making its determination and approval decision.

1.5 Other Regulatory Requirements

In addition to CEQA and NEPA, the proposed rehabilitation activities are subject to a variety of federal, state, and local statutes, regulations, policies, and other authorities, such as the Clean Water Act, Endangered Species Act, California Fish and Game Code, National Historic Preservation Act[4], Wild and Scenic Rivers Act, and BLM's 1993 Redding Resource Management Plan (RMP). The primary responsible and trustee agencies are the U.S. Army Corps of Engineers (USACE), USFWS, National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (CDFW), the Regional Water Board, and Trinity County. Chapter 3, Regulatory Framework, of the Master EIR includes descriptions of the actions required of these agencies and the applicable environmental statutes and identifies permits required for the TRRP work on the Trinity River.

The BLM's Redding Field Office manages public lands in the Trinity River Basin in accordance with its 1993 RMP and Record of Decision (RMP) (BLM 1993). The RMP discusses the general condition of natural resources in the plan area and prescribes appropriate land use management for

[4] Section 3.1.1 of the Master EIR provides a comprehensive discussion of Reclamation's approach to compliance with the National Historic Preservation Act; specifically with respect to Section 106 consultation requirements. Appendix D to the Master EIR documents the programmatic agreement between USFWS, Reclamation, BLM, Hoopa Valley Tribe, the California State Historic Preservation Office and the Advisory Council on Historic Preservation.

lands within the plan jurisdiction, including BLM-managed lands at the Deep Gulch and Sheridan Creek rehabilitation sites. Section 4.2.2 of the Master EIR provides additional information about the RMP. As part of the BLM decision-making process, BLM must evaluate the consistency of the proposed action with the RMP, as amended.

1.6 Scoping and Public Involvement

Since the signing of the ROD and efforts to begin its implementation, TRRP and other agencies have held numerous public meetings and open houses to obtain public input and provide the public with information on the overall TRRP rehabilitation activities. As part of ongoing TRRP outreach activities, TRRP staff members have met with local groups (e.g., fishing guides and mining groups) and individual landowners from the Junction City area to obtain stakeholder input and advice and to address general concerns not specific to the Deep Gulch or Sheridan Creek rehabilitation activities. Notice of all public meetings and other pertinent project information are announced in local newspapers and posted on the TRRP's website: http://www.trrp.net/.

Assembly Bill 52 (AB52) was signed by the Governor of California in September 2014. The bill requires that California state lead agencies consult with California Native American tribes traditionally and culturally affiliated with the geographic area of a project when the Tribe requests to be informed of such projects and requests the consultation in order to ensure that impacts to tribal cultural resources are minimized. AB 52 requirements apply to projects with a notice of preparation or a notice of negative declaration or mitigated negative declaration filed on or after July 1, 2015. The consultation requirements of AB 52 did not apply to the preparation and adoption of the 2009 Master EIR prepared for the TRRP.

Under the auspices of Reclamation, the TRRP entered into a Programmatic Agreement (PA) with the California State Historic Preservation Officer to ensure compliance with Section 106 of the National Historic Preservation Act. The PA ensured that tribal cultural resources were addressed in the Master EIR. The mitigation, monitoring, and reporting plan adopted by the Regional Water Board includes measures for the protection of tribal cultural resources, including tribal consultation and coordination; site evaluations; and avoidance, minimization, and other specific mitigation as necessary at the site scale.

Consistent with Reclamation and BLM's NEPA requirements, the public review of this EA/IS will begin when the agencies post the document to their official websites. The official public review period will begin when the document is submitted to the California State Clearinghouse. The document will be circulated to local, state, and federal agencies and to interested organizations and individuals for a minimum review and comment period of 30 days. The review period will run from when the document is accepted at the State Clearinghouse through April 7, 2017. At the onset of the review period, public notices informing the public of the availability of this EA/IS for review will be posted on the TRRP website, at the rehabilitation sites, at the TRRP Weaverville and BLM Redding Field offices, and in the *Trinity Journal* and *Redding Record Searchlight* newspapers; the public notices will also be mailed to local landowners and emailed to interest groups. An open house to describe the proposed action and receive public input will be held on March 15, 2017, at 6:00 pm at the North Fork Grange Hall on Dutch Creek Road in Junction City, California.

Copies of the EA/IS are available for review on the TRRP website at http://www.trrp.net/, Reclamation's website at http://www.usbr.gov/mp/nepa/nepa_base.cfm?location=ncao, and BLM's website at http://www.blm.gov/ca/st/en/fo/redding/earoster.html, as well as at the following locations:

Trinity River Restoration Program Office
United States Department of the Interior
Bureau of Reclamation
1313 South Main Street
Weaverville, California 96093

United States Department of Interior
Bureau of Land Management
Redding Field Office
6640 Lockheed Drive
Redding, CA 96002

Trinity County Library
Weaverville Branch
211 Main Street
Weaverville, California 96093

Written comments on or questions regarding this document should be sent to:

Brandt Gutermuth
Environmental Scientist
Trinity River Restoration Program
P.O. Box 1300
Weaverville, California 96093
bgutermuth@usbr.gov
Phone: (530) 623-1800
Fax: (530) 623-5944

Copies of the Master EIR, the 2000 ROD, and the Trinity River EIS/EIR are also available on the TRRP website at http://www.trrp.net

Chapter 2. Description of Alternatives

This chapter describes the proposed action and the no action alternative as well as alternatives that were eliminated from detailed analysis in this EA/IS. The NEPA term "proposed action" is used throughout this document rather than the CEQA term "proposed project"; however, the terms should be considered synonymous.

2.1 Proposed Action

The proposed action consists of a number of rehabilitation activities at the Deep Gulch and Sheridan Creek rehabilitation sites, including reducing the encroachment of riparian vegetation; placement of large wood material; physical alteration of alluvial features (e.g., placement or excavation of alluvial material to construct floodplains and side channels); construction of large wood hydraulic and habitat structures; and removal or replacement of riparian and upland vegetation at strategic locations. These activities are based on those described and analyzed in the Master EIR; refer to Section 2.3.2 of the Master EIR for more information about each of these general activity types.

For the proposed action, specific activities that fall within the broader categories outlined in Table 2-1 of the Master EIR are described below. Activities P and W have the same level of impacts originally analyzed in the Master EIR, but are described separately in this analysis to clarify their intent. This section describes the general types of activities that occur in the TRRP's rehabilitation projects; Section 2.4.2.2 below describes the actual site-specific activities for the proposed action at the Deep Gulch and Sheridan sites.

2.1.1 Activity A (Recontouring and Vegetation Removal)

Under Activity A, the ground surface would be modified to reduce riparian encroachment and minimize the risk of stranding of juvenile salmonids. Vegetation would be cleared at most of the activity areas that would be subject to rehabilitation activities (e.g., constructed floodplains, disposal areas), but would be maintained where possible.

Activity A includes grading to construct or enhance topographic features that could develop into functional riparian habitat; excavation and the placement of fill would be balanced. In addition to the activity areas that would be cleared prior to grading, site-specific removal of trees (e.g., cottonwood, grey pine) may be required to enhance the safety of the work site and to improve local conditions for individual tree growth and wildlife; these trees would be used to construct large wood habitat structures. In these instances, consultation and authorization with BLM would be required before removal of site-specific trees.

Removed vegetation would be used for in-river placement as large wood, chipped/masticated, or spread/buried in revegetation areas to increase nutrients in and the water holding capability of the soils. Activities would be accomplished using a variety of methods, including hand tools and heavy equipment, such as excavators, bulldozers, scrapers, and dump trucks. Only the minimum amount of riparian vegetation that is necessary for project implementation would be removed.

2.1.2 Activities B, C, and D (Construction of Inundated Surfaces)

Activities B, C, and D concern the construction of surfaces that would be inundated. Activities associated with the construction of these surfaces would enhance their connection to the river at various flows. These activities are intended to expand the surface area of the channel that could be inundated by reoccurring flows below the ordinary high water mark. Vegetation would be cleared as necessary, and earth would be excavated to meet design elevations for periodic inundation.

Newly inundated surfaces would provide important rearing and slow-water habitat for juvenile salmonids and other native anadromous fish. They would also provide low points that could enhance sinuosity and thereby provide the habitat variability that was historically present and is required to support rapid growth of native fishes.

These treatment areas would rely on a combination of natural recruitment of native riparian vegetation and riparian planting to enhance the establishment of a diverse assemblage of native vegetation. If initial revegetation establishment is less successful than anticipated, additional efforts would be made by Reclamation consistent with requirements and commitments outlined in the Riparian Mitigation and Monitoring Plan (Reclamation 2016). This plan requires supplemental efforts (e.g., in-planting, weed control, irrigation) as necessary to establish riparian vegetation to meet the standard of no net loss in riparian vegetation from pre-project levels.

2.1.3 Activities E and F (Side Channels)

Under Activities E and F, modifications to create or change side channels would reconnect the Trinity River with its floodplain at targeted flows. Side channels constructed for flows of 300 cubic feet per second (cfs) would provide off-channel, low-velocity habitat for a variety of aquatic organisms, including juvenile salmonids at base flow conditions. Side channels constructed for 1,000 cfs flows would provide habitat for salmonid rearing when water is flowing through the channels. As flows recede during the year, these side channels would drain naturally, reducing the likelihood of stranding aquatic organisms.

Side channels would evolve and revegetate to varying degrees over time. While the duration of side channel flow would depend on their evolution over time and the river's water surface elevation (WSE), riparian and wildlife habitat diversity would increase even when water is not flowing.

Side channels would be constructed to leave earthen berms near the upstream and downstream ends to protect water quality during construction. These berms would be removed at the end of construction if the water in the side channel is of appropriate quality for discharge to the river or the water in the side channel would be left in place for removal by subsequent high flows. Water in side channels may be pumped to uplands or slowly metered into the mainstem river post-construction. These techniques would reduce the amount of turbid water that would ultimately reach the Trinity River during side channel connection.

2.1.4 Activity G (Alcoves)

Under Activity G, alcoves would be excavated to design elevations at the downstream end of side channels or other appropriate locations. They would be continuously inundated (approximately 1-2

feet deep during low flows) and scoured/maintained during high flows to provide year-round juvenile fish habitat.

2.1.5 Activity H (Grade Control Removal)

Under Activity H, grade control structures, including constructed features, would be removed to increase channel complexity via promotion of channel migration, increased sinuosity, reduced fine sediment storage, increased coarse sediment transport, and restoration of bars.

2.1.6 Activity I (Sediment Management, Coarse and Fine)

In addition to site-specific creation and enhancement of alluvial features (bars), sediment management activities would occur at various sites under Activity I. Sediment management activities include augmentation of coarse sediment (e.g., spawning gravel) and removal of fine sediment (0.5–0.8 millimeter size fraction) at key locations. Long-term, large-scale coarse sediment augmentation sites would be established at select locations to encourage channel migration and the development of alternate bars. Augmentation activities also include measures required to provide a long-term supply of coarse sediment and to ensure that the TRRP has the administrative access necessary to implement these activities at specific locations.

Selected vegetation would be removed to facilitate the introduction of the coarse sediment along the channel margin. As appropriate, salvaged large wood would be retained and incorporated into riverine/in-channel activities to provide additional habitat complexity. The use of large wood is a vital component of channel rehabilitation work and includes incorporation of hydraulic structures (wood and/or rock), wood habitat structures, skeletal bars, and boulder habitat placement. Coarse sediment would be introduced via mechanized equipment (e.g., conveyor, mechanical placement below the ordinary high water mark) into the river channel under various high-flow conditions in a manner that facilitates the river's ability to route the coarse sediment downstream during high-flow periods.

2.1.7 Activity J (Placement of Excavated Materials)

Under Activity J, excavated materials would be placed in spoil areas so that there would be no increase in the elevation of the 100-year floodplain to comply with the requirements of Trinity County's Floodplain Ordinance. Appropriate site-specific spoil areas are identified and verified through hydraulic analysis so that they would have no effect on the 100-year flood elevation or only within established ordinance parameters. Spoiled materials would be spread in uniform layers that blend with the natural terrain. Placement of excavated and cleaned coarse sediment or cobbles may alternatively be used to create an infiltration gallery to allow subsurface water flow.

2.1.8 Activity K (Staging/Contractor Use Areas)

Under Activity K, excavated materials would be transported across the staging area to stockpile areas. Water would be applied to the excavated materials for construction purposes, including dust abatement, as directed by the Contracting Officer. Activity in these areas would include maintaining existing water wells and other infrastructure. The staging area may also be used for processing and

storage of coarse sediment required for long-term sediment management activities or to obtain and store boulders for use in constructing hydraulic structures and boulder habitat placements.

2.1.9 Activities L and M (Roads, Existing and New)

Activities L and M pertain to existing and new access roads. The location of the activity areas within the project area would require construction of access roads that connect one activity area to others or to an existing public or private road authorized for use for specific project purposes. In some instances, these access roads would remain in use after the completion of the authorized project at the discretion of the land owner or manager. The site-specific design of these roads would consider factors like topography, soils, existing vegetation, and the need for future vehicle access. BMPs would be used to reduce the impacts of road-related sediment on the riparian and aquatic environments.

2.1.10 Activity N (Temporary Channel Crossings)

Temporary crossings under Activity N occur in "X" activity areas on the figures and may include constructed fords, temporary bridges, or other site improvements to facilitate access for construction-related traffic. If required, temporary bridges would be used when crossings are needed outside of the summer (July 15–September 15) in-channel work window.

Fords would be constructed using imported clean gravel and native alluvial materials excavated from the bed and bank of the Trinity River or adjacent sources. Where equipment crossings are needed outside of the summer (July 15–September 15) in-channel work window (e.g., to perform wet season revegetation on the right bank), temporary, permitted conditions would be created to prevent spawning in the crossing until all crossings have been completed. All temporary crossings would be designed and constructed to meet the requirements for heavy equipment such as trucks and excavators. With the exception of rip-rap or other stabilizing materials, material would be primarily extracted from activity areas within identified, permitted sites. The use of fords to cross the river would be minimized, and fords would not be used to transport excavated materials across the channel. All extracted material would be placed on the same side from which it was taken.

Due to requirements to retain passage for fish and boats, at least one-third of a ford crossing would be submerged to a minimum depth of 1 foot under low-flow conditions. The construction of the temporary crossings would likely require some vegetation removal at entrances and exits to the channel. All temporary crossings would be constructed in a manner that does not impede navigability at the specific site.

2.1.11 Activity O (Revegetation)

Impacts to vegetation are anticipated in most activity areas. Under Activity O, revegetation of riparian and upland areas would rely on a combination of planting and natural recruitment of native species consistent with Reclamation's Riparian Mitigation and Monitoring Plan (Reclamation 2016) and the needs of BLM and other cooperating, responsible, and trustee agencies. Native willows from the impact areas would be replanted as clumps during construction to speed recovery of vegetation. Replanting of affected native vegetation (e.g., willows and cottonwoods) would be completed after

construction in accordance with a site-specific plan. This activity may include watering during the first 3 years post-planting.

In general, the TRRP objective is to ensure that riparian vegetation is minimally affected by TRRP activities and is replaced at a 1:1 ratio (no net loss of riparian area habitat) within the Trinity River corridor. Revegetation would provide aquatic refugia at high flows, improve terrestrial habitat for birds and other wildlife, provide future wood recruitment, and provide future terrestrial nutrient input to the river. Additional planting, seeding, mulching, and irrigation in the upland areas would occur at a 3:1 ratio using native seed and root stock available to Reclamation. Reclamation would also implement measures to control or inhibit the reestablishment of noxious and invasive plant species.

The proposed action also includes the extraction, processing, and use of mineral materials (e.g., gravel, cobble) for on-site activities. Consistent with the Master EIR, the design teams use activity areas to define discrete activities that would be implemented at the rehabilitation sites. The considerations that went into the designs at each site are summarized below, and the descriptions of the activities and activity areas follow the section that discusses design considerations section.

2.1.12 Detailed Master EIR Activities Described to Provide Additional Clarity Beyond That in Table 2-1

Activity P (In-River Installation of LWD [Hydraulic and Habitat Structures], Skeletal Bars, and Boulder Habitat)

Activity P impacts were covered in the Master EIR as part of Activity I (Sediment Management) as well as other activities to facilitate side channel construction and maintenance (e.g., excavation of in-channel and riverine areas—activities E, F, and G). The TRRP would use appropriate materials to cause and enhance geomorphic action that would also be expected to improve aquatic and wildlife habitat. Addition of large rock (>6 inch as in the skeletal bars described in the ROD) or rock/wood structures would remain in place and confine the river, thereby increasing stream power to scour and maintain adult salmonid holding habitat.

As appropriate, salvaged large wood and accompanying slash would be retained and used in riverine/in-channel activities to provide additional hydraulic and habitat complexity. This could include large wood placement as individual pieces, small accumulations, and large habitat structures. The addition of large wood would develop topographical and hydraulic complexity and increase bank length to provide additional rearing habitat over a wide range of flows. Incorporation of woody material would improve anadromous fish spawning and rearing habitat.

Woody material is a natural part of healthy rivers. It provides important habitat for aquatic species by providing cover from high flows and predators. The low velocity areas collect suitable spawning materials, and its organic materials are a food source for aquatic insects. It can help create and maintain beneficial habitat features such as pools, islands, and gravel bars. Activity P may also include the construction of log jams to further engage the flow and act as a catalyst for natural processes of scour and channel migration. Construction of larger habitat structures or log jams may incorporate rock and boulders as ballast to ensure that the structures do not migrate with high flows. Furthermore, log jams may be built with downstream "skeletal bars," thus forming habitat complexes that would grow in depositional areas.

Processed alluvial construction material would be obtained and imported from off-site gravel processing areas, or purchased from local vendors for delivery. Unprocessed material or "pit-run" dirt and gravel from onsite excavation may be used in the construction of features and for habitat enhancement, using methods that would be continuously monitored for compliance with turbidity standards when in or near the river channel.

All large wood installations would be designed so that local velocities would be safe for navigation during relatively low river flows (less than approximately 2,000 cfs). Natural wood material would be placed in a manner to reduce the chances of hazardous contact with swimmers and boaters. Over time, woody material would collect on the structures to create areas of slower flow, which would direct water flow and, consequently, boaters away from the large wood, any hazard of these structures to people.

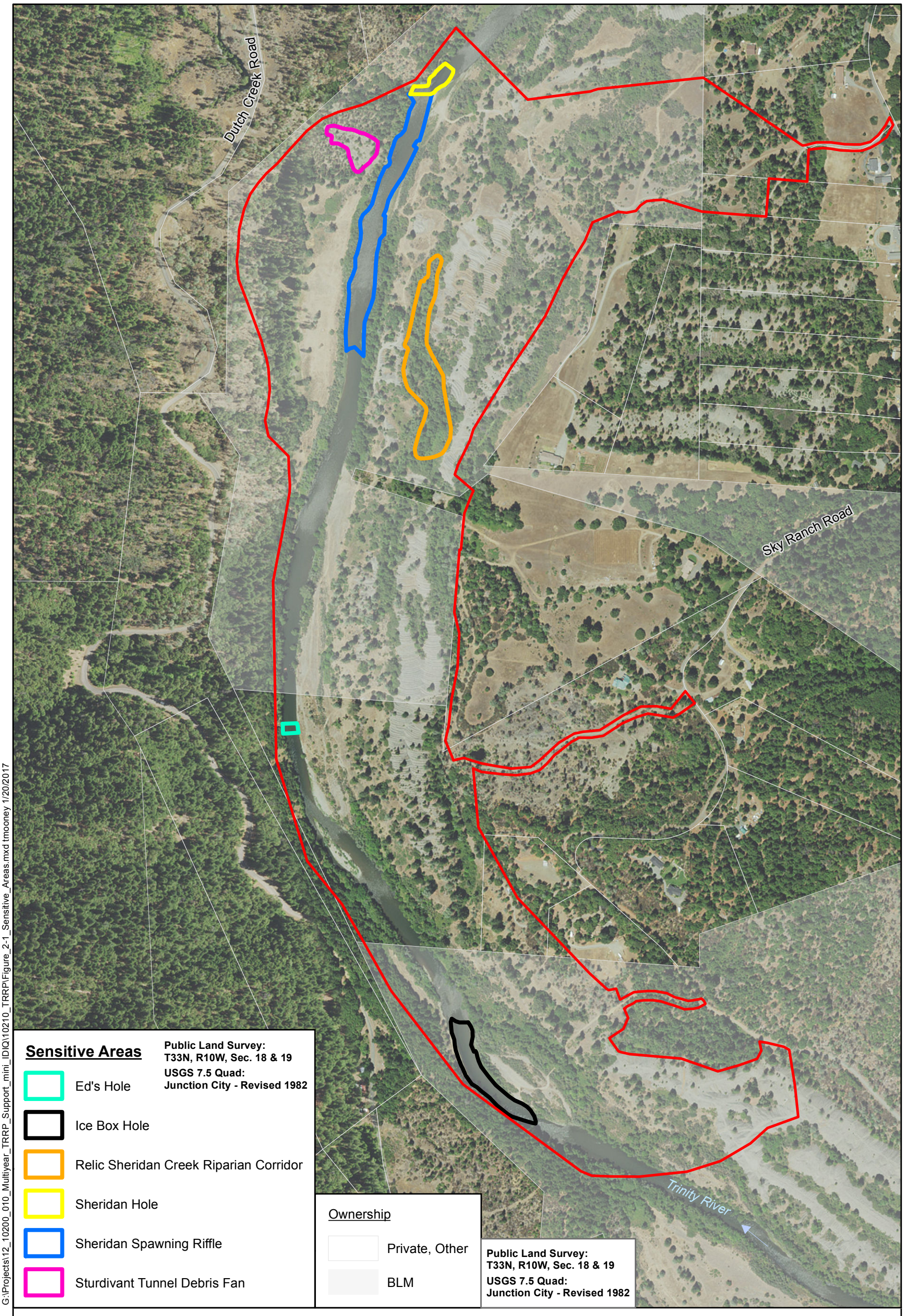
The proposed action would place wood in alcoves to improve the quality of habitat by providing cover for juvenile fish, enhancing roughness and complexity, and increasing shading. Because of uncertainties about the availability, types, shapes, and sizes of the wood and the planned construction methods, the exact amounts and locations of wood placement are not known at this time. Trees, tree tops, and branches for use in constructing large wood structures would be obtained on-site (see Activity A) and/or opportunistically from other lawful sources (e.g., public or private construction areas where clearing has occurred) and delivered to the project area. The final locations and dimensions of wood and large rock placement would be determined in the field based on direction from Reclamation's field engineer.

Activity W (Wetland Complexes – Rearing Ponds)

Activities identified for Activity W were covered in the Master EIR under Activities A, B, C, or D. Ponds would be created off the mainstem Trinity River via excavation to capture groundwater and/or surface run-off. The water holding capability may be enhanced through the use of Beaver Dam Analog (BDA) features similar to those constructed in 2016 at the Bucktail site. The ponds would provide slow backwater refugia during high flow periods and rearing habitat for juvenile salmonid species. Groundwater infiltration and surface water inflow from side channels would supply the ponds with a cold water environment. The existing tree/shrub canopy would be saved during construction to provide food sources, shade, and protection from predation. The ponds would contain deep pools that have a connection to groundwater to supply needed cold water. Existing vegetative cover and revegetation planting would be incorporated into the ponds for food productivity.

2.1.13 Design Considerations

Early in the planning process, the TRRP identified six sensitive features that are critical with respect to design considerations (e.g., Ice Box Hole, Sheridan Spawning Riffle). Throughout this chapter, these features are referenced with respect to avoiding and/or protecting them to ensure that the overall design objectives are met. These features are illustrated on Figure 2-1.



G:\Projects\12_10200_010_Multiyear_TRRP_Support_mini_IDIQ\10210_TRRP\Figure_2-1_Sensitive_Areas.mxd tmooney 1/20/2017

Prepared by:

North State Resources, Inc.
5000 Bechelli Lane, Suite 203
Redding, CA 96002
(530) 222-5347

N

0 325 650 1,300 Feet

PLSS Mount Diablo Base and Meridian
California State Plane Zone 1, NAD83 Feet

TRINITY RIVER RESTORATION PROGRAM
Deep Gulch and Sheridan Creek Rehabilitation Sites

Figure 2-1
Deep Gulch and Sheridan Creek Sensitive Areas

This page intentionally left blank .

The design teams worked closely with Reclamation and BLM cultural resources staff to avoid a number of dredge tailing deposits that provide important information on the mining history along the Trinity River. By combining the Deep Gulch and Sheridan Creek sites into one project, there is an reduction in the amount of dredge tailing features that would be impacted. Specifically, activity areas DG U-3 and DG U-4 are not currently planned to receive excavated material.

Initial design of the Deep Gulch rehabilitation site was assigned to the TRRP Federal Design Group, and design of the Sheridan Creek rehabilitation site was assigned to the Yurok Tribe; a design report was prepared for each site by the design teams. Preparation of these reports entailed a review of existing conditions at the site, such as vegetation communities, flow patterns, fluvial geomorphology, soil conditions and characteristics, and other physical characteristics; the reports also included an evaluation of future desired conditions, which considered the success of rehabilitation activities at other sites along the Trinity River and the opportunities available at the two sites. Copies of these design reports are available on the TRRP data portal (odp.trrp.net).

The design teams later worked together to develop final designs for these sites that were responsive to the following physical, biological, and riparian objectives:

- Physical Objectives
  - Promote dynamic river processes
  - Increase functional floodplain area
  - Reduce wood storage deficit (wood structures and standing inventory)
- Biological Objectives
  - Eliminate the dip in habitat between low flows and 7,150 cfs
  - Double the amount of juvenile fish rearing habitat area–days across the range of critical habitat flows during the January–June time period
  - Encourage stream-type life history characteristics for rearing Chinook juveniles
  - Protect existing high-use spawning riffles above Sheridan Hole
  - Enhance existing amphibian habitat
  - Create perennial or seasonal surface water connection to existing and new off-channel water features
- Riparian Habitat Objectives
  - Minimize impacts to existing multi-story riparian vegetation and cottonwoods
  - Increase over existing conditions the riparian vegetation biomass and abundance in the tree, shrub, and herb layer along design features

— Increase the number of trees (especially cottonwood) that could supply logs larger than 24 inches diameter at breast height to the river

— Increase native species richness/abundance on surfaces that will be open and greater than 7 feet above the lowest groundwater of the year

2.1.14 Rehabilitation Activities

The proposed rehabilitation activities in the project area are described below. Table 2-1 summarizes the proposed activities by activity area, and Figure 2-2 illustrates the locations of each activity area in the project area. As the table shows, each activity area has been assigned a unique alphabetic label that corresponds to the type of activity area and the site name.

The activity areas include riverine areas, upland areas, and construction support areas. While these areas are intended to cover the full range of activities, the actual area that would be treated will typically be smaller. Riverine areas are labeled with an R preceding the site number (e.g., R-1, R-2); upland areas are labeled with a U (e.g., U-1, U-2); in-channel work areas are labeled with an IC; construction staging/contractor use areas are labeled with a C; access roads are labeled with an A; wetland/pond areas are labeled with a W; and temporary crossings are labeled with an X. Activities at Deep Gulch are labeled with "DG," and activities at Sheridan Creek are labeled with "SC." These labels are used throughout this document.

Table 2-1. Overview of Activity Areas at Deep Gulch and Sheridan Creek Rehabilitation Sites

Activity Area[a]	Primary Activity	Activity/ Treatment Area[b]	Earthwork (CY)[c]	Fill (CY)[c]
DG IC-1	Main channel	0.48 ac	3,565	–
DG IC-2	Bars and islands in channel *	0.53 ac	–	1,250
DG IC-3	Wood structure *	0.06 ac	200	245
DG IC-4	Wood structure *	0.02 ac	70	85
DG IC-5	Wood structure *	0.14 ac	400	525
DG IC-6	Wood structure *	0.04 ac	165	200
DG IC-7	Wood structure *	0.02 ac	130	160
DG IC-8	Wood structure *	0.03 ac	105	130
DG IC-9	Wood placement	0.08 ac	–	–
DG IC-10	Wood placement	0.13 ac	–	–
DG IC-11	Wood placement	0.07 ac	–	–
SC IC-1	Main channel – realignment	1.56 ac	11,469	1,045
SC IC-2	Bars and islands – gravel bar/alcove *	1.11 ac	734	5,534
SC IC-3	Wood structure *	0.04 ac	424	–
SC IC-4	Bars and islands – transverse riffle *	0.14 ac	–	458
SC IC-5	Main channel – realignment	1.16 ac	5,932	1,185
SC IC-6	Bars and islands – gravel bar/alcove *	0.52 ac	293	2,303
SC IC-7	Wood placement	0.46 ac	–	–

Table 2-1. Overview of Activity Areas at Deep Gulch and Sheridan Creek Rehabilitation Sites

Activity Area[a]	Primary Activity	Activity/ Treatment Area[b]	Earthwork (CY)[c]	Fill (CY)[c]
SC IC-8	Wood structure *	0.03 ac	–	–
SC IC-9	Wood structure *	0.05 ac	–	–
SC IC-10	Wood structure – hydraulic structure *	0.03 ac	–	–
	IC Subtotal =	**6.7 ac**	**23,487 CY**	**13,120 CY**
DG R-1	Banks and floodplains – floodplain *	3.99 ac	23,300	–
DG R-1a	Banks and floodplains – floodplain	0.02 ac	–	15
DG R-2	Banks and floodplains – channel *	0.25 ac	700	–
DG R-3	Side channel	0.46 ac	2,390	15
DG R-4	Banks and floodplains – floodplain *	1.67 ac	7,600	–
SC R-1	Banks and floodplains – floodplain construction *	0.39 ac	114	2,206
SC R-2	Banks and floodplains – floodplain construction*	0.09 ac	44	362
SC R-3	Banks and floodplains – floodplain construction	0.16 ac	78	337
SC R-4	Banks and floodplains – floodplain construction	0.24 ac	–	801
SC R-5	Banks and floodplains – floodplain transition	0.03 ac	22	12
	R Subtotal =	**7.3 ac**	**34,248 CY**	**3,748 CY**
SC W-1	Constructed wetland – ponds and riparian floodplain complex *	0.92 ac	7,128	45
SC W-2	Constructed wetland – ponds and riparian floodplain complex *	1.26 ac	8,953	75
SC W-3	Constructed wetland – ponds and riparian floodplain complex *	1.17 ac	8,717	34
SC W-4	Constructed wetland – enhance existing wetland drainage *	0.10 ac	220	6
SC W-5	Constructed wetland – ponds and riparian floodplain complex *	1.46 ac	11,471	26
	W Subtotal =	**4.91 ac**	**37,489 CY**	**1,186 CY[d]**

Table 2-1. Overview of Activity Areas at Deep Gulch and Sheridan Creek Rehabilitation Sites

Activity Area[a]	Primary Activity	Activity/ Treatment Area[b]	Earthwork (CY)[c]	Fill (CY)[c]
DG A-1	Temporary access	0.88 ac	–	–
DG A-2	Temporary access	0.63 ac	–	–
DG A-3	Temporary access	0.16 ac	–	–
DG A-5	Temporary access	0.15 ac	–	–
DG A-6	Temporary access	0.21 ac	–	–
DG A-7	Temporary access	0.09 ac	–	–
DG A-9	Existing access	0.89 ac	–	–
SC A-1	Temporary access	0.87 ac	–	–
SC A-2	Existing access	0.33 ac	–	–
SC A-3	Existing access	0.29 ac	–	–
SC A-4	Temporary access	0.14 ac	–	–
SC A-5	Temporary access	0.33 ac	–	–
SC A-6	Existing access	0.21 ac	–	–
SC A-7	Existing access	1.06 ac	–	–
SC A-10	Existing access	0.15 ac	–	–
	A Subtotal =	**6.39 ac**	**–**	**–**
DG C-1	Contractor use area, gravel processing (parking area post-construction)	1.65 ac	–	–
DG C-2	Contractor use area	3.49 ac	–	–
DG C-3	Contractor use area	0.62 ac	–	–
DG C-4	Contractor use area	0.40 ac	–	–
DG C-5	Contractor use area	0.36 ac	–	–
DG C-6	Contractor use area	1.14 ac	–	–
SC C-1	Contractor use area	1.14 ac	–	–
SC C-2	Contractor use area	0.38 ac	–	–
SC C-3	Contractor use area	0.30 ac	–	–
SC C-4	Contractor use area	1.18 ac	–	–
SC C-5	Contractor use area	1.38 ac	–	–
SC C-6	Contractor use area	0.34 ac	–	–
SC C-7	Contractor use area	0.64 ac	–	–
SC C-8	Contractor use area	0.93 ac	–	–
SC C-9	Contractor use area	0.46 ac	–	–
SC C-10	Contractor use area	0.40 ac	–	–
SC C-11	Contractor use area	1.83 ac	–	–
SC C-12	Contractor use area	3.13 ac	–	–
SC C-13	Contractor use area	1.03 ac	–	–
	C Subtotal =	**21.80 ac**	**–**	**–**

Table 2-1. Overview of Activity Areas at Deep Gulch and Sheridan Creek Rehabilitation Sites

Activity Area[a]	Primary Activity	Activity/ Treatment Area[b]	Earthwork (CY)[c]	Fill (CY)[c]
DG U-1	Upland fill, gravel processing *	2.36 ac	–	26,865
DG U-2	Upland fill *	0.81ac		2,410
DG U-3	Upland fill [e]	0.94 ac	–	–
DG U-4	Upland fill *	1.41 ac	–	–
SC U-1	Upland drainage – rerouting *	0.37 ac	361	10
SC U-2	Upland fill – spoils area *	1.48 ac	–	37,581
SC U-3	Upland fill – spoils area [f] *	0.53 ac	–	–
SC U-4	Gravel processing – tailings *	0.57 ac	20,295	–
SC U-5	Upland fill, gravel processing – spoils area *	3.36 ac	–	14,324
	U Subtotal =	**11.02 ac**	**20,656 CY**	**81,087 CY**
DG X-1	Temporary river crossing	0.10 ac	–	–
DG X-2	Temporary river crossing	0.05 ac	–	–
SC X-1	Temporary river crossing – upstream	0.27 ac	–	450
SC X-2	Temporary river crossing – downstream	0.43 ac	–	–
	X Subtotal =	**0.85 ac**	**–**	**450 CY[g]**

a DG = Deep Gulch; SC = Sheridan Creek; IC = in-channel work area; R = riverine work area; U = upland activity area; C = construction staging/contractor use areas; A = access roads; X = temporary river crossing; W = wetlands.

b Area calculated from geographical information system (GIS) data; ac = acre.

c Provided by TRRP; CY = cubic yard.

d In addition to alluvial materials, approximately 150 logs (35 feet in length) will be used to construct wetland infiltration structures.

e Would only be used in the event SC U-5 is unavailable.

f Would only be used if SC U-2 has inadequate space.

g These crossings will also be used to transport woody materials (logs and/or slash) to activity areas on river left.

* Revegetation after construction

The implementation of the proposed action would require placement of alluvial materials at activity areas throughout the project area. The size of alluvial materials necessary to construct the in-channel, floodplain, and wetland/riparian features varies, depending on the function and location of the activity areas. Table 2-2 describes the size classes of processed alluvial materials called for by the design teams that would be excavated and processed on lands managed by BLM. At activity areas DG-U-1 and SC U-4), the size and location were revised based on the outcome of cultural resource investigations and subsequent negotiations with BLM to ensure that representative dredge tailings features are retained. Dredge tailings will be used as a source of alluvial material. In addition to processed materials, additional alluvial material will be used as fill without processing (i.e., pit run).

Table 2-2. Material Types

Material	Description	D_{50} (inches)	D_{90} (inches)	D_{Max} (inches)	Percent Fines*
Clean gravel and cobble (CGC)	Gravel and cobble between 0.5 and 6 inches intermediate diameter	2	5	6	0
Modified pit run (MPR)	Excavated material processed to remove excess fines	2-3	5-6	10-12	< 20
Cobble and small boulder (CSB)	Cobble and small boulders between 5 and 12 inches intermediate diameter	7-9	10-12	14	0
Sorted Cobble (SC)	Medium cobble between 4 and 8 inches intermediate diameter	5-7	7-8	10	0

*Fines are defined as material less than 0.5 inch in diameter.

Table 2-3 illustrates the volume of alluvial material anticipated to be processed for each site, by size class.

Table 2-3. Processed Material by Size Class

Site	CGC (Cu. Yd.)	MPR (Cu. Yd.)	CSB (Cu. Yd.)	SC (Cu. Yd.)
Deep Gulch	1,000	815	670	15
Sheridan Creek	3,836	4,080	1,747	0
Total	**4,836**	**4,895**	**2,417**	**15**

Note: About 9,600 yards of dredge tailing deposits will be excavated and processed from activity area SC U-4.

The implementation of the proposed action would require a large amount of large wood and slash for proposed activities in a variety of locations. In addition to large wood structures that incorporate the pin logs, root wads, and whole trees proposed at a number of locations (e.g., DG IC-3, SC IC-3), additional wood would be incorporated into a number of activity areas (e.g., IC-6, SC W-1). Slash and/or chips from on-site and off-site sources[1] would be used to increase site productivity, provide effective ground cover on disturbed areas, and function as cover habitat for terrestrial organisms. Table 2-4 illustrates the type and amounts of wood and slash necessary to implement the proposed action. The primary on-site sources of wood include upland material placement areas (e.g., SC U-2 and SC U-3) and riverine excavation areas (e.g., DG R-1 and DG-R-4).

[1] All material from off-site sources will be acquired by Reclamation from public lands (as authorized by BLM) and private parcels in Trinity County.

Table 2-4. Woody Material Used for Rehabilitation Activities

Site	Whole Trees Harvested – On-Site (#)	Trees/Logs (Structural) (#)	Trees/Logs (Habitat) (#)	Slash (Cu. Yd.)
Deep Gulch	120	120	170	1,300
Sheridan Creek	200	90	110	900
Total	**320**	**210**	**280**	**2,200**

Notes: Whole trees are approximately 75 feet in length. Logs range from 10 feet to 35 feet in length. An additional 150 logs (35 feet in length) acquired from off-site sources would be used in the construction of the wetland complexes (e.g., SC W-1) at the Sheridan Creek site.

Deep Gulch Rehabilitation Activities

At the Deep Gulch rehabilitation site, the design focus would be on modifying the channel of the Trinity River to restore riverine processes and enhancing the floodplain through restoration of native riparian vegetation and excavation of terraces and floodplain surfaces. Critical features considered in the design process include Ice Box Hole and Ed's Hole (see Figure 2-1), historic dredge tailing deposits, public river access, and adjacent residences. Most activities would take place in the upstream (southern) half of the site. In-channel activities would include bank excavation (DG IC-1); creation of a bar (DG IC-2 and IC-3); and installation of woody material, consisting of individual pieces of wood, wood jams (primarily for habitat), and wood structures (primarily for hydraulic function; DG IC-3 through IC-11). Riverine activities would include lowering the floodplain (DG R-1, R-2, and R-4), filling a swale (DG R-1A), and creating a side channel (DG R-3). Additional details on these activities are presented below.

Floodplain Modifications (DG R-1 and R-1A)

The DG R-1 activity area encompasses approximately 3.99 acres on the right bank (east side) of the river at the upstream (southern) end of the rehabilitation site. Existing terrace and floodplain surfaces would be lowered by up to 7 feet to create a lower floodplain composed of two main topographic structures, requiring the excavation of approximately 21,200 cubic yards of material. The larger of the two structures would consist of a surface that slopes downvalley and away from the river toward a swale (DG R-1A) that drains into an alcove at the downstream end of the floodplain. The edge of this surface nearest the river would remain at its existing elevation. Inundation of the floodplain would begin at moderate flows from backwater entering from the alcove outlet at its downstream end. Downstream flow over the floodplain would increase at discharges greater than about 4,500 cfs and would overtop the surface at its upstream end. The upstream end would remain at the existing elevation so that construction of this feature does not alter flow conveyance outside the main channel. The other topographic structure would be a smaller excavation that allows backwater to inundate another portion of the constructed floodplain at moderate flow levels.

The floodplain at the DG R-1 activity area would provide slow water habitat that increases in area with an increase in discharge. The area of inundated habitat would cover nearly the entire floodplain area as discharge approaches bankfull stage. However, limited flow conveyance would ensure that the area inundates primarily from its downstream end, keeping overbank flow velocities relatively low. Limited overbank conveyance would also ensure that sediment transport capacity in the main

channel is maintained. Overtopping of the crest at the upstream end of the floodplain at higher discharges would allow periodic flushing of fines from the floodplain swales and maintain the downstream connectivity. The activity area would eventually provide wood and organic material as well as trophic production to the aquatic ecosystem, as well serving as a high-flow refugia with abundant cover. The habitat value of the floodplain is expected to increase as it becomes vegetated through natural recruitment and planting. Some bank erosion may occur along the floodplain adjacent to the DG IC-1 channel expansion (west side of DG R-1), but other major topographic changes would not be expected.

The DG R-1A activity area is at the downstream end of DG R-1 and encompasses approximately 0.02 acre. Approximately 15 cubic yards of coarse permeable fill would be placed in the swale at this activity area. The bottom of the swale, which is 10 to 15 feet wide, would be filled with 1 to 2 feet of fill to make it even with the ground on either side of the swale over a linear distance of about 15 feet. The purpose of the fill is to limit overbank flow velocities in the swale. Modification of the floodplain at DG R-1 would allow water from the main channel to enter the swale at a lower discharge than occurs under existing conditions. Flow velocities in the swale during moderate floods would therefore be larger than under existing conditions. The fill in the swale would enable surface flow to enter the swale when discharges are between 2,500 and 6,000 cfs, while ensuring that hyporheic flow continues unrestricted

Diagonal Bar Complex Creation (DG IC-1, IC-2, R-2, and IC-3)

The DG IC-1, IC-2, R-2, and IC-3 activity areas are just west of DG R-1 in the upstream (southern) portion of the rehabilitation site. These activity areas encompass approximately 1.32 acres. Both banks would be excavated to increase the bankfull channel width from about 175 feet to about 215 feet. A large constructed bar would be created in the main channel, and a smaller bar and wood structure would be incorporated into the left bank. The excavation of approximately 3,565 cubic yards from the right bank at DG IC-1 would lower the existing floodplain surface to a level about 2 feet below the baseflow water surface, matching the existing bed elevation at its downstream end. The excavation of approximately 700 cubic yards from the left bank at DG R-2 would lower the existing floodplain to a level slightly above the baseflow water surface elevation. A medial bar would be constructed at DG IC-2 by placing approximately 1,250 cubic yards of gravel and cobble fill to form the crest of the diagonal complex. The medial bar would be built so that it would be fully inundated at flows near 2,500 cfs. At DG IC-3, a bar and wood structure, consisting of approximately 245 cubic yards of gravel, cobble, small boulders, and wood, would extend about 40 feet into the channel from the left bank downstream of DG R-2. Approximately 200 cubic yards of material would be excavated at DG IC-3 to create the bar. Together with the bar at DG IC-2, they would create a diagonal structure that extends from upstream right to downstream left and would be cross cut by a pair of channels along the toe of each bank. The hydraulic control that regulates flow into the right channel would be approximately three times wider and about 1 foot deeper than the control regulating flow into the left channel, such that more than 90 percent of the baseflow discharge would be directed to the right of the medial bar.

The diagonal bar complex is intended to greatly increase local hydraulic and habitat diversity over a wide range of flows. At lower flows, the medial bar would emerge, which would double the length of emerged edge habitat in the area. More than 0.15 acre of new eddy habitat would be created. At

higher flows, the medial bar would submerge and would provide cover, slower flowing water, and large eddies that span about 0.15 acre. The diagonal bar complex would also create the potential for increased bed scour and pool formation over an area of the bed covering at least 0.15 acre near the downstream end of DG R-1. The habitat value provided by the medial bar would increase as riparian vegetation becomes established on its surface. Topographic and ecological complexity is also expected to increase as high flows reshape the bar, bed, and banks. Modest bank erosion that further widens the channel is likely.

Side Channel Creation (DG R-3 and IC-4)

The DG R-3 and IC-4 activity areas are just downstream (north) of DG R-2 and IC-3 on the left bank of the river. They encompass approximately 0.48 acre.

A baseflow side channel would be created at DG R-3, and a wood structure that extends 15 feet into the main channel immediately downstream of the side channel inlet would be installed at DG IC-4. The inlet to the side channel would be cut through the riparian fringe about 200 feet downstream of the new diagonal bar complex. The final elevation of the inlet would allow surface water flow in the side channel at a rate of about 15 cfs during baseflow periods. In addition, the inlet would be over-excavated during construction and backfilled with longitudinally oriented large wood and rock to allow hyporheic flow into the side channel regardless of whether surface water connectivity is maintained in the future. An estimated 2,410 cubic yards of material would be excavated to create the side channel, and about 15 cubic yards of rock and wood would be placed along the channel. Flow into the side channel would continue through existing low areas and sections of excavated channel into an alcove that grades into the mainstem channel bed near the center of the site. The wood structure adjacent to the side channel at DG IC-4 would contain approximately 85 cubic yards of coarse fill and wood, and approximately 70 cubic yards of material would be excavated to install the wood structure.

The new side channel is intended to provide additional rearing habitat at low and intermediate flows. The wood structure along the side channel is intended to help prevent clogging of the side channel inlet and would provide a small amount of additional cover and slow water habitat. The side channel would provide rearing habitat indefinitely. The inlet design incorporates hyporheic flow to ensure future function even if the inlet aggrades.

Wood Jam Installation (DG IC-5)

The DG IC-5 activity area is on the right bank of the river across from DG R-3 and encompasses approximately 0.14 acre. A wood jam would be installed at this activity area. It would extend about 40 feet into the channel from the right bank and would contain approximately 525 cubic yards of gravel, cobble, small boulders, and wood. An estimated 400 cubic yards of material would be excavated to install the wood jam. The top elevation of the jam would be constructed approximately equal to the water surface elevation at the design discharge of 8,500 cfs. The back of the structure (the side away from the river) would be anchored with vertical posts[2], which would not be keyed far

[2] Anchoring may include the use of pile-driving equipment at one or more activity areas.

into the floodplain. This would allow flood flows to potentially scour the floodplain behind the structure, increasing complexity and possibly creating additional aquatic habitat.

The wood jam is intended to increase hydraulic and habitat diversity by causing bed scour at its base, creating an eddy in its lee, and providing direct cover habitat. This feature is located in an area that currently can be described as a planar bed that gradually slopes up toward the next hydraulic control. Zones of scour and deposition associated with the jam would shorten the length of bed lacking local topographic relief. High flows would scour the bed near the leading edge of the jam, and deposition of fine gravel and sand is expected in portions of the eddy zone. The jam is intended to remain in place for 10-20 years.

Floodplain Modifications and Wood Jam Installation (DG R-4, IC-6, IC-7, and IC-8)

The DG R-4, IC-6, IC-7, and IC-8 activity areas are on the right bank of the river near the downstream or northern portion of the rehabilitation site. These activity areas encompass approximately 1.76 acres. At the DG R-4 activity area, the floodplain surface would be lowered, requiring the excavation of approximately 7,600 cubic yards of material. The upstream third of the excavated floodplain would be constructed so that it will inundate at flows as low as 2,000 cfs. A rise in ground elevation by about 2 feet at the downstream end of this low region (i.e., near the center of DG R-4) would keep flow conveyance in the area very small until the higher area in the middle of the activity area is overtopped at flows greater than 2,500 cfs. A wood jam would be installed at DG IC-6 on the existing bank immediately downstream of the intersection between the low floodplain and the main channel. The top elevation of the wood jam would be the same as the existing top of the bank. The wood jam would consist of approximately 200 cubic yards of rock and wood fill, and approximately 165 cubic yards of material would be excavated to install the wood jam.

The downstream two-thirds of the excavated floodplain would slope downstream but away from the river toward a swale that empties into a series of three alcoves, similar to the floodplain modifications at DG R-1. Existing terrace and floodplain surfaces would be lowered to varying degrees. Typical excavation depths would be less than 3 feet, but larger cut depths of up to 6 feet would be required where the alcove at the far downstream end grades into the existing channel bed. Inundation of this downstream section of floodplain would begin at moderate flow by backwater entering the swale from the alcove. The swale extends upstream along the distal edge of the floodplain until it grades into the broad low area in the upstream third of DG R-4. Three sections of existing bank between the alcoves would remain unexcavated, increasing the topographic complexity of the surface. A wood jam would be installed at DG IC-7 on the existing bank at the upstream edge of the middle of the three unexcavated areas. The top elevation of the wood jam would be near the existing top of bank. The wood jam would consist of approximately 160 cubic yards of rock and wood fill, and approximately 130 cubic yards of material would be excavated to install the wood jam. Another wood jam would be installed at DG IC-8 on the existing bank immediately downstream of the alcove. The top elevation of the wood jam would also be similar to the existing top of bank. The wood jam would consist of approximately 130 cubic yards of rock and wood fill, and approximately 105 cubic yards of material would be excavated to install the wood jam.

The upstream third of the floodplain at DG R-4 would inundate at very low discharge levels, and the lack of downstream gradient would keep flow velocities very low. This floodplain is expected to provide abundant high-quality rearing habitat. The downstream two-thirds of the floodplain at DG R-

4 is intended to function similar to the floodplain at DG R-1; more habitat would become available with increasing discharge due to backwatering from downstream. The entire excavated area would be inundated at discharges near 4,500 cfs. The unexcavated portions of bank in this area would create local eddies, promote local scour, and provide riparian cover. All three of the wood jams associated with this floodplain are also intended to promote local scour and hydraulic diversity. Scour at the toe of the wood jam at DG IC-6 is specifically intended to maintain a low gap in any natural levee that might deposit along the floodplain margin so that the floodplain continues to inundate at low discharge levels in the future. The wood jam at DG IC-8 is intended to split the flow draining toward the main channel from the downstream part of the floodplain, potentially causing incision of an additional alcove on the right side of the wood jam. The entire floodplain would eventually provide wood and allochthonous trophic production to the aquatic ecosystem, as well serve as a high-flow refugia with abundant cover. The habitat value of the floodplain would increase as it becomes vegetated through natural recruitment and planting. Some bank erosion may occur adjacent to the main channel, but other major topographic changes are not expected.

Woody Materials Installation (DG IC-9, IC-10, and IC-11)

The DG IC-9 and IC-10 activity areas are along the left and right banks, respectively, near the DG R-3 and DG IC-5 activity areas in the middle portion of the rehabilitation site. The DG IC-11 activity area is on the right bank near the DG R-4 activity area. These activity areas encompass approximately 0.28 acre. Woody debris would be installed in the baseflow channel to provide immediate cover habitat and a substrate for primary and macroinvertebrate production. Approximately 214 cubic yards of slash and 61 large wood pieces would be placed along the river at these activity areas.

Sheridan Creek Rehabilitation Activities

At the Sheridan Creek rehabilitation site, the design focus is on modifying the channel of the Trinity River to restore riverine processes and enhancing the floodplain through creation of multiple wetland/pond complexes. Critical features considered in the design process include Sheridan Hole, Sheridan Spawning Riffle, Relic Sheridan Creek Riparian Corridor, and the Sturdivant Tunnel Debris Fan. In-channel activities would include creation of a meander complex (SC IC-1, IC-2, IC-4, IC-5, and IC-6) and installation of woody material, consisting of wood placement as individual pieces, wood jams (primarily for habitat), or wood structures (primarily for hydraulic function; SC IC-3 and IC-7 through IC-10). Riverine activities would include elevating the floodplain (SC R-1 and R-2) and constricting the floodplain (SC R-3 and R-4). At SC R-5, a notch would be created through the riparian berm to encourage formation of a high-flow scour channel around the log jam at SC IC-10. Wetland activities include creating wetland/pond complexes along both sides of the river and connecting them to the river (SC W-1 through W-5). Additional details of these activities are presented below.

Meander Complex (SC IC-1, IC-2, IC-4, IC-5, IC-6, R-1, and R-2)

The SC IC-1, IC-2, IC-4, IC-5, R-1, and R-2 activity areas are adjacent to one another along the main channel and left bank of the river in the upstream (southern) end of the rehabilitation site. These activity areas encompass a total of approximately 4.97 acres. A meander complex would be constructed at these activity areas that would include two constructed bars and alcoves (SC IC-2 and

IC-6), excavated bends with scour pools and side slope transitions (SC IC-1 and IC-5), one constructed riffle (SC IC-4), and two raised floodplains (SC R-1 and R-2). Overall, the meander complex would increase sinuosity and hydraulic complexity in this reach to create a diverse suite of habitats. The meander complex is also intended to increase shear stress along the right edge of SC IC-5 (an old dredger tailings pile) to promote bank erosion and to provide additional sediment for transport and deposition downstream.

The meander complex would encompass about 1,050 feet of the river and would end about 230 feet just upstream of Sheridan Hole, one of the most important and highly used spawning riffles on the mainstem Trinity River. The location and length of the meander complex would be constrained upstream by the valley wall on river left and preservation of the spawning riffle downstream. The separation between the complex and spawning riffle is important in order to minimize changes to the velocity and shear stress fields across the existing spawning riffle where redds are typically located. Overall, the meander complex is expected to be self-maintaining, with minor adjustments to the channel and planform dimensions following high flows.

At the SC IC-2 and IC-6 activity areas, bars and alcoves would be constructed to adjust the river meander. The bars would have variable flow widths ranging from 84 feet at baseflow to a bankfull width of 200 feet. Gravel, cobble, excavated materials, and boulders would be obtained from the U-4 and U-5 activity area and placed in the river to create the bars. An estimated 2,615 cubic yards of clean gravel and cobble would be placed below the 450 cfs water surface elevation at SC IC-2, and approximately 2,619 cubic yards of well-graded excavated materials and 300 cubic yards of cobbles and small boulders would be placed above the 450 cfs water surface elevation. An estimated 542 cubic yards of clean gravel and cobble would be placed below the 450 cfs water surface elevation at SC IC-6, and approximately 1,461 cubic yards of well-graded excavated materials and 300 cubic yards of cobbles and small boulders would be placed above the 450 cfs water surface elevation. The maximum size of added substrate (excluding boulders that vary between 3 and 6 feet in diameter) would be 12 to 14 inches in diameter, consistent with the existing range of substrate size that allows for long-term geomorphic processes. The proposed substrate for the constructed bars is expected to remain semi-stable under the modeled shear stress. In addition, alcoves would be excavated to create shallow/slow water habitat on the backside of the constructed bars. An estimated 734 and 293 cubic yards of material would be excavated from the SC IC-2 and IC-6 activity areas, respectively, and transported to one of the upland activity areas. Once constructed, large wood would be incorporated into the bars, and the surface of these bars would be planted with native vegetation to reduce flow velocity and promote depositional processes.

The SC IC-2 bar is expected to maintain its form as shear stresses across the bar would be low at all flows. Shear stress in the alcove would also be low, and the alcove is expected to fill in over time. Overbank flows across the backside of SC IC-2 may form an incised channel leading into the alcove. These overbank flows would help maintain the alcove. It is unlikely that this incised channel would be cut off because the shear stress would be low. The substrate of the SC IC-6 bar is sized to withstand the modeled shear stress and allow the bar to persist and redirect mainstem flows towards river right. The bar is expected to deflate somewhat as an armor layer develops. The shear stresses across the top of the SC IC-6 bar should be sufficient to maintain an incised channel and alcove on the backside of the bar.

At the SC IC-1 and IC-5 activity areas, the river banks would be excavated to modify the bend and create scour pools and side slope transitions. An estimated 11,469 cubic yards of material would be excavated from the SC IC-1 activity area, and an estimated 1,045 cubic yards of fill (gravel, cobble, and boulders) would be placed in the activity area. An estimated 5,932 cubic yards of material would be excavated from the SC IC-5 activity area, and an estimated 1,185 cubic yards of fill would be placed in the activity area. The excavated material would be transported to one of the upland activity areas for processing and/or disposal. Boulders[3] would be added to the deeper portions of the activity areas to increase hydraulic complexity. The outer bank of SC IC-5 is expected to erode over time, widening the channel and creating a more gradual transition back to the original downstream channel. The bank erosion process is expected to reach quasi-equilibrium without substantial lateral channel migration (i.e., without corresponding growth of the SC IC-6 bar), although lateral migration is desirable if it occurs.

A riffle would be constructed at the SC IC-4 activity area, which is entirely in the main channel. Approximately 229 cubic yards of clean gravel and cobble and 229 cubic yards of cobbles and small boulders from the U-4 or U-5 activity area would be placed at the SC IC-4 activity area. The substrate size would be slightly larger than the existing bed substrate, but no bigger than 12 to 14 inches in diameter for the gravel and cobble. Boulders would be 3 to 6 feet in diameter. The transverse bar at SC IC-4 would connect the bar at SC IC-2 to the bar at SC IC-6 and would adjust its size and elevation to accommodate the new channel hydraulics.

The floodplain on river left would be raised at activity areas SC R-1 and R-2 to minimize flanking associated with the new meander complex. This would maintain flow conveyance in the mainstem channel and minimize overbank bypass flows. Floodplain modifications would include some excavation of the banks and placement of fill, primarily gravel and cobble. Woody material may also be incorporated opportunistically into these activity areas. At SC R-1, an estimated 114 cubic yards of material would be excavated, and an estimated 2,206 cubic yards of material would be placed in the activity area; the fill material would preferentially come from excavation of native alluvium at the SC W-1 and W-2 activity areas. If the excavated native alluvium is too small, the fill would need to be imported from U-4 or U-5 or from a local commercial source. At SC R-2, an estimated 44 cubic yards of material would be excavated, and an estimated 362 cubic yards of material would be placed in the activity area. Any excess or unusable excavated material would be transported to the SC U-2 or U-3 activity areas.

River Left Wetland Complex (SC W-1, W-2, W-3, U-1, IC-3, R-3, and R-4)

The SC W-1, W-2, W-3, IC-3, R-3, and R-4 activity areas are adjacent to one another on the left bank of the river and extend from the border of SC R-1 and R-2 activity areas about 1,200 feet downstream. These activity areas encompass approximately 3.78 acres. The U-1 activity area consists of an ephemeral stream that conveys seasonal flow onto the existing floodplain on river left, just west of SC W-1. The activity area encompasses approximately 0.37 acre. A wetland/pond complex would be constructed at the SC W-1, W-2, and W-3 activity areas, and the floodplain would be modified at the SC R-3 and R-4 activity areas. The ephemeral stream at the U-1 activity area

[3] The size and number of boulders available from on-site are uncertain. It is expected that some boulder-sized alluvium will be procured from a local commercial source; a commercial pit within several miles of the project area has boulders available.

would be modified to direct flow to the SC W-1 activity area. A large wood jam would be installed at the SC IC-3 activity area, which is between the floodplain modifications proposed at SC R-1 and R-2.

The floodplain and wetland complexes are designed to provide a large area of high-quality rearing habitat across a wide range of flows, as well as off-channel over-summer and over-winter habitat for both fry and presmolt salmonids. Due to the high density of redds in this reach, juvenile fish densities are anticipated to be very high. These complexes would help reduce densities of rearing fish, especially for those migrating into this area. The floodplain and wetland complex is also intended to raise local groundwater levels to promote robust riparian forest growth and enhance riparian and salmonid habitat. In addition, the complex was designed to protect high-quality adult steelhead holding habitat near the SC IC-10 activity area in the downstream portion of the site by keeping overbank velocities low and locating the floodplain outlets of SC W-2 and W-3 upstream of SC IC-10.

Three wetland/pond complexes would be constructed at the SC W-1, W-2, and W-3 activity areas. The ponds would have variable depths: 6 to 8 feet during summer baseflow conditions and as much as 10 to 12 feet when the ponds are inundated during higher flows. Each pond would have side slopes that allow for emergency egress for wildlife. The ponds would be constructed adjacent to existing riparian vegetation to optimize shade and cover, and wood would be placed in the ponds to enhance juvenile rearing habitat. Shade plus groundwater connectivity are expected to maintain water temperatures adequate for fry/juvenile rearing. The small ephemeral channel at the SC U-1 activity area would be redirected to flow into the wetland/pond complex at SC W-1. An existing scrub wetland at SC W-3 would be modified to enhance the functions and values of the wetland/pond complex by conversion of this scrub wetland.

All three wetland ponds would be perennial and would be reliant on a hyporheic connection with the river under base flow conditions (i.e., 450 cfs) based on site-specific groundwater monitoring data collected by members of the design team. The ponds would be graded to collect ephemeral flow emanating from small drainage features along the valley wall. In addition, the SC IC-3 wood jam would be constructed to supply some additional surface and hyporheic water from the mainstem into the SC W-1 pond, while filtering out mainstem sediment. Surface water supplied from the SC IC-3 activity area during base flow conditions is expected to dissipate into the groundwater, elevating the local groundwater table, but would be insufficient to provide a perennial surface water supply to the downstream SC W-2 wetland. If a perennial surface water connection does develop, it would be desirable.

Floodplain swales at the SC W-1, W-2, and W-3 activity areas would provide surface water connections between the wetland ponds and the Trinity River. The swales would be compound features that are 25 feet wide and 1 foot deep, with an inner swale that is 10 feet wide and 2 feet deep. The swales would allow overbank flows to backwater into the wetland ponds when mainstem flows are greater than about 1,200 cfs and would provide fish passage between the wetlands and the river under those conditions. Surface water flow in the floodplain swales is not expected during low-flow conditions due to the groundwater connection at the wetland complex. Riparian floodplains surrounding the wetland complex are designed to progressively inundate between 2,500 cfs and 4,500 cfs to provide rearing habitat and promote natural riparian vegetation recruitment that increases cover and habitat quality over the long term. Side slope transition areas would transition back to the

existing ground surface. The extent of grading necessary to establish the wetland/pond complexes would vary. With the exception of fine sediments that are excavated and stockpiled on site to enhance revegetation efforts on the constructed floodplain, all spoils generated from excavation activities would be transported to the SC U-2 or U-3 activity areas on river left to minimize the number of river crossings. An estimated 25,661 cubic yards of material would be excavated for the wetland/pond complexes, and about 130 cubic yards of specified fill material would be transported across the river from excavations or processing sites in the activity areas on river right for use as backfill at the SC W-1, W-2, and W-3 activity areas.

The SC W-3 wetland and floodplain maintain a minimum buffer distance of 125 feet from the hydraulic mining debris fan on river left at the confluence of Deep Gulch (located immediately upstream of Sheridan Hole). The buffer would prevent the sedimentation of the constructed features from ongoing erosion of the toe of the Sturdivant Tunnel Debris Fan and maintain the existing mainstem outflow connection, preventing outflow and associated sediment from draining into SC W-3. The existing riparian vegetation that separates the mainstem and constructed floodplains would be retained as a buffer between the wetland complex and the existing spawning riffle during high flows. This buffer of riparian vegetation would also act as a sediment filter, promoting sediment deposition on the floodplain where it benefits riparian growth and minimizes deposition in the wetland ponds (extending their life). The SC IC-3 wood jam is also intended to reduce sediment delivery from the mainstem directly into the wetlands. This wood jam would contain various rootwads, logs, whole trees, and slash.

Floodplain constrictions would be established between each wetland complex at the SC R-3 and R-4 activity areas. These constrictions are designed to reduce overbank flow velocities during high-discharge events in excess of 6,000 cfs. The flow paths in and out of the river-left floodplain and wetland complex would work together with the floodplain constrictions to limit overbank flow velocities. The effect would make overbank floodplain flow hydraulically ineffective in order to preserve the existing shear stresses in the mainstem, thereby protecting the existing spawning riffle. Hyporheic connections through SC R-3 and R-4 would be established to increase groundwater exchange between all three wetland ponds. The hyporheic connections would be constructed by over-excavation of a 4-foot-wide trench, placement of cobbles and wood in the bottom to create a porous matrix (i.e., french drain), and backfilling with native material to the design elevations of the surrounding features such that no trench or depression would be visible. An estimated 78 cubic yards of material would be excavated at the SC R-3 activity area, and an estimated 337 and 801 cubic yards of material would be placed at the SC R-3 and R-4 activity areas, respectively. Alluvial materials (e.g., gravel, cobble, boulders) would be excavated and processed from activity areas on river right and transported to river left using the temporary crossings at SC X-1 and X-2.

Riparian planting and natural recruitment would revegetate the floodplains over time to create a robust and diverse riparian forest. Native vegetation from the excavated pond areas (e.g., mugwort) would be salvaged during the initial excavation efforts, and steps would be taken to ensure salvaged plants are available for incorporation into wetland revegetation efforts after grading is completed. Overbank flows are expected to cause some minor changes in the pond and floodplain configuration post construction. The wetland ponds are anticipated to maintain their general depth and volume for many decades because mainstem sediment supply would be restricted by the SC IC-3 feature and the existing riparian vegetation along the mainstem. Over time, the pond bottoms would accumulate

organic matter that could reduce porosity and reduce (but not eliminate) groundwater connectivity. The potential warming effect caused by reduced groundwater connectivity is expected to be offset by development of a riparian forest that provides shade and organic input. Fines would most likely accumulate in the SC IC-3 wood jam, reducing the amount of surface water flowing into SC W-1 over time.

Alternatively, the wood structure at SC IC-3 may degrade over the long term, increasing the amount of overbank flow that may pass into SC W-1. Although improbable, it is conceivable that such overbank flows may convert SC W-1 into a side channel that would also provide a wealth of complex rearing habitat. The SC R-3 floodplain constriction would return potential surface and overbank flows back to the mainstem upstream of the existing spawning riffle to maintain high flow confinement and shear stresses.

Sheridan Creek (SC W-4)

Sheridan Creek and Sheridan Spring are currently disconnected from each other and from the Trinity River as a result of remnant dredger tailings piles. The SC W-4 activity area encompasses approximately 0.1 acre (10 feet wide by 40 feet long) on the east side of the rehabilitation site near Sheridan Spring. At the SC W-4 activity area, a channel would be constructed by excavating approximately 220 cubic yards of material from the adjacent tailings pile to intercept perennial flow from Sheridan Spring and redirect it across an old road surface and through tailings piles to the high-quality, 1,300-foot-long riparian corridor that is associated with a relic reach of Sheridan Creek located between the SC W-4 and W-5 activity areas. Both Sheridan Spring and Sheridan Creek contribute to an elevated groundwater table that supports the riparian corridor. This riparian corridor forms contiguous, gently sloping habitat that connects SC W-4 to W-5 and contains several ephemeral wetlands. It is located between two tailings piles that isolate Sheridan Creek and Sheridan Spring from the mainstem, and a broad terrace near SC W-5 blocks surface water from exiting the riparian corridor. The riparian corridor is shaded with a grassy bottom and maintains moist soil conditions and cooler air temperatures throughout the summer, even in drought years. During wet periods in the winter and spring, water from Sheridan Creek and Sheridan Spring elevate the perched groundwater table, causing the riparian corridor to become ponded for several months at a time. No construction would take place in this riparian corridor to protect the soil profiles, maintain the perched groundwater table, and encourage formation of a perennial surface water connection between Sheridan Spring and the SC W-5 wetland. Over the long term, the constructed channel (SC W-4) is expected to remain very stable because of the perennial source of water emanating from Sheridan Spring.

River Right Wetland Complex (SC W-5)

The SC W-5 activity area is near the northern portion of the rehabilitation site on the right bank of the river. It encompasses approximately 1.46 acres of an elevated floodplain terrace adjacent to high-quality spawning habitat upstream of Sheridan Hole. At this activity area, the floodplain would be lowered and an off-channel wetland would be constructed. The purpose of the wetland complex is to provide high-flow refugia and intermittent access to the off-channel wetland that supports over-summer and over-winter habitat for juvenile salmonids. An estimated 11,471 cubic yards of material would be excavated from the floodplain to create the wetland. During the initial grading, temporary stockpiling of excavated fines will occur for use in site rehabilitation and revegetation efforts. The

excavated material would be transported to the processing/disposal area at the SC U-3 activity area for re-use or disposal.

Fish passage between the mainstem and SC W-5 would be possible when the mainstem flow exceeds approximately 2,500 cfs and the off-channel wetland backwaters. The wetland bottom at SC W-5 would be 8 feet below the mainstem water surface at 450 cfs to facilitate a groundwater connection that maintains a perennial wetland with water temperatures suitable for salmonids. Post construction, new riparian vegetation on the SC W-5 floodplains would provide shade and additional water temperature benefits in the wetland as the vegetation matures. Wood would be added to the floodplain to provide cover.

Excavation of Sheridan Spring at SC W-4 may provide a surface water supply via the relic reach of Sheridan Creek and/or via localized groundwater sources to the wetland at SC W-5. Such additional water supply would be beneficial, but is uncertain. Therefore, the wetland was designed to function without any water supply from Sheridan Spring and would, instead, continue to rely on a hyporheic connection to the mainstem. In the event that flow from Sheridan Spring reaches this wetland, the flow would improve water temperature, increase water supply, and increase the level of ponding and associated riparian and aquatic habitat. Active bars along the right bank of the Trinity River preclude establishment of a perennial connection between SC W-5 and the Trinity River that would be suitable for fish passage under low flows.

*Downstream Wood Jam Complex (SC IC-7, IC-8, IC-9, IC-10, and R-5)**

A wood jam complex would be established along the right bank at the SC IC-7, IC-8, IC-9, and IC-10 activity areas at the downstream end of the rehabilitation site. These activity areas encompass approximately 0.57 acre. The SC IC-7 activity area would provide high-quality rearing habitat, with whole trees anchored into the existing riparian vegetation. The wood jams at SC IC-8 and IC-10 would be on active bars and are intended to increase bar complexity by redirecting water along the backside of the bars to create and maintain scour channels and local deposition, as well as collect and store woody debris being transported during high flow events. Minor excavation along the floodplain at the SC R-5 activity area would initiate formation of a scour channel upslope of SC IC-10 through the existing riparian berm. An estimated 22 cubic yards of material would be excavated from the SC R-5 activity area, which encompasses approximately 0.03 acre. Approximately 12 cubic yards of alluvial material from the project area would be used as backfill along the berm to anchor the wood jam.

Individually, the SC IC-8 and IC-10 wood structures would create local scour and deposition zones on bar surfaces to create bar complexity and a patchier mosaic of riparian vegetation and fish habitat. The wood structures may temporarily collect more wood material from the river during high flows, but would be overtopped too frequently to retain much debris. Local scour and deposition patterns around and downstream of the wood structures would be dynamic over time. The wood structures would not appreciably change the location or the magnitude of shear stress magnitude across the nearby spawning riffles or Sheridan Hole downstream. The SC IC-8 and IC-10 wood structures would emulate natural wood jams and would slowly degrade over time, as well as occasionally collect additional wood. Riparian vegetation would be used in the design and construction of the wood jams to increase the longevity of the wood structures if the vegetation matures before the structures degrade.

The hillslope on river left adjacent to the SC IC-9 activity area is an active fan associated with eroding debris from the construction and use of the Sturdivant Tunnel upslope (See Figure 2-1). The toe of this depositional feature is subject to periodic erosion, resulting in the release of small fan deposits in the mainstem. The wood feature at SC IC-9 would be designed and built consistent with site conditions at the time of construction within an existing fan deposit to mimic a natural slide deposit that contains both wood and sediment. Boulders would also be added to the river in front of the feature. The wood and boulders would increase mainstem complexity next to and downstream of the structure. This wood feature is not intended to capture additional sediment from the eroding mining debris fan. Over time, the wood feature is expected to degrade, and the wood and rocks would mobilize downstream, mimicking a natural small debris flow.

In addition to the activity areas described above, several beaver dam analog (BDA) features would be constructed in conjunction with the wetland complexes on either side of the river. The specific locations of these features will be identified in conjunction with construction activities based on input from regulatory agencies, TRRP biologists, and design team members. These features would allow an adaptive approach to raising water surface elevations at various flows to backwater areas in the newly constructed wetlands. These BDAs would consist of buried posts (12 inches in diameter) that provide a framework for willow cuttings to be woven between the posts. This would regulate water depth in the wetland upstream. The BDA features would be reviewed the first year following construction to determine the level of adjustment necessary to allow high winter and spring flows to pass without obstruction and the ability to reduce the potential for deposition of fine sediment behind them. An adaptive approach would be necessary to successfully achieve riparian and wetland plant success as well as encourage fine sediment deposition outside the low-flow channel thalweg.

2.1.15 Revegetation Activities

The TRRP's goal for revegetation of the Deep Gulch and Sheridan Creek rehabilitation sites is to promote the establishment and growth of a more diverse assemblage of riparian shrubs and deciduous hardwoods with varying ages so that the size, frequency, and distribution of native vegetation would increase in the future. By meeting this goal, the functions and values of native riparian and upland vegetation are expected to increase over time. In addition, the revegetation plan emphasizes the expansion of large conifers and hardwoods that could be naturally recruited as woody material into the mainstem. The revegetation activities described in this section are based on the TRRP's project experience and subsequent yearly monitoring efforts since the first channel rehabilitation site (Hocker Flat) was constructed in 2006.

Revegetation at both the Deep Gulch and Sheridan rehabilitation sites would include preparing planting areas; planting a mixture of wetland, riparian, and upland plant species; and installing plant protection over woody plants after planting (Hoopa Valley Tribe Design Group 2016). A number of the plant species used for revegetation at these sites are used for various purposes by members of the Native American community. Revegetation efforts may also include the use of anadromous salmonid carcasses as a source of supplemental fertilizer in an effort to reintroduce marine nutrients into the riparian ecosystem. The plantings would include plants salvaged from the sites, nursery container stock available from USFS nurseries and or commercial sources[4], live hardwood poles, bareroot trees, and herbaceous plugs. Plant species expected to be incorporated into the revegetation plan for either

[4] All plant materials used in revegetation efforts are acquired in a manner to ensure they are pathogen-free.

site include California brome (*Bromus carinatus*), incense cedar (*Calocedrus decurrens*), sedge (*Carex* spp.), wildrye (*Elymus* spp.), rush (*Juncus* spp.), ponderosa pine (*Pinus ponderosa*), cottonwood (*Populus trichocarpa*), oak (*Quercus* spp.), and willow (*Salix* spp.). Mulch and other tree protection and stabilization devices (e.g., stakes, fencing, cages) would be installed after the planting is done. These devices would be removed once the revegetation efforts are deemed successful by the TRRP, typically within a 3-year period after vegetation is established. Revegetation activities may start during the latter part of construction efforts (e.g., planting and watering as appropriate) and would continue primarily in the wet season (October through March) after final grading and site stabilization measures are completed. Planting and seeding efforts may extend into the year following construction, depending on site and weather conditions. Herbaceous bare root material and hardwood poles would be used if planting occurs in or after November.

The TRRP anticipates that most planting areas would not require watering post project. However, given recent drought years, some intermittent watering of revegetated areas during dry conditions may increase plant survival. Source water for any irrigation efforts will be pumped from the Trinity River consistent with existing riparian water rights available from willing landowners or from the river on public lands as authorized by the BLM. If this subsequent irrigation is needed, gasoline pumps and irrigation equipment would be brought into the site; where vehicle access is limited, irrigation equipment would be brought in using authorized watercraft. Equipment would be used to water plants as needed, stored on site for use during dry periods, or brought in as water demands require. Any irrigation measures would be temporary to improve establishment and survival of vegetation. The decision to implement irrigation measures would be based on site-specific monitoring information (e.g., soil moisture, plant stress) concerning planting areas during or subsequent to initial revegetation efforts. Irrigation measures would likely occur during the first 3 years following initial revegetation efforts. Post-project monitoring may indicate the need for additional irrigation and other measures to ensure successful revegetation. These measures may include weeding, in-planting, and replanting as conditions require.

The revegetation plan at the Deep Gulch rehabilitation site includes approximately 6.8 acres within in six elevation zones; 12.4 acres would be seeded and mulched. Planting zones include emergent wetland (0.8 acre), herbaceous toe zone (1.2 acres), willow (0.5 acre), cottonwood (2.75 acres), transition (1.0 acre), and upland (0.5 acre). Each zone would have different combinations of herbaceous, shrub, and tree species. Plantings in wetland and toe zones would be herbaceous and have approximately 3 feet between plant centers, about 5,500 plants per acre. Plantings in willow, cottonwood, and transition zones would be sedges, shrubs, and trees and have approximately 5 to 8 feet between plant centers, with about 872 plants per acre. Plantings in upland zones would be shrubs and trees and have approximately 10 to 12 feet between plant centers with about 326 plants per acre.

Throughout the Sheridan Creek rehabilitation site, trees, shrubs, forbs, and herbs would be planted immediately alongside select constructed features and islands of remnant riparian vegetation. Cottonwoods and tree willows are target woody riparian species because of their ability to meet the riparian goal in the next 30 to 50 years. Revegetating constructed features (e.g., floodplains, side channels) improves the complexity of aquatic habitats in the 300 cfs to 2,000 cfs range; covers areas where non-native, invasive, and less preferable plant species could grow (i.e., sweet-clover, Bermuda grass, Himalayan blackberry, and narrowleaf willow); and speeds the recovery of activity areas. Revegetation was designed to complement the functional values and structural diversity of remnant

riparian vegetation after construction by planting tree and shrub species together. To varying degrees, activity areas that are cleared would be revegetated with black cottonwood, shiny willow, and red willow in an arrangement that promotes greater riparian patch interior area and continuity with existing vegetation. Revegetation of the activity areas is expected to increase the riparian corridor width and riparian connectivity throughout the site. Post-project riparian land cover types would cover a greater area and be less linear in shape than the existing narrow and often discontinuous patches of riparian and upland vegetation.

The revegetation plan at the Sheridan Creek rehabilitation site includes approximately 5.75 acres within seven elevation zones and up to 40.3 acres that would be seeded and mulched. Planting zones include deepwater wetland (about 0.16 acre), emergent wetland (about 0.5 acre), herbaceous toe (about 1.0 acre), willow (about 1.1 acres), cottonwood (about 1.5 acres), transition (about, 0.9 acre), and upland (about 0.7 acre). Each zone would have different combinations of herbaceous, shrub, and tree species. Plantings in wetland and toe zones would be herbaceous and have approximately 3 feet between plant centers, with about 5,500 plants per acre. Plantings in willow, cottonwood, and transition zones would be sedges, shrubs, and trees and have approximately 5 to 8 feet between plant centers, with about 872 plants per acre. Plantings in upland zones would be shrubs and trees and have approximately 10 to 12 feet between plant centers, with about 455 plants per acre.

2.1.16 Access and Other Associated Activities

To support the rehabilitation activities, designated contractor use areas were identified by the design team to avoid sensitive resources. These areas would be used for stockpiling materials, staging equipment, contractor parking, and similar activities (these are labeled with “C” in Table 2-1 and Figure 2-2). Similarly, excavated material from each rehabilitation site would be stored in upland spoils areas if it is not re-used on-site (these are labeled with “U” in Table 2-1 and Figure 2-2).

Primary access to the upstream portion of the Deep Gulch rehabilitation site would be from Sky Ranch Road through DG C-1, DG C-2, and U-1 via connections to DG A-1 from DG A-2 and A-3. Generally, these access areas would be 40 feet wide to allow flexibility in the alignment so that off-highway trucks and other heavy equipment can use these activity areas for two-way traffic. Administrative access to this site would be available via existing roads DG A-1 and A-6; these access routes would not be used by construction equipment other than for emergency purposes (e.g., fire protection and/or suppression). That portion of DG A-1 from Sky Ranch Road to DG C-2 would primarily be used for administrative access and would not be improved for construction access. Access area DG A-6 would be available for administrative use in the event of emergencies (e.g., fire, medical) with permission from the landowner and would not be subject to any improvements. Access between activity areas during rehabilitation activities would be via the temporary access routes, which would be decommissioned after both the Deep Gulch and Sheridan Creek sites have been constructed and revegetation efforts have been successfully completed. Access routes DG A-4 and A-5 may be required for a longer period of time to access the lower portion of Deep Gulch and upstream portion of the Sheridan Creek site in the event construction is staged over multiple years. Some degree of decommissioning of these access routes (e.g., DG A-2, A-3, A-5, A-6, and A-7) would occur as part of final grading and site stabilization (i.e., narrowing route width); however, some level of access for high-clearance vehicles would be required for up to 5 years following revegetation efforts.