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RECLAMATION

# **Tributary Habitat Projects Completed for the Columbia River System Biological Opinion in 2019**

**Columbia-Pacific Northwest Region**



## **Mission Statements**

The Department of the Interior conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

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

# **Tributary Habitat Projects Completed for the Columbia River System Biological Opinion in 2019**

**Columbia-Pacific Northwest Region**

*prepared by*

**Columbia-Pacific Northwest Regional Office**

**Environmental Services Office**

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**Cover Photo:** Construction at the Bird Track Springs Habitat Enhancement Project. The placement of large wood helps retain banks and provides habitat for fish. (Photograph ID: B1678-100-67) (Reclamation/Kirsten Strough)

Acronym or Abbreviation	Description
BiOp	Biological Opinion
CRS	Columbia River System
ESA	Endangered Species Act
FCRPS	Federal Columbia River Power System
GIS	Geographic Information System
HUC	Hydrologic Unit Code
NEPA	National Environmental Policy Act
NMFS	NOAA National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWF	National Wildlife Foundation
Reclamation	Bureau of Reclamation
RM	River Mile
RPA	Reasonable and Prudent Alternative
U.S. Forest Service	United States Forest Service
UCR	Upper-Columbia River



# Table of Contents

<b>Introduction</b>	<b>1</b>
<b>2019 Activities</b>	<b>5</b>
<b>Future Projects</b>	<b>5</b>
<b>Acknowledgments</b>	<b>5</b>
<b>Upper Salmon River Subbasin</b>	<b>7</b>
Lemhi River	8
Middle Eighteenmile Creek Habitat Improvement Project	10
Upper Salmon River	13
Garden Creek – Chipmunk Hill Culvert Removal	15
Garden Creek – County Road Culvert Removal	18
<b>Grande Ronde River Subbasin</b>	<b>21</b>
Upper Grande Ronde River	22
Bird Track Springs Habitat Complexity Project	24
Sheep Creek Habitat Enhancement Phase I	30
<b>Upper Columbia River Subbasin</b>	<b>35</b>
Entiat River	36
Middle Entiat, Stormy A	38
Middle Entiat, Stormy B	41
Middle Entiat, Gray E	46
Methow River	50
Twisp River Floodplain Phase II	52

# List of Tables

<b>Table 1:</b> Project costs by subbasin including Reclamation’s development cost and Reclamation’s partners’ and sponsors’ implementation cost. ....	4
<b>Table 2:</b> Reclamation's total expenditures for completed projects in the Upper Salmon River subbasin. ....	7
<b>Table 3:</b> Reclamation's total expenditures for completed projects in the Lemhi River. ....	8
<b>Table 4:</b> Reclamation's total expenditures for completed projects in the Upper Salmon River. ....	13
<b>Table 5:</b> Reclamation's total expenditures for completed projects in the Grande Ronde River Subbasin. ....	21
<b>Table 6:</b> Reclamation's total expenditures for completed projects in the Upper Grande Ronde River. ....	22
<b>Table 7:</b> Reclamation's total expenditures for completed projects in the Upper Columbia River Subbasin. ....	35
<b>Table 8:</b> Reclamation's total expenditures for completed projects in the Entiat River. ....	36
<b>Table 9:</b> Reclamation's total expenditures for completed projects in the Methow River. ....	50

# List of Maps

<b>Map 1:</b> Tributary habitat projects with Reclamation involvement that were completed in 2019 for the Columbia River System Biological Opinion. ....	2
<b>Map 2:</b> Map of tributary habitat projects completed on the Lemhi River in 2019. ....	9
<b>Map 3:</b> Tributary habitat projects completed on the Upper Salmon River in 2019. ....	14
<b>Map 4:</b> Tributary habitat projects completed on the Upper Grande Ronde River in 2019. ....	23
<b>Map 5:</b> Tributary habitat projects completed on the Entiat River in 2019. ....	37
<b>Map 6:</b> Tributary habitat projects completed on the Methow River in 2019. ....	51

# List of Photographs

<b>Photograph 1:</b> Excavator placing sod mats on the fabric that forms the outside bends of the newly excavated channel. (Middle Eighteenmile Creek Habitat Improvement Project) (Reclamation/Brian Hamilton) .....	11
<b>Photograph 2:</b> Fine and coarse layers of fabric were wrapped around sod mats excavated from the banks of the old channel. The sod mats contained sedges, grass, and small willows to help form the riparian zone of the newly constructed channel. (Middle Eighteenmile Creek Habitat Improvement Project) (Reclamation/Brian Hamilton) .....	11
<b>Photograph 3:</b> Sprinkler pods were used to irrigate the riparian zone of the channel alignment. (Middle Eighteenmile Creek Habitat Improvement Project) (Reclamation/Brian Hamilton) .....	12
<b>Photograph 4:</b> The newly constructed Eighteenmile Creek channel, which will provide a more efficient stream function. (Middle Eighteenmile Creek Habitat Improvement Project) (Reclamation/Brian Hamilton) .....	12
<b>Photograph 5:</b> This pre-project view of the Chipmunk Hill culvert shows the flow barrier to fish movement into the upper Garden Creek drainage. (Garden Creek - Chipmunk Hill Culvert Removal) (Reclamation/Brian Hamilton) .....	16
<b>Photograph 6:</b> This view shows the removal of the Chipmunk Hill culvert. (Garden Creek - Chipmunk Hill Culvert Removal) (Reclamation/Brian Hamilton) .....	16
<b>Photograph 7:</b> This post-project view shows the newly constructed bridge, which now allows fish passage into the upper reaches of Garden Creek. (Garden Creek - Chipmunk Hill Culvert Removal) (Reclamation/Brian Hamilton) .....	17
<b>Photograph 8:</b> This post-project view looking downstream shows the newly constructed bridge. The project now provides passage for adult and juvenile salmonids all year. (Garden Creek - Chipmunk Hill Culvert Removal) (Reclamation/Brian Hamilton) .....	17
<b>Photograph 9:</b> Before culvert removal, Idaho Department of Fish and Game staff conduct a fish salvage in the scour pool downstream of the old culvert. (Garden Creek - County Road Culvert Removal) (Reclamation/Brian Hamilton) .....	19
<b>Photograph 10:</b> Placement of the pre-cast concrete footers for the new bridge. (Garden Creek - County Road Culvert Removal) (Reclamation/Brian Hamilton) .....	19
<b>Photograph 11:</b> Excavation on the new channel where the old culvert was removed. (Garden Creek - County Road Culvert Removal) (Reclamation/Brian Hamilton) .....	20
<b>Photograph 12:</b> The first section of the new bridge resting on the concrete footers. There were four sections of the bridge, which were bolted together after placement. (Garden Creek - County Road Culvert Removal) (Reclamation/Brian Hamilton) .....	20
<b>Photograph 13:</b> Comparison of pre-project (top) and post-project (bottom) channel configuration. Note the new channel alignment, side channels, alcoves, and floodplain access in the post-project image. (Bird Track Springs Habitat Complexity Project) (Reclamation/Al Simpson) .....	25
<b>Photograph 14:</b> Project overview map showing as-built linework (blue) overlapped onto post-project aerial imagery. Pre-project channel alignment shown in red. (Bird Track Springs Habitat Complexity Project) (Reclamation/Al Simpson) .....	26

<b>Photograph 15:</b> View looking downstream of the Grande Ronde River, near the confluence of side channel 2 and the main channel, before (top) and during (bottom) construction. (Bird Track Springs Habitat Complexity Project) (Reclamation/Al Simpson) .....	27
<b>Photograph 16:</b> View looking upstream of the Grande Ronde River, near the confluence of the main channel, side channel 3 complex, and side channel 5, before (top) and during (bottom) construction. (Bird Track Springs Habitat Complexity Project) (Reclamation/Al Simpson) .....	28
<b>Photograph 17:</b> This pre-construction view shows the portion of the floodplain where a new side channel is to be constructed. (Bird Track Springs Habitat Complexity Project) (Reclamation/Al Simpson).....	29
<b>Photograph 18:</b> This post-construction view shows the newly constructed side channel. (Bird Track Springs Habitat Complexity Project) (Reclamation/Al Simpson).....	29
<b>Photograph 19:</b> View of Sheep Creek during construction. Note the excavator and large woody materials being staged for installation. (Sheep Creek Habitat Enhancement Phase I) (Reclamation/Al Simpson) .....	31
<b>Photograph 20:</b> This view shows a hand crew using grip hoists to drag large trees into the stream. The large woody material will provide cover and refuge for salmonids and improve stream function. (Sheep Creek Habitat Enhancement Phase I) (Reclamation/Al Simpson).....	31
<b>Photograph 21:</b> Hand crew using grip hoist and two-person log carrier to drag large trees into the stream. (Sheep Creek Habitat Enhancement Phase I) (Reclamation/Al Simpson).....	32
<b>Photograph 22:</b> Completed large woody debris structure constructed by a hand crew. (Sheep Creek Habitat Enhancement Phase I) (Reclamation/Al Simpson) .....	33
<b>Photograph 23:</b> This large wood structure ensures flow into the newly constructed side channel on the river right. (Middle Entiat, Stormy A) (Reclamation/Steve Kolk) .....	39
<b>Photograph 24:</b> This view shows the typical construction of the engineered log jams in the project area. (Middle Entiat, Stormy A) (Reclamation/Steve Kolk) .....	40
<b>Photograph 25:</b> Large wood was added to the stream to improve fish habitat. The wood structures will provide refuge for juvenile salmonids during high flows. Also, apex structures narrow the channel and force higher flows onto the floodplain and into side channels, which creates beneficial habitat. (Middle Entiat, Stormy B) (Reclamation/Steve Kolk).....	42
<b>Photograph 26:</b> Large wood is stabilized with vertical piles that are driven into the streambed. The large wood disrupts streamflow, which allows natural river processes to resume. (Middle Entiat, Stormy B) (Reclamation/Steve Kolk) .....	42
<b>Photograph 27:</b> Large wood was staged and transported to the individual structure sites via helicopter. (Middle Entiat, Stormy B) (Reclamation/Steve Kolk) .....	43
<b>Photograph 28:</b> Throughout the project, levees were removed down to the level of the natural floodplain. This allows the river greater access to improve habitat on the floodplains. (Middle Entiat, Stormy B) (Reclamation/Steve Kolk).....	44
<b>Photograph 29:</b> The levee removal and installation of large wood allow natural river processes to resume along the project length. The natural processes will vastly improve habitat for spawning and rearing salmon and steelhead. (Middle Entiat, Stormy B) (Reclamation/Steve Kolk) .....	45

<b>Photograph 30:</b> Large woody material was placed in-stream to improve stream dynamics, provide habitat, and narrow the channel to allow the river to access the floodplain. (Middle Entiat, Gray E) (Reclamation/Steve Kolk) .....	47
<b>Photograph 31:</b> Large woody material was engineered in key locations to encourage flows into side channels, which improves stream processes and habitat. (Middle Entiat, Gray E) (Reclamation/Steve Kolk) .....	47
<b>Photograph 32:</b> Construction of the large wood structures involves driving vertical timbers to help stabilize the more horizontal portions of the structure. Root wads have proven to be crucial to the function of the large wood structures. (Middle Entiat, Gray E) (Reclamation/Steve Kolk) .....	48
<b>Photograph 33:</b> The large wood structures were constructed in key locations to encourage flows onto the floodplain and side channels. When a river accesses the floodplain, key rearing habitat for juvenile salmonids is available. (Middle Entiat, Gray E) (Reclamation/Steve Kolk) .....	49
<b>Photograph 34:</b> The right bank levee was removed in this area, which will allow access to the floodplain. This view shows the riparian plantings and roughness added to the right bank. (Twisp River Floodplain Phase II) (Reclamation/Steve Kolk) .....	53
<b>Photograph 35:</b> This view shows the completed entry to the side channel. The side channel activates during low and high flows, providing valuable rearing habitat. (Twisp River Floodplain Phase II) (Reclamation/Steve Kolk) .....	53

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# Introduction

The Bureau of Reclamation (Reclamation), United States Army Corps of Engineers, and Bonneville Power Administration contribute to the implementation of salmonid habitat improvement projects in Columbia River Basin tributaries to help meet commitments in the 2008 Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp) and the 2010 and 2014 Supplemental BiOps<sup>1</sup>. The 2008 FCRPS BiOp was replaced by the 2019 Columbia River System (CRS) BiOp in March 2019. The 2019 CRS BiOp includes a Reasonable and Prudent Alternative (RPA), or a suite of actions, to protect salmon and steelhead listed under the Endangered Species Act (ESA) across their lifecycle. Reclamation's contributions to habitat improvement are meant to be within the framework of the 2019 CRS BiOp RPA or related commitments. This document only covers habitat improvement projects with Reclamation involvement.

ESA-listed fish species present in the Columbia River Basin include Upper Columbia River (UCR) spring chinook salmon (*Oncorhynchus tshawytscha*) (endangered), UCR steelhead trout (*O. mykiss*) (threatened), Mid-Columbia River steelhead (*O. mykiss*) (threatened), Snake River spring/summer chinook salmon (*O. tshawytscha*) (threatened), Snake River steelhead trout (*O. mykiss*) (threatened), Snake River sockeye salmon (*O. nerka*) (endangered), and Columbia River bull trout (*Salvelinus confluentus*) (threatened).

Habitat improvement actions (projects) in various Columbia River tributaries are one aspect of the 2019 CRS BiOp. These projects are shown in Map 1 and benefit anadromous fish species listed under the ESA. Rehabilitation or improvement of altered stream habitat and formation of new habitat are generally accepted methods that benefit fish populations. In addition, Reclamation conducts tributary and reach assessments in the river subbasins specified in the 2019 CRS BiOp to maximize the success of habitat improvement projects. These assessments analyze the physical and ecological processes at work in the watershed. Towards this end, the assessments define environmental baseline conditions to complement monitoring activities that evaluate fish species' physical and biological responses to the improvement projects.

Project documentation including permits, as-built drawings, GIS files, additional photographs, and other technical records are located at the Bureau of Reclamation, Columbia-Pacific Northwest Regional Office, 1150 North Curtis Road, Boise, Idaho 83706-1234. Files can be requested through the Environmental Services Office by calling (208) 378-5057.

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<sup>1</sup> NOAA (National Oceanic and Atmospheric Administration) National Marine Fisheries Service, *Supplemental Consultation on Remand for Operation of the Federal Columbia River Power System, 11 Bureau of Reclamation Projects in the Columbia Basin and ESA Section 10(a)(1)(A) Permit for Juvenile Fish Transportation Program*, May 20, 2010, F/NWR/2010/02096. The 2010 BiOp incorporates in whole the 2008 BiOp: *Consultation on Remand for Operations of the Federal Columbia River Power System, 11 Bureau of Reclamation Projects in the Columbia Basin and ESA Section 10(a)(1)(A) Permit for Juvenile Fish Transportation Program* [Revised and reissued pursuant to court order, *NWF (National Wildlife Foundation) v. NMFS (NOAA National Marine Fisheries Service)*, Civ No. CV 01-0640-RE (D. Oregon)].





**Map 1:** Tributary habitat projects with Reclamation involvement that were completed in 2019 for the Columbia River System Biological Opinion.

Reclamation provides technical assistance to states, Tribes, Federal agencies, and other local partners to identify, design, and construct stream habitat improvement projects that address streamflow, access, entrainment, channel complexity, and floodplain conditions. Annually, approximately 15 projects are implemented and additional projects are in various stages of planning, development, and design during any year. Habitat improvement projects may take three years or more to implement from conception to completion. Construction activities associated with the more complex and costly projects usually continue across multiple years. Project cost varies depending on the objectives, landowner cooperation, availability of construction funding from project partner(s), changes in project scopes, and other actions required to meet biological criteria in the 2019 CRS BiOp for ESA-listed species.

Reclamation does not own, operate, or maintain the habitat improvement projects described in this report. Reclamation's role in these projects is to provide technical assistance, project development, and planning to ensure the projects have sound engineering and perform as intended. Reclamation's assistance includes habitat assessments, evaluations, concept development, modeling, designs, permitting, and observation of construction and implementation. For continual improvement of project designs, Reclamation evaluates completed projects to determine if they are functioning as designed. The findings from these evaluations are incorporated into future projects.

Projects described in this report are completed with contributions from many partners. Full descriptions of the projects and associated benefits are presented in this report, even if Reclamation only contributed to a portion of the project. Consequently, the benefits identified in this report may be more comprehensive than the benefits that were reported by Reclamation in the 2019 CRS BiOp Annual Progress Reports. Descriptions in this report also include partner objectives that often target rehabilitation goals that are broader than the goals Reclamation addresses to implement the 2019 CRS BiOp.

Expenditures for the total subbasin costs are included in each subbasin section and repeated for each river in the subbasin. Those totals include the annual budgets spent for development, coordination, financial assistance to partners, contracts for architectural and engineering services, and project-specific activities for 2019. The development cost shown for each project includes all years of project development summarized for the Reclamation contribution. With projects in different stages of development during each year, the development cost will not equal the expenditures for the basin in any given year. When the term "implementation cost" is used in this report, it refers to the costs incurred by Reclamation's partners and sponsors, including the construction of the specific project.

Metrics are reported in the following categories: Channel Access, Entrainment (fish screening), Streamflow, Channel Complexity (including floodplain enhancement), and Riparian Enhancement.

**Table 1:** Project costs by subbasin including Reclamation’s development cost and Reclamation’s partners’ and sponsors’ implementation cost.

Subbasin	Project Name	Reclamation’s Development Cost	Reclamation’s Partners’ and Sponsors’ Implementation Cost
Upper Salmon River Subbasin	Middle Eighteenmile Creek Habitat Improvement Project	\$ 2,500	\$ 210,000
Upper Salmon River Subbasin	Garden Creek – Chipmunk Hill Culvert Removal	\$ 2,500	\$ 85,000
Upper Salmon River Subbasin	Garden Creek – County Road Culvert Removal	\$ 2,500	\$ 210,000
<b>Upper Salmon River Subbasin Total:</b>		<b>\$ 7,500</b>	<b>\$ 505,000</b>
Grande Ronde River Subbasin	Bird Track Springs Habitat Complexity Project	\$ 4,811,000	\$ 2,838,000
Grande Ronde River Subbasin	Sheep Creek Habitat Enhancement Phase I	\$ 39,000	\$ 3,700
<b>Grande Ronde River Subbasin Total:</b>		<b>\$ 4,850,000</b>	<b>\$ 2,841,700</b>
Upper Columbia River Subbasin	Middle Entiat, Stormy A	\$ 200,000	\$ 550,000
Upper Columbia River Subbasin	Middle Entiat, Stormy B	\$ 200,000	\$ 1,500,000
Upper Columbia River Subbasin	Middle Entiat, Gray E	\$ 200,000	\$ 450,000
Upper Columbia River Subbasin	Twisp River Floodplain Phase II	\$ 1,052,000	\$ 236,000
<b>Upper Columbia River Subbasin Total:</b>		<b>\$ 1,652,000</b>	<b>\$ 2,736,000</b>
<b>Grand Total:</b>		<b>\$ 6,509,500</b>	<b>\$ 6,082,700</b>

# 2019 Activities

In the calendar year 2019, Reclamation and its partners completed nine fish habitat improvement projects in the following three subbasins of the Columbia River Basin:

## Upper Salmon River Subbasin

- Lemhi River
- Upper Salmon River

## Grande Ronde River Subbasin

- Upper Grande Ronde River

## Upper Columbia River Subbasin

- Entiat River Subbasin
- Methow River Subbasin

The goals of the projects included, but were not limited to, removal of fish passage barriers; redesign of irrigation structures to allow for fish passage; and improvement of instream habitat complexity, floodplain reconnection, and side channel fish habitat.

# Future Projects

Reclamation plans to continue providing technical assistance for habitat improvement projects that enhance tributary spawning and rearing habitat associated with the implementation of the 2019 CRS BiOp. In particular, Reclamation will continue to assist non-Federal parties located in Idaho, Oregon, and Washington to comply with environmental and cultural resources regulations, and to produce engineering designs related to barrier removals, screens, and channel morphology (e.g., blockages, floodplains, and culverts) associated with the implementation of the 2019 CRS BiOp.

# Acknowledgments

Reclamation's 2019 CRS BiOp implementation successes are due to the participation and cooperation of many partners, including landowners, local and state agencies, Tribes, non-profit organizations, interest groups, and other Federal agencies. Reclamation activities through this program support a larger cooperative process. This process is generally controlled by non-Federal partners who secure funding and implement habitat improvement projects that address water, land, and other resource management challenges. Some partners provide their financial and labor resources for a single project, while others support multiple projects throughout the subbasins. In the following sections, partners and sponsors are listed under each subbasin in which they participated.

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# Upper Salmon River Subbasin

From its headwaters in the Sawtooth Mountains, the Salmon River flows northerly approximately 180 miles (joined by the North Fork at river mile (RM) 237) and then heads westerly across central Idaho until it enters the Snake River at RM 188. The Upper Salmon River subbasin drains approximately 14,000 square miles from elevations exceeding 10,000 feet to approximately 900 feet at its confluence with the Snake River. The Salmon River is the second-longest undammed river in the Columbia River Basin.

Reclamation currently works in four rivers in the Upper Salmon River subbasin—the Upper Salmon River, Lemhi River, Little Salmon River, and Pahsimeroi River. In 2019, one project was completed in the Lemhi River, and two projects were completed in the Upper Salmon River.

Reclamation’s actions aim to improve habitat for the following ESA-listed fish species present in the subbasin: Snake River spring/summer chinook salmon (threatened), Snake River steelhead trout (threatened), Snake River sockeye salmon (endangered), and Columbia River bull trout (threatened).

**Table 2:** Reclamation's total expenditures for completed projects in the Upper Salmon River subbasin.

Subbasin	Reclamation’s Development Cost
Upper Salmon River Subbasin	\$ 7,500

## Lemhi River

The Lemhi River (Hydrologic Unit Code (HUC) 17060204) is tributary to the Salmon River, entering it at RM 258.5, and has a drainage area of approximately 1,270 square miles. In 2019, one project was completed in the subbasin that improved channel access, entrainment, and riparian areas.

Reclamation's actions aim to improve habitat for the following ESA-listed fish species present in the Lemhi River: Snake River spring/summer chinook salmon (threatened), Snake River steelhead trout (threatened), Snake River sockeye salmon (endangered), and Columbia River bull trout (threatened).

### **Project:**

- Middle Eighteenmile Creek Habitat Improvement Project

### **Sponsor:**

- Lemhi Soil and Water Conservation District

### **Partners:**

- Bonneville Power Administration
- Idaho Fish and Game
- Idaho Governor's Office of Species Conservation
- Upper Salmon Basin Watershed Program

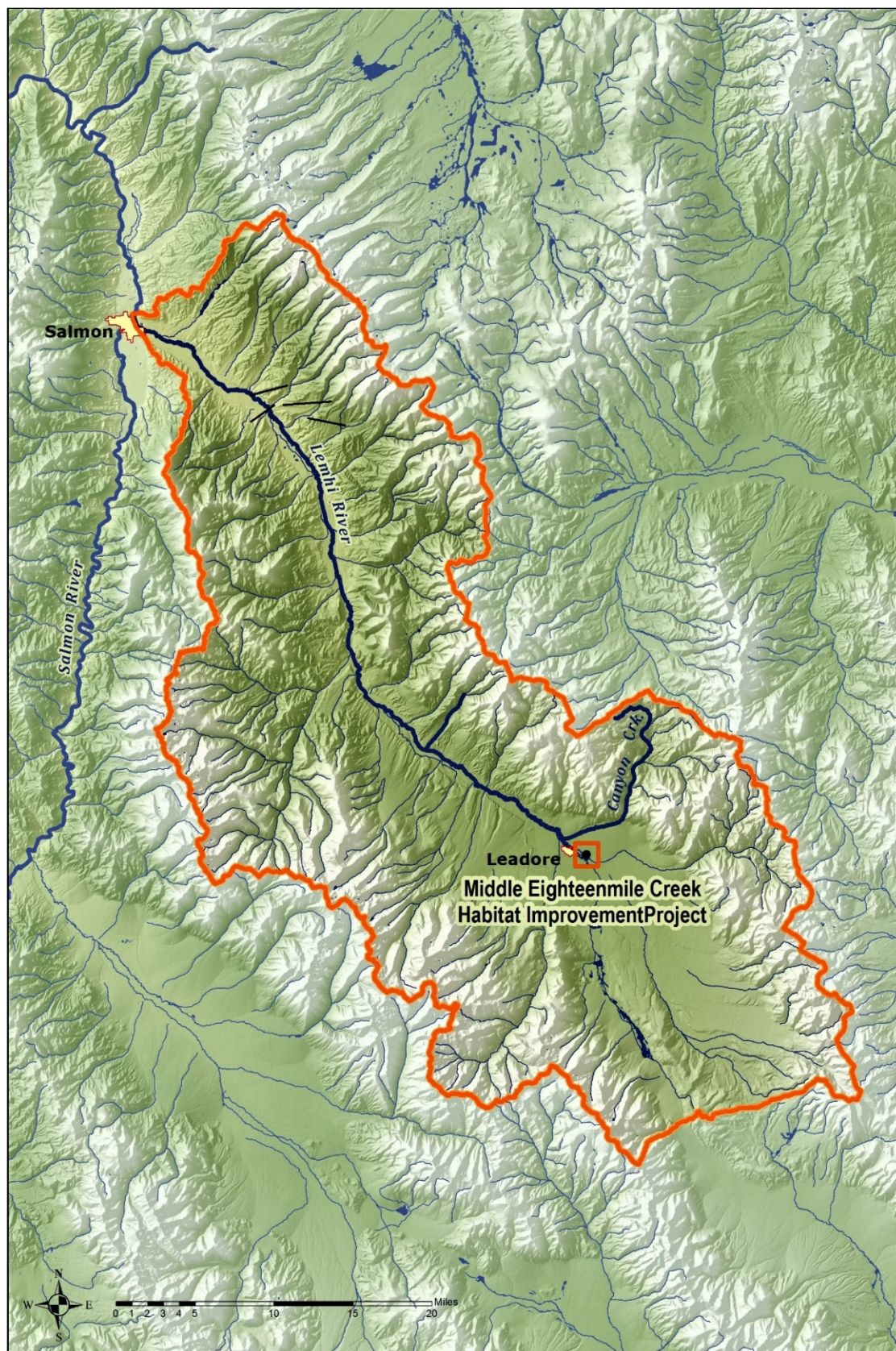
### **Funding Source:**

- Bonneville Power Administration

**Table 3:** Reclamation's total expenditures for completed projects in the Lemhi River.

Subbasin	Reclamation's Development Cost
Lemhi River	\$ 2,500





**Map 2:** Map of tributary habitat projects completed on the Lemhi River in 2019.

## **Middle Eighteenmile Creek Habitat Improvement Project**

**Sponsor:** Lemhi Soil and Water Conservation District

**Partners:** Upper Salmon Basin Watershed Program, Idaho Fish and Game, Bonneville Power Administration, and Idaho Governor's Office of Species Conservation

### **Project Types:**

- **Channel Complexity:** Constructed 0.31 miles of a new channel for Eighteenmile Creek. The old channel ran through a center pivot irrigated field with multiple pivot track crossings.
- **Entrainment:** A new fish screen was constructed for the diversion that delivers water to the adjacent center pivot. The old diversion was unscreened.
- **Riparian Enhancement:** Riparian vegetation planted on both banks of the new 0.31-mile-long channel.

**Latitude:** 44° 41' 57" N

**Longitude:** 113° 22' 24" W

**Funding Source:** Bonneville Power Administration

**National Environmental Policy Act (NEPA) Compliance:** Bonneville Power Administration's Fish and Wildlife Implementation Plan Environmental Impact Statement

**Reclamation's Development Cost:** \$ 2,500

**Reclamation's Partners' and Sponsors' Implementation Cost:** \$ 210,000

### **Project Description:**

Eighteenmile Creek runs from the headwaters of the Lemhi Valley down to the town of Leadore, Idaho where it converges with the Lemhi River. This upper area of the Lemhi Valley provides crucial salmon and steelhead spawning and rearing habitat. The Middle Eighteenmile Creek Habitat Improvement project relocated 0.31 miles of Eighteenmile Creek that ran through a cultivated center pivot field. The pivot towers crossed the stream in multiple locations, adding turbid water and sediment to the channel. The new channel alignment was constructed away from the cultivated field, which eliminated several water quality issues including turbidity and sediment. The new alignment allows a healthier riparian zone to be established to assist in reducing water temperatures. The project also included the replacement of an older, unscreened diversion, with a new screened irrigation diversion that allows fish passage.





**Photograph 1:** Excavator placing sod mats on the fabric that forms the outside bends of the newly excavated channel. (Middle Eighteenmile Creek Habitat Improvement Project) (Reclamation/Brian Hamilton)



**Photograph 2:** Fine and coarse layers of fabric were wrapped around sod mats excavated from the banks of the old channel. The sod mats contained sedges, grass, and small willows to help form the riparian zone of the newly constructed channel. (Middle Eighteenmile Creek Habitat Improvement Project) (Reclamation/Brian Hamilton)





**Photograph 3:** Sprinkler pods were used to irrigate the riparian zone of the channel alignment. (Middle Eighteenmile Creek Habitat Improvement Project) (Reclamation/Brian Hamilton)



**Photograph 4:** The newly constructed Eighteenmile Creek channel, which will provide a more efficient stream function. (Middle Eighteenmile Creek Habitat Improvement Project) (Reclamation/Brian Hamilton)

## Upper Salmon River

The Upper Salmon River (HUC 17060201) extends from its headwaters in the Sawtooth Mountains to its confluence with the Middle Fork Salmon River, excluding the Lemhi and Pahsimeroi Rivers. The river basin has a drainage area of approximately 2,425 square miles. In 2019, two projects were completed in the Upper Salmon River that improved channel access.

Reclamation's actions aim to improve habitat for the following ESA-listed fish species present in the Upper Salmon River: Snake River spring/summer chinook salmon (threatened), Snake River steelhead trout (threatened), Snake River sockeye salmon (endangered), and Columbia River bull trout (threatened).

### Projects:

- Garden Creek – Chipmunk Hill Culvert Removal
- Garden Creek – County Bridge Culvert Removal

### Sponsor:

- Custer Soil and Water Conservation District

### Partner:

- Idaho Department of Fish and Game

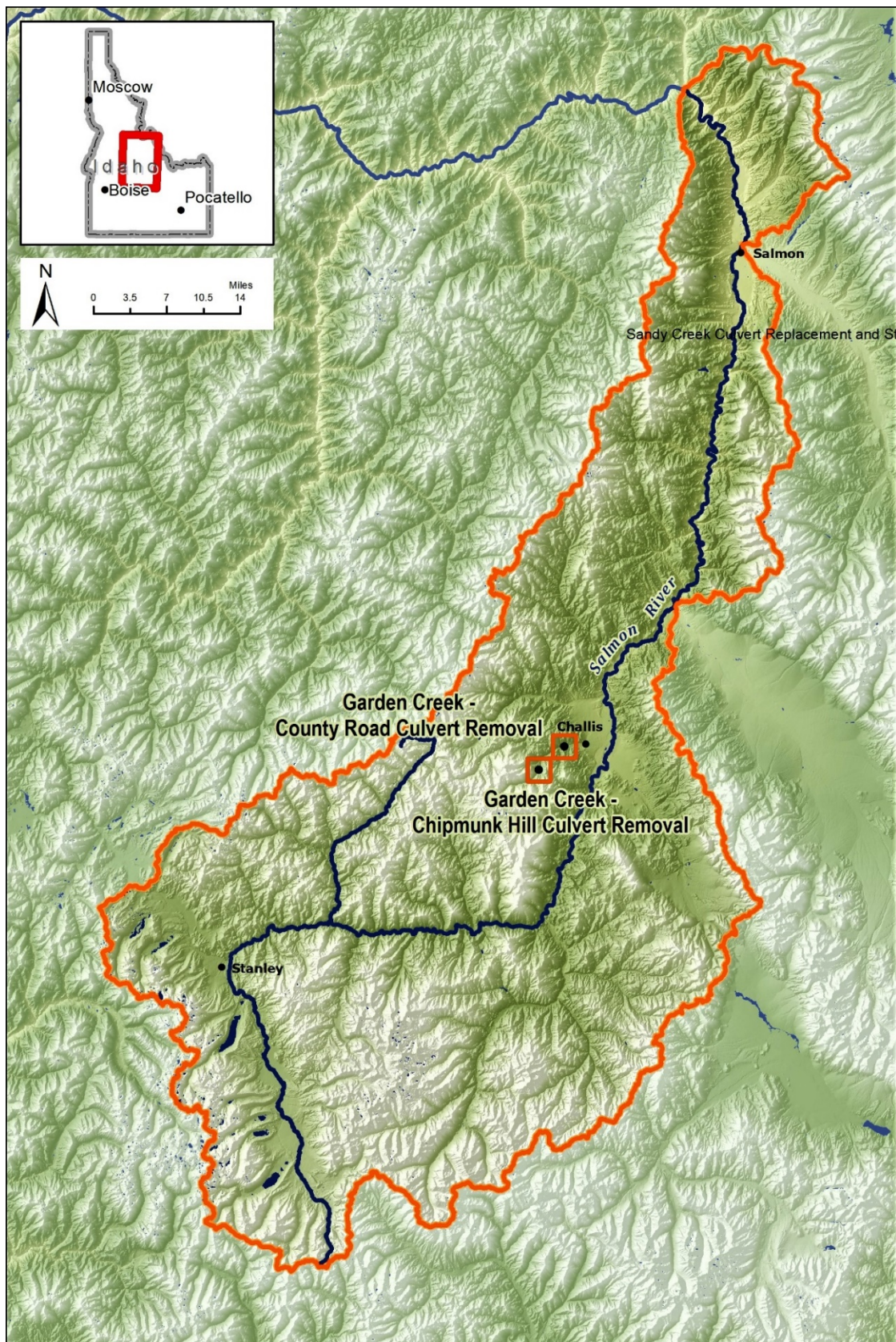
### Funding Source:

- Bonneville Power Administration

**Table 4:** Reclamation's total expenditures for completed projects in the Upper Salmon River.

Subbasin	Reclamation's Development Cost
Upper Salmon River	\$ 5,000





**Map 3:** Tributary habitat projects completed on the Upper Salmon River in 2019.

## **Garden Creek – Chipmunk Hill Culvert Removal**

**Sponsor:** Custer Soil and Water Conservation District

**Partner:** Idaho Department of Fish and Game

**Project Type:**

- **Channel Access:** Improved access to approximately 2.5 miles of habitat in the headwaters of Garden Creek for juvenile salmon and steelhead spawning and rearing.

**Latitude:** 44° 28' 15.77" N

**Longitude:** 114° 19' 27.39" W

**Funding Source:** Bonneville Power Administration

**NEPA Compliance:** Bonneville Power Administration's Fish and Wildlife Implementation Plan Environmental Impact Statement

**Reclamation's Development Cost:** \$ 2,500

**Reclamation's Partners' and Sponsors' Implementation Cost:** \$ 85,000

**Project Description:**

Garden Creek is tributary to the Salmon River. The creek runs through the town of Challis, Idaho and converges with the Hannah Slough. The slough contains important salmon and steelhead rearing habitat that is connected to the Salmon River. The project removed an undersized culvert that restricted fish passage in Garden Creek and replaced it with a steel beam bridge. Access was improved to approximately 2.5 miles of headwater habitat in the drainage area of Garden Creek. An additional county bridge was installed in 2019, which improved access for 3.5 miles up to the Chipmunk Ski Hill Bridge.





**Photograph 5:** This pre-project view of the Chipmunk Hill culvert shows the flow barrier to fish movement into the upper Garden Creek drainage. (Garden Creek - Chipmunk Hill Culvert Removal) (Reclamation/Brian Hamilton)



**Photograph 6:** This view shows the removal of the Chipmunk Hill culvert. (Garden Creek - Chipmunk Hill Culvert Removal) (Reclamation/Brian Hamilton)





**Photograph 7:** This post-project view shows the newly constructed bridge, which now allows fish passage into the upper reaches of Garden Creek. (Garden Creek - Chipmunk Hill Culvert Removal)  
(Reclamation/Brian Hamilton)



**Photograph 8:** This post-project view looking downstream shows the newly constructed bridge. The project now provides passage for adult and juvenile salmonids all year. (Garden Creek - Chipmunk Hill Culvert Removal) (Reclamation/Brian Hamilton)



## **Garden Creek – County Road Culvert Removal**

**Sponsor:** Custer Soil and Water Conservation District

**Partner:** Idaho Department of Fish and Game

**Project Type:**

- **Channel Access:** Improved access to approximately 3.8 miles of habitat in Garden Creek (up to the Chipmunk Hill Bridge, which was installed in 2019).

**Latitude:** 44° 30' 7.63" N

**Longitude:** 114° 16' 25.37" W

**Funding Source:** Bonneville Power Administration

**NEPA Compliance:** Bonneville Power Administration's Fish and Wildlife Implementation Plan Environmental Impact Statement

**Reclamation's Development Cost:** \$ 2,500

**Reclamation's Partners' and Sponsors' Implementation Cost:** \$ 210,000

**Project Description:**

Garden Creek is tributary to the Salmon River. The creek runs through the town of Challis, Idaho and converges with the Hannah Slough. The slough contains important salmon and steelhead rearing habitat that is connected to the Salmon River. Salmon and steelhead rear and steelhead spawn in Garden Creek. This project removed an undersized culvert that was restricting fish passage and replaced it with a steel beam bridge. Access was improved to approximately 3.8 miles of habitat in the Garden Creek drainage. The Chipmunk Ski Hill Bridge, also completed in 2019, provided improved access 2.5 miles further up the drainage.





**Photograph 9:** Before culvert removal, Idaho Department of Fish and Game staff conduct a fish salvage in the scour pool downstream of the old culvert. (Garden Creek - County Road Culvert Removal) (Reclamation/Brian Hamilton)



**Photograph 10:** Placement of the pre-cast concrete footers for the new bridge. (Garden Creek - County Road Culvert Removal) (Reclamation/Brian Hamilton)





**Photograph 11:** Excavation on the new channel where the old culvert was removed. (Garden Creek - County Road Culvert Removal) (Reclamation/Brian Hamilton)



**Photograph 12:** The first section of the new bridge resting on the concrete footers. There were four sections of the bridge, which were bolted together after placement. (Garden Creek - County Road Culvert Removal) (Reclamation/Brian Hamilton)



# Grande Ronde River Subbasin

From its headwaters in the Blue Mountains, the Grande Ronde River flows northeast approximately 212 miles to its confluence with the Snake River at RM 169, approximately twenty miles upstream of Asotin, Washington. The Grande Ronde River drains approximately 4,000 square miles. Its major tributaries include the Wallowa River (RM 81) and Catherine Creek (RM 144).

Within the Grande Ronde River subbasin, Reclamation currently works in the Upper Grande Ronde River, Catherine Creek, and the Wallowa River. In 2019, two projects were completed in the Upper Grande Ronde River.

Reclamation's actions aim to improve habitat for the following ESA-listed fish species present in the subbasin: Snake River spring/summer chinook salmon (threatened), Snake River steelhead trout (threatened), and Columbia River bull trout (threatened).

**Table 5:** Reclamation's total expenditures for completed projects in the Grande Ronde River Subbasin.

Subbasin	Reclamation's Development Cost
Grande Ronde River Subbasin	\$ 4,850,000

## Upper Grande Ronde River

The Upper Grande Ronde River begins in the southwest portion of the Blue Mountains with mountain peaks above 7,000 feet. The river flows north, then northeast, through the city of La Grande, Oregon (RM 157). As the river reaches the Grande Ronde Valley, it slows and meanders along the low-gradient valley floor north-northeast to the confluence with Catherine Creek (RM 144). In 2019, two projects were completed in the Upper Grande Ronde River that improved channel complexity, enhanced riparian areas, and increased channel access.

Reclamation's actions aim to improve habitat for the following ESA-listed fish species present in the Upper Grande Ronde River: Snake River spring/summer chinook salmon (threatened), Snake River steelhead trout (threatened), and Columbia River bull trout (threatened).

### Projects:

- Bird Track Springs Habitat Complexity Project
- Sheep Creek Habitat Enhancement Phase I

### Sponsors:

- Confederated Tribes of the Umatilla Indian Reservation
- Trout Unlimited

### Partners:

- Bonneville Power Administration
- Bureau of Land Management
- Confederated Tribes of the Umatilla Indian Reservation
- Grande Ronde Model Watershed
- North Fork John Day Watershed Council
- Private Landowner
- United States Forest Service (U.S. Forest Service)
- Wallowa Whitman National Forest

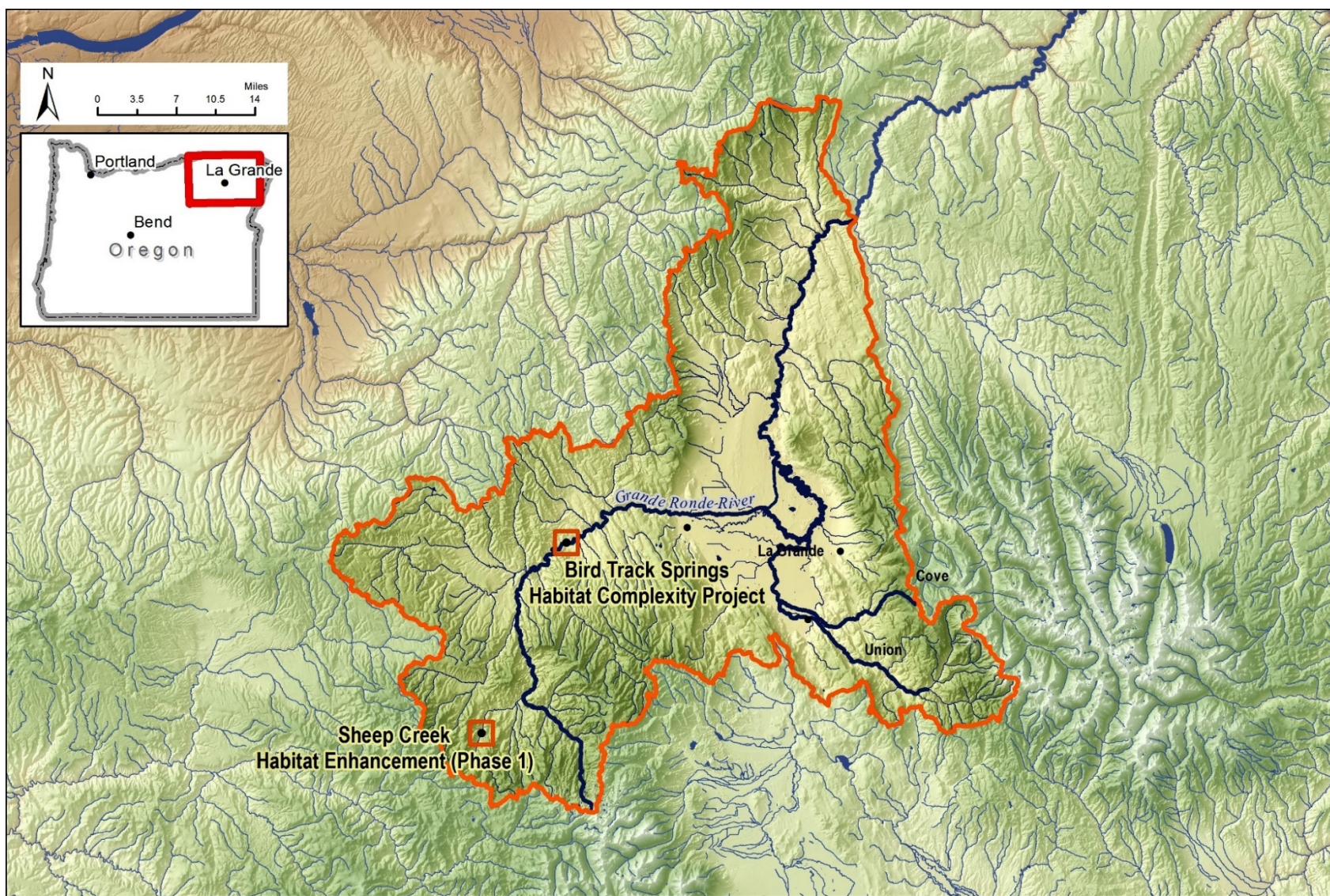
### Funding Sources:

- Bonneville Power Administration
- National Fish and Wildlife Foundation
- National Forest Foundation
- Oregon Watershed Enhancement Board
- Portland General Electric/The Nature Conservancy Salmon Habitat Fund

**Table 6:** Reclamation's total expenditures for completed projects in the Upper Grande Ronde River.

Subbasin	Reclamation's Development Cost
Upper Grande Ronde River	\$ 4,850,000





**Map 4:** Tributary habitat projects completed on the Upper Grande Ronde River in 2019.

## **Bird Track Springs Habitat Complexity Project**

**Sponsor:** Confederated Tribes of the Umatilla Indian Reservation

**Partners:** Confederated Tribes of the Umatilla Indian Reservation, U.S. Forest Service, Grande Ronde Model Watershed, Bonneville Power Administration, and Private Landowner

### **Project Types:**

- **Channel Access:** 3.1 miles of new channel access was constructed
- **Channel Complexity:** 1.9 miles of the main channel was enhanced and 1.8 miles of new complex side channels were constructed
- **Riparian Enhancement:** 3.7 miles of riparian habitat was enhanced

**Latitude:** 45° 18' 10.94" N

**Longitude:** 118° 18' 29.54" W

**Funding Sources:** Bonneville Power Administration and Oregon Watershed Enhancement Board

**NEPA Compliance:** U.S. Forest Service NEPA

**Reclamation's Development Cost:** \$ 4,811,000

**Reclamation's Partners' and Sponsors' Implementation Cost:** \$ 2,838,000

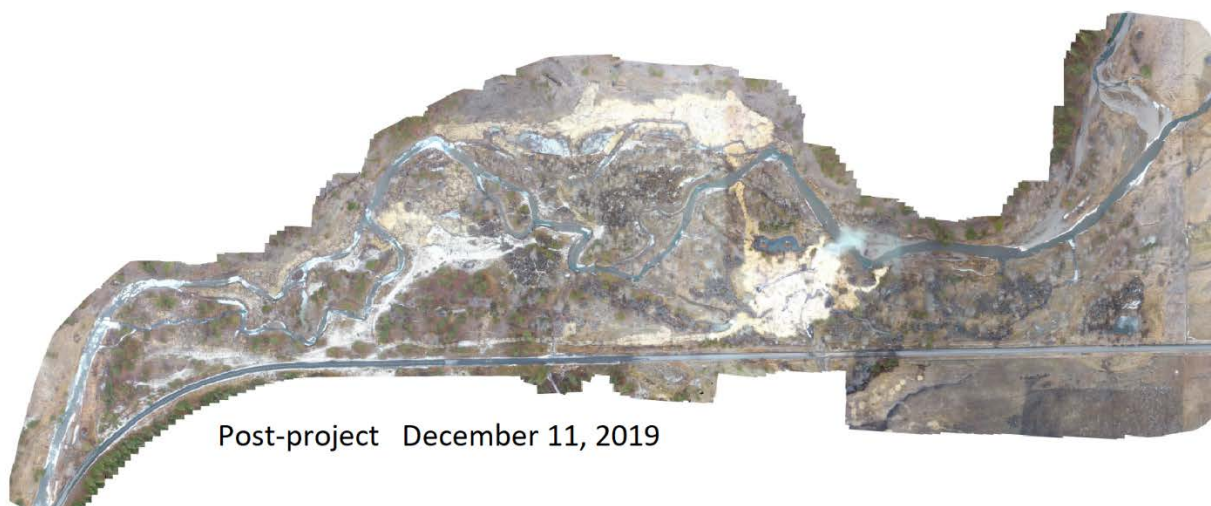
### **Project Description:**

The Bird Track Springs Habitat Complexity Project is located approximately 13 miles west of La Grande, Oregon. The project reach encompasses approximately 1.9 miles of the Grande Ronde River adjacent to Oregon State Highway 244 beginning at RM 146.1 and ending downstream at RM 144.2. In its pre-project condition, this reach of the river consisted of a wide, shallow channel that lacked pools, sinuosity, and channel complexity. Poor habitat conditions were the result of historic placer mining, splash dam logging, livestock grazing, and railroad and highway construction. The fish habitat was degraded and the channel was disconnected from the floodplain. The newly constructed habitat improvement project resulted in a narrower and meandering mainstem channel, and numerous side channels, deep pools, ponds and alcoves. In addition, whole trees, root wads, and engineered wood structures were strategically placed within the channels and floodplain to stabilize streambanks and provide complex fish habitat. Collectively, these improvements provide vastly improved habitat for juvenile salmonids.





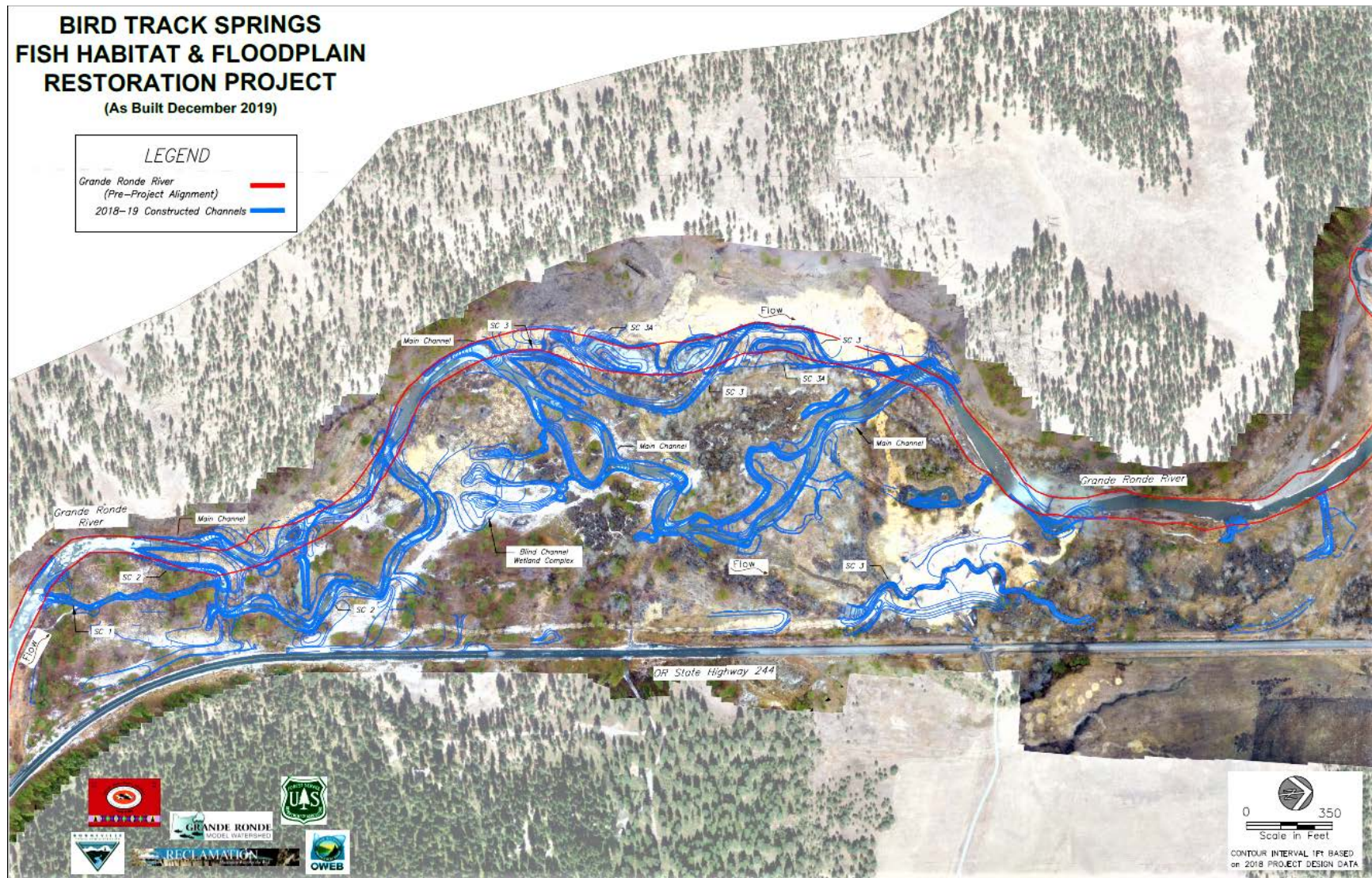
Pre-project September 6, 2018



Post-project December 11, 2019

**Photograph 13:** Comparison of pre-project (top) and post-project (bottom) channel configuration. Note the new channel alignment, side channels, alcoves, and floodplain access in the post-project image. (Bird Track Springs Habitat Complexity Project) (Reclamation/Al Simpson)





**Photograph 14:** Project overview map showing as-built linework (blue) overlapped onto post-project aerial imagery. Pre-project channel alignment shown in red. (Bird Track Springs Habitat Complexity Project) (Reclamation/AI Simpson)





**Photograph 15:** View looking downstream of the Grande Ronde River, near the confluence of side channel 2 and the main channel, before (top) and during (bottom) construction. (Bird Track Springs Habitat Complexity Project) (Reclamation/Al Simpson)





**Photograph 16:** View looking upstream of the Grande Ronde River, near the confluence of the main channel, side channel 3 complex, and side channel 5, before (top) and during (bottom) construction. (Bird Track Springs Habitat Complexity Project) (Reclamation/Al Simpson)





**Photograph 17:** This pre-construction view shows the portion of the floodplain where a new side channel is to be constructed. (Bird Track Springs Habitat Complexity Project) (Reclamation/Al Simpson)



**Photograph 18:** This post-construction view shows the newly constructed side channel. (Bird Track Springs Habitat Complexity Project) (Reclamation/Al Simpson)

## **Sheep Creek Habitat Enhancement Phase I**

**Sponsor:** Trout Unlimited

**Partners:** Grande Ronde Model Watershed, Bureau of Land Management, North Fork John Day Watershed Council, and Wallowa Whitman National Forest

### **Project Types:**

- **Channel Complexity:** 10.5 miles
- **Riparian Enhancement:** 4.0 miles planted with native shrubs, trees, and grasses

**Latitude:** 45° 3' 21.18" N

**Longitude:** 118° 27' 24.88" W

**Funding Sources:** Bonneville Power Administration, Oregon Watershed Enhancement Board, Portland General Electric/The Nature Conservancy Salmon Habitat Fund, National Forest Foundation, and National Fish and Wildlife Foundation

**NEPA Compliances:** U.S. Forest Service NEPA and Bureau of Land Management Project Specific NEPA

**Reclamation's Development Cost:** \$ 39,000

**Reclamation's Partners' and Sponsors' Implementation Cost:** \$ 3,700

### **Project Description:**

The Sheep Creek Project is located approximately 26 air miles southwest of La Grande, Oregon on property administered by the U.S. Forest Service and Bureau of Land Management. The project reach includes the mainstem of Sheep Creek and select headwater tributaries. The stream habitat has been degraded due to previous logging, beaver trapping, overgrazing and road construction. The primary goal of the project is to improve spawning and rearing habitat for chinook and steelhead. The strategy included the placement of various types of wood structures in the stream channel to improve the quantity and quality of complex fish habitat and to re-establish the hydrologic connection to the floodplain. Construction was accomplished with an excavator and hand crew labor. Over 240 large woody debris structures were placed within the stream channels and adjacent floodplain. In addition, whole and cut trees were harvested from the nearby forest and flown to the site via helicopter. Also, native trees, shrubs, and grasses were planted to improve riparian habitat. The next phase of construction will include the use of hand crews to construct additional wood habitat structures and riparian fencing to exclude livestock.





**Photograph 19:** View of Sheep Creek during construction. Note the excavator and large woody materials being staged for installation. (Sheep Creek Habitat Enhancement Phase I) (Reclamation/AI Simpson)



**Photograph 20:** This view shows a hand crew using grip hoists to drag large trees into the stream. The large woody material will provide cover and refuge for salmonids and improve stream function. (Sheep Creek Habitat Enhancement Phase I) (Reclamation/AI Simpson)





**Photograph 21:** Hand crew using grip hoist and two-person log carrier to drag large trees into the stream. (Sheep Creek Habitat Enhancement Phase I) (Reclamation/Al Simpson)



**Photograph 22:** Completed large woody debris structure constructed by a hand crew. (Sheep Creek Habitat Enhancement Phase I)  
(Reclamation/Al Simpson)

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# Upper Columbia River Subbasin

The Upper Columbia River has a drainage area of approximately 74,100 square miles, including approximately 39,000 square miles that extend into Canada. Reclamation works in three Upper Columbia River subbasins—Entiat River subbasin, Methow River subbasin, and Wenatchee River subbasin. In 2019, three projects were completed in the Entiat River Subbasin and one project was completed in the Methow River subbasin.

Reclamation's actions aim to improve habitat for the following ESA-listed fish species present in this part of the subbasin: UCR spring-run chinook salmon (endangered), UCR steelhead trout (threatened), and Columbia River bull trout (threatened). Also present are UCR summer/fall-run chinook salmon (not listed). The Yakama Nation has a Coho salmon reintroduction program in the Methow River and Wenatchee River subbasins.

**Table 7:** Reclamation's total expenditures for completed projects in the Upper Columbia River Subbasin.

Subbasin	Reclamation's Development Cost
Upper Columbia River Subbasin	\$ 1,652,000



## Entiat River

The Entiat River is tributary to the Columbia River at RM 483.7. The Entiat River (HUC 17020010) has a drainage area of approximately 1,520 square miles. In 2019, three projects were completed in the Entiat River subbasin that improved channel complexity.

Reclamation's actions aim to improve habitat for the following ESA-listed fish species present in the Entiat River: UCR spring chinook salmon (endangered), UCR steelhead trout, and Columbia River bull trout (threatened).

### Projects:

- Middle Entiat, Stormy A
- Middle Entiat, Stormy B
- Middle Entiat, Gray E

### Sponsors:

- Cascadia Conservation District
- Chelan County Natural Resources Department
- Yakama Nation

### Partners:

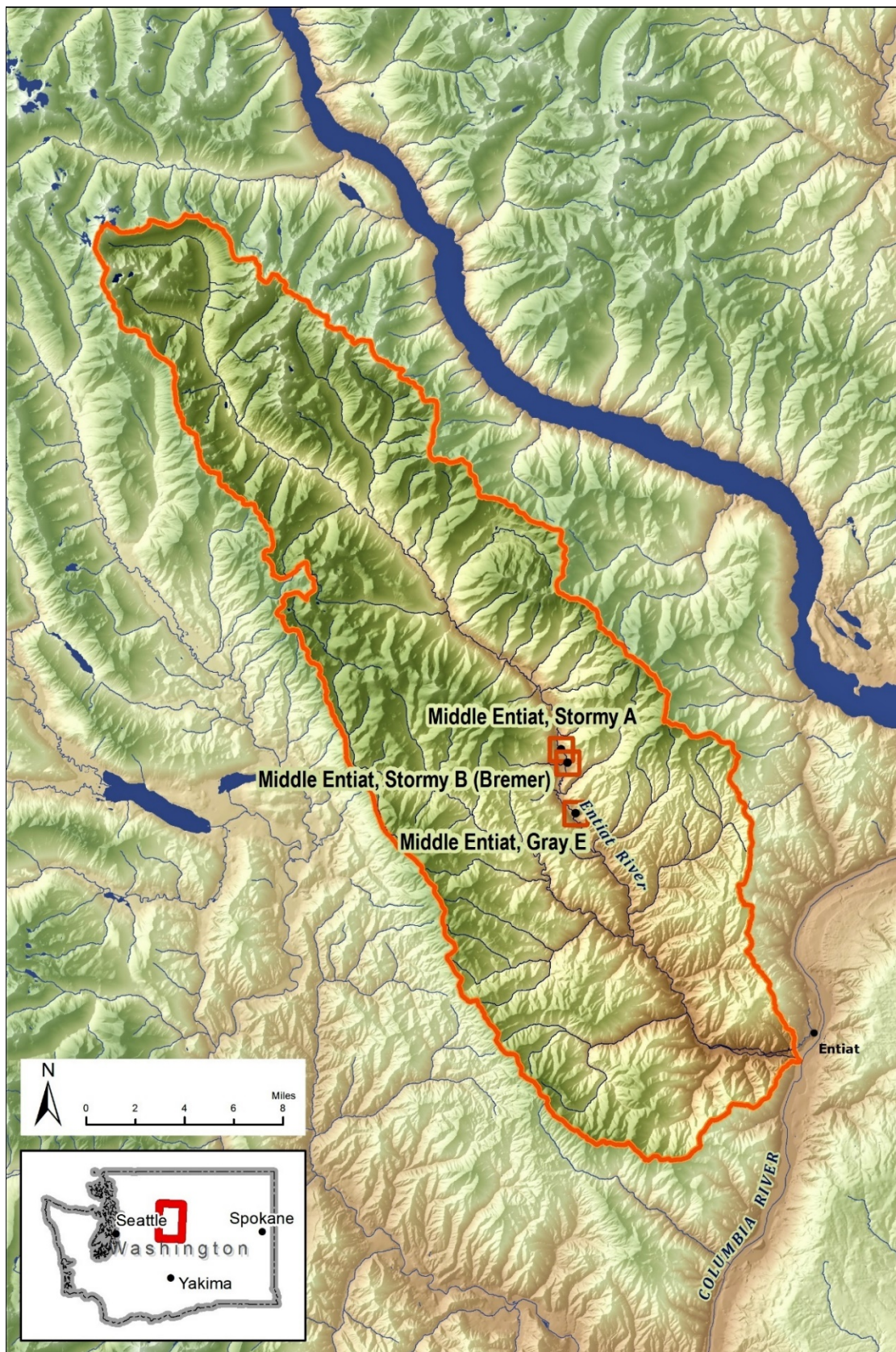
- Bonneville Power Administration
- Chelan County
- Chelan Douglas Land Trust

### Funding Sources:

- Bonneville Power Administration
- Bureau of Reclamation
- Yakama Nation Fish Accords

**Table 8:** Reclamation's total expenditures for completed projects in the Entiat River.

Subbasin	Reclamation's Development Cost
Entiat River	\$ 600,000



**Map 5:** Tributary habitat projects completed on the Entiat River in 2019.

## **Middle Entiat, Stormy A**

**Sponsor:** Yakama Nation

**Partners:** Chelan Douglas Land Trust and Chelan County

**Project Type:**

- **Channel Complexity:** 0.7 miles

**Latitude:** 47° 50' 50.52" N

**Longitude:** 120° 25' 13.16" W

**Funding Sources:** Yakama Nation Fish Accords, Bonneville Power Administration, and Reclamation

**NEPA Compliance:** Bonneville Power Administration's Fish and Wildlife Implementation Plan Environmental Impact Statement

**Reclamation's Development Cost:** \$ 200,000

**Reclamation's Partners' and Sponsors' Implementation Cost:** \$ 550,000

### **Project Description:**

The Stormy A project was originally part of Reclamation's Middle Entiat Projects. However, after preliminary designs were completed, the Yakama Nation became the project sponsor and manager. This project consists of several engineered log structures and two side channel enhancements. It is intended to provide off-channel rearing habitat for salmonids, as well as improve the main channel habitat.





**Photograph 23:** This large wood structure ensures flow into the newly constructed side channel on the river right. (Middle Entiat, Stormy A) (Reclamation/Steve Kolk)



**Photograph 24:** This view shows the typical construction of the engineered log jams in the project area. (Middle Entiat, Stormy A) (Reclamation/Steve Kolk)

## **Middle Entiat, Stormy B**

Phase I

**Sponsor:** Chelan County Natural Resources Department

**Partner:** Chelan Douglas Land Trust

**Project Type:**

– **Channel Complexity:** 0.6 miles

**Latitude:** 47° 50' 21.50" N

**Longitude:** 120° 24' 54.06" W

**Funding Sources:** Bonneville Power Administration and Reclamation

**NEPA Compliance:** Reclamation's Environmental Assessment

**Reclamation's Development Cost:** \$ 200,000

**Reclamation's Partners' and Sponsors' Implementation Cost:** \$ 1,500,000

### **Project Description:**

The purpose of the Middle Entiat, Stormy B project is to restore hydraulic connectivity between the Middle Entiat River and its floodplain. The project also improves the connectivity of flows with adjacent floodplain wetlands. The project re-establishes the flow connection of historic side channels and alcoves along the river. Through the strategic placement of large woody material along the Middle Entiat River's bends and bars, flows are directed into the restored side channels and alcoves and onto the floodplain. To assist with floodplain connections, levees were also removed throughout the project area.





**Photograph 25:** Large wood was added to the stream to improve fish habitat. The wood structures will provide refuge for juvenile salmonids during high flows. Also, apex structures narrow the channel and force higher flows onto the floodplain and into side channels, which creates beneficial habitat. (Middle Entiat, Stormy B) (Reclamation/Steve Kolk)



**Photograph 26:** Large wood is stabilized with vertical piles that are driven into the streambed. The large wood disrupts streamflow, which allows natural river processes to resume. (Middle Entiat, Stormy B) (Reclamation/Steve Kolk)





**Photograph 27:** Large wood was staged and transported to the individual structure sites via helicopter. (Middle Entiat, Stormy B) (Reclamation/Steve Kolk)





**Photograph 28:** Throughout the project, levees were removed down to the level of the natural floodplain. This allows the river greater access to improve habitat on the floodplains. (Middle Entiat, Stormy B)  
(Reclamation/Steve Kolk)





**Photograph 29:** The levee removal and installation of large wood allow natural river processes to resume along the project length. The natural processes will vastly improve habitat for spawning and rearing salmon and steelhead. (Middle Entiat, Stormy B) (Reclamation/Steve Kolk)



## **Middle Entiat, Gray E**

Phase I

**Sponsor:** Cascadia Conservation District

**Partner:** Bonneville Power Administration

**Project Type:**

– **Channel Complexity:** 0.6 miles

**Latitude:** 47° 48' 34.53" N

**Longitude:** 120° 24' 41.56" W

**Funding Sources:** Bonneville Power Administration and Reclamation

**NEPA Compliance:** Reclamation's Environmental Assessment

**Reclamation's Development Cost:** \$ 200,000

**Reclamation's Partners' and Sponsors' Implementation Cost:** \$ 450,000

### **Project Description:**

The project's purpose is to improve fish habitat by restoring hydraulic connectivity between the Middle Entiat River and its floodplain and by improving the connectivity of flows with adjacent floodplain wetlands. To fulfill this purpose, the project seeks to re-establish the connection of historic side channels and alcoves along the river. In addition, the project strategically placed large woody material along the Middle Entiat River's bends and bars to direct flow onto the floodplain and into the restored side channels and alcoves. The project will allow the river to establish more natural processes that will improve habitat for fish.



**Photograph 30:** Large woody material was placed in-stream to improve stream dynamics, provide habitat, and narrow the channel to allow the river to access the floodplain. (Middle Entiat, Gray E) (Reclamation/Steve Kolk)



**Photograph 31:** Large woody material was engineered in key locations to encourage flows into side channels, which improves stream processes and habitat. (Middle Entiat, Gray E) (Reclamation/Steve Kolk)





**Photograph 32:** Construction of the large wood structures involves driving vertical timbers to help stabilize the more horizontal portions of the structure. Root wads have proven to be crucial to the function of the large wood structures. (Middle Entiat, Gray E) (Reclamation/Steve Kolk)





**Photograph 33:** The large wood structures were constructed in key locations to encourage flows onto the floodplain and side channels. When a river accesses the floodplain, key rearing habitat for juvenile salmonids is available. (Middle Entiat, Gray E) (Reclamation/Steve Kolk)

## Methow River

The Methow River subbasin (HUC 17020008) is tributary to the Columbia River at RM 523.9 and has a drainage area of approximately 1,820 square miles. In 2019, one project was completed in the subbasin that improved channel complexity and riparian enhancement.

Reclamation's actions aim to improve habitat for the following ESA-listed fish species present in the Methow River: UCR spring-run chinook salmon (endangered) and UCR steelhead trout (threatened). Also present are UCR summer run chinook salmon (not listed) and Columbia River bull trout (threatened).

**Project:**

- Twisp River Floodplain Phase II

**Sponsor:**

- Methow Salmon Recovery Foundation

**Partner:**

- Bonneville Power Administration

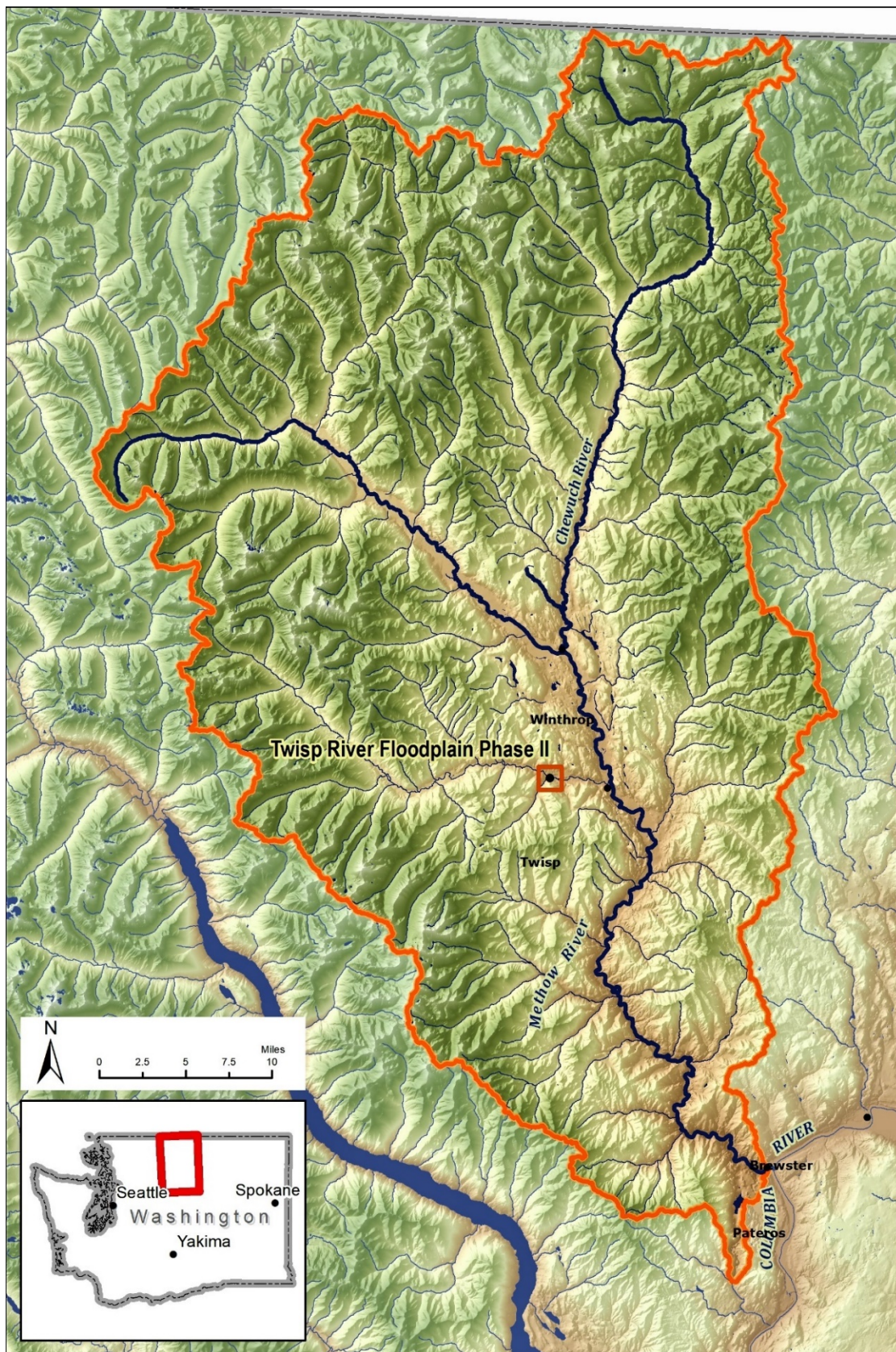
**Funding Sources:**

- Bonneville Power Administration
- Salmon Recovery Foundation Board

**Table 9:** Reclamation's total expenditures for completed projects in the Methow River.

Subbasin	Reclamation's Development Cost
Methow River	\$ 1,052,000





**Map 6:** Tributary habitat projects completed on the Methow River in 2019.

## **Twisp River Floodplain Phase II**

**Sponsor:** Methow Salmon Recovery Foundation

**Partner:** Bonneville Power Administration

**Project Types:**

- **Channel Complexity:** 0.5 miles
- **Riparian Enhancement:** 1 acre

**Latitude:** 48° 22' 10.74" N

**Longitude:** 120° 11' 43.46" W

**Funding Sources:** Bonneville Power Administration and Salmon Recovery Foundation Board

**NEPA Compliance:** Bonneville Power Administration's Fish and Wildlife Implementation Plan Environmental Impact Statement

**Reclamation's Development Cost:** \$ 1,052,000

**Reclamation's Partners' and Sponsors' Implementation Cost:** \$ 236,000

**Project Description:**

This habitat complexity project is located in a key area of the Twisp River to improve spawning and rearing habitat for anadromous fish. The project involves several elements including levee removal to provide a natural flood bench and allow riparian expansion; alcoves for off-stream juvenile rearing and refuge; large wood structures for habitat complexity; and riparian restoration.





**Photograph 34:** The right bank levee was removed in this area, which will allow access to the floodplain. This view shows the riparian plantings and roughness added to the right bank. (Twisp River Floodplain Phase II) (Reclamation/Steve Kolk)



**Photograph 35:** This view shows the completed entry to the side channel. The side channel activates during low and high flows, providing valuable rearing habitat. (Twisp River Floodplain Phase II) (Reclamation/Steve Kolk)