


Medford Irrigation District Joint System Canal Modernization Project Fish and Aquatic Species Technical Report

Prepared for

U.S. Department of Agriculture Natural Resources Conservation Service, Lead Federal Agency, in cooperation with the Medford Irrigation District

February 2026

Parametrix

fca

Medford Irrigation District Joint System Canal Modernization Project Fish and Aquatic Species Technical Report

Prepared for

U.S. Department of Agriculture Natural Resources Conservation Service, Lead Federal Agency, in cooperation with the Medford Irrigation District
USDA NRCS
Oregon State Office
1201 NE Lloyd Boulevard
Portland, OR 97232

Medford Irrigation District
5045 Jacksonville Highway
Central Point, Oregon 97502

Prepared by

Parametrix
5 SE Martin Luther King Jr. Boulevard, Suite 400
Portland, OR 97214
T. 503.233.2400 F. 1.206.649.6353
www.parametrix.com

Farmers Conservation Alliance
102 State Street
Hood River, OR 97031
T. 541.716.6085
www.fcasolutions.org

February 2026 | 273-8767-010

Citation

Parametrix. 2026. Medford Irrigation District Joint System Canal Modernization Project Watershed Plan–Environmental Impact Statement Fish and Aquatic Species Technical Report. Prepared for U.S. Department of Agriculture Natural Resources Conservation Service, Lead Federal Agency, in cooperation with the Medford Irrigation District by Parametrix, Portland, Oregon. February 2026.

Contents

Executive Summary ES-1

1. Introduction 1-1
   1.1 Project Location ..... Error! Bookmark not defined.
   1.2 Project Purpose and Need ..... Error! Bookmark not defined.

2. Project Alternatives ..... Error! Bookmark not defined.
   2.1 No Action (Future without Federal Investment) ..... Error! Bookmark not defined.
   2.2 Modernization Alternative (Future with Federal Investment) ..... Error! Bookmark not defined.
      2.2.1 Siphon Updates ..... Error! Bookmark not defined.
      2.2.2 Drainage Restoration ..... Error! Bookmark not defined.
      2.2.3 Irrigation Turnouts and Deliveries ..... Error! Bookmark not defined.

3. Definitions 2-1

4. Legal Regulations and Standards 3-1
   4.1 Laws, Plans, Policies, and Regulations 3-1
      4.1.1 Federal 3-1
      4.1.2 State of Oregon 3-2
      4.1.3 Jackson County 3-4
   4.2 Design Standards 3-4
      4.2.1 Endangered Species Act 3-4
      4.2.2 ODFW Fish Passage Criteria 3-4

5. Affected Environment 4-1
   5.1 Study Area 4-1
   5.2 Resource Identification and Evaluation Methods 4-1
      5.2.1 Published Sources and Databases 4-1
      5.2.2 Field Visits and Surveys 4-6
   5.3 Existing Conditions 4-6
      5.3.1 General Fish and Aquatic Species 4-6
      5.3.2 Federally Listed Fish and Aquatic Species 4-7
      5.3.3 State-Listed Fish and Aquatic Species 4-11
      5.3.4 Fish and Aquatic Species Habitat and Migration 4-12

Contents *(continued)*

6. Impact Assessment Methodology and Data Sources 5-1
6.1 Long-Term Impact Assessment Methods 5-1
6.2 Short-Term Impact Assessment Methods 5-1
6.3 Indirect Impact Assessment Methods 5-1
6.4 Cumulative Impact Assessment Methods 5-1

7. Environmental Consequences 6-1
7.1 Long-Term Impacts 6-1
7.1.1 No Action 6-1
7.1.2 Modernization Alternative (Future With Federal Investment) 6-1
7.2 Construction Impacts 6-12
7.2.1 Impacts from Pipe Construction 6-12
7.2.2 Potential Off-Site Staging Areas 6-17
7.3 Cumulative Effects 6-18
7.3.1 No-Build Alternative 6-18
7.3.2 Modernization Alternative 6-19
7.4 Compliance with Laws, Regulations, and Standards 6-20
7.4.1 Federal 6-20
7.4.2 State 6-22
7.4.3 Jackson County 6-24
7.5 Conclusion 6-24

8. Mitigation Measures 7-1

9. Contacts and Coordination 8-1

10. Preparers 9-1

11. References 10-1

FIGURES

Figure 1-1. Project Area ..... **Error! Bookmark not defined.**
Figure 5-1. Waterbodies Associated with District Operations and Infrastructure 4-4
Figure 5-2. Unnamed Drainages Associated with District Operations 4-5

Contents *(continued)*

Figure 5-3. Southern Oregon/Northern California Coast Coho Salmon Critical Habitat within the Study Area 4-9

TABLES

Table 5-1. Waterbodies Associated with District Operations and those that could be impacted by the Modernization Alternative 4-2

Table 5-2. Fish and Aquatic Species found in the Upper Rogue River and Little Butte Creek Watershed 4-6

Table 5-3. Fish and Aquatic Species found in Study Area Streams and Lakes within the Little Butte Creek Watershed 4-13

Table 7-1. Impacts of the Modernization Alternative on Waterbodies Associated with District Operations and Infrastructure 6-3

Acronyms and Abbreviations

ac	acre
AF	acre-feet
AF/year	acre-feet per year
BMP	best management practice
cfs	cubic feet per second
C.F.R.	Code of Federal Regulations
CWA	Clean Water Act
DEQ	Oregon Department of Environmental Quality
DSL	Oregon Department of State Lands
EFH	essential fish habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	evolutionarily significant unit
F.R.	Federal Register
JSC	Joint System Canal
MID	Medford Irrigation District
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
OAR	Oregon Administrative Rule
ODFW	Oregon Department of Fish and Wildlife
ORS	Oregon Revised Statute
Pub. L. No.	public law number
SMU	species management unit
RRVID	Rogue River Valley Irrigation District
TID	Talent Irrigation District
USACE	U.S. Army Corps of Engineers
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

Executive Summary

The Modernization Alternative would result in minor temporary impacts to fish and aquatic species along the Joint System Canal alignment during construction of the Joint System Canal Project. Construction adjacent to or within waterbodies may result in temporary impacts to water quality and in temporary displacement of fish and aquatic species. Following construction, the Project would result in minor long-term benefits to fish and aquatic species due to increases in habitat availability and quality within waterbodies associated with Medford Irrigation District operations. Because there would be a net benefit to fish and aquatic species from project implementation, and because best management practices employed during construction would avoid or minimize temporary impacts to associated habitats and species during and immediately following construction, no fish and aquatic species mitigation is proposed for the Modernization Alternative. The Joint System Canal Project would comply with federal, state, and local land use regulations related to fish, other aquatic species, and associated habitats.

1. Introduction

This technical report has been prepared as a part of the preparation of the Watershed Plan–Environmental Impact Statement (Plan-EIS) for the Joint System Canal Project (Project). The following sections identify and evaluate fish and aquatic species resource conditions within the Project Area and the potential effects of the project alternatives on fish and aquatic species and associated habitats.

2. Definitions

The following terminology is used when discussing geographic areas in this technical report.

Project Area. The area within which improvements associated with the project alternatives would occur and the area needed to construct these improvements. The Project Area consists of the current JSC alignment; the footprint of all modernization improvements proposed under the alternatives, including proposed siphons; , staging and storage, and temporary construction access.

Study area. This is the general geographic area within which physical direct or indirect impacts to the environment could occur with the project alternatives. The study area is resource-specific and differs depending on the environmental topic being addressed. For all resource topics, the study area encompasses the project area, and for some topics (such as soil resources), the geographic extent of the study area is the same as that for the project area. The study area for fish and aquatic species is substantially larger to account for impacts that could occur outside of the project area and is defined in Section 5.1.

3. Legal Regulations and Standards

3.1 Laws, Plans, Policies, and Regulations

Sensitive fish and aquatic species are regulated by several federal, state, local, and regional laws, plans, policies, and regulations.

3.1.1 Federal

3.1.1.1 Clean Water Act, 1977 as Amended, 33 U.S.C. 1251–1376

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The permitting processes within the purview of the CWA are summarized below.

Section 303(d) Impaired Waters and Total Maximum Daily Loads

Section 303(d) requires states and territories to issue water quality status reports every 2 years. These reports identify water quality trends, prioritize polluted waters, and target waters for total maximum daily load (TMDL) development. TMDLs identify the pollutant load reductions that are necessary from point and nonpoint sources and guide implementation work by federal, state, tribal, territorial, and local water quality protection programs. In Oregon, the Oregon Department of Environmental Quality (DEQ) develops and maintains a Section 303(d) list for approval by the U.S. Environmental Protection Agency (EPA).

Section 401 Water Quality Certification

Section 401 of the CWA requires states to set water quality standards for all contaminants in surface waters based on the "beneficial" or "designated" uses for the waterbody and makes it unlawful for a person to discharge a pollutant from a point source into navigable waters unless a permit was obtained under its provisions. It also recognizes the need to address the problems posed by nonpoint source pollution. Section 401 requires an applicant for a federal license, or a Section 404 permit applicant planning to conduct an activity that may result in a discharge to waters of the state or United States, to obtain a certification that the activity complies with state water quality requirements and standards. Regulatory authority is given to states and tribes directly through Section 401 of the CWA; the regulatory authority in Oregon is DEQ. Because these permits are administered by a state regulatory agency, their applicability is discussed under state regulations in Section 4.1.2.

Oregon Revised Statutes (ORS) 468 and 468B contain the codified body of statutory law that pertains to environmental quality and water quality for DEQ.

Applicants must submit a prefiling meeting request to DEQ at least 1 month prior to submitting the Section 404 application to the U.S. Army Corps of Engineers (USACE). After the Section 404 application is submitted, DEQ certifies whether a project meets state water quality standards and does not endanger waters of the state or United States or wetlands and forwards the application to EPA for review. Comments on the Section 404 application are addressed by the applicant. Upon completing EPA review, the Section 401 certification is issued by DEQ.

Section 402 National Pollutant Discharge Elimination System Permits

EPA requires National Pollutant Discharge Elimination System (NPDES) permits for industrial sites and construction activities, as well as for certain sizes of municipalities that discharge stormwater into waterways. In Oregon, these permits are administered through DEQ. Because these permits are administered by a state regulatory agency, their applicability is discussed under state regulations in Section 4.1.2. Construction stormwater management would likely require a 1200-CA Stormwater General Discharge Permit for projects that disturb more than 1 acre or that may affect waterways.

Section 404 for Permitting Discharges of Dredge or Fill Material

Section 404 requires a permit authorization from USACE for activities involving the discharge of dredge or fill material into waters of the United States, including wetlands. This permit would be required for work associated with project activities that would occur within a jurisdictional wetland or below the ordinary high-water mark of jurisdictional waterbodies.

3.1.1.2 Endangered Species Act of 1973 and Amendments, 16 U.S.C. 1531 et seq.

The Endangered Species Act (ESA) provides a framework to conserve and protect endangered and threatened species and designated critical habitats from effects such as those related to stormwater (e.g., water quality and hydromodification) and direct habitat impacts from construction and project design. The ESA is administered by the U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS).

3.1.1.3 Magnuson-Stevens Fishery Conservation and Management Act of 1976 and Amendments, 16 U.S.C. 1801 et seq.

The Magnuson-Stevens Fishery Conservation and Management Act governs marine fisheries management by fostering their long-term biological and economic sustainability. The act is administered by NMFS, and the act directs the agency to designate essential fish habitat (EFH) which is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity” and includes inland freshwater habitats used by anadromous salmonids.

3.1.1.4 Fish and Wildlife Coordination Act of 1934 and Amendments, 16 U.S.C. 661 et seq.

The Fish and Wildlife Coordination Act protects fish and wildlife when federal actions result in the control or modification of a natural stream or body of water. The applicant must coordinate with federal and state agencies during the environmental permitting process for a project, including during early coordination.

3.1.1.5 Public Law No. 83-566 Section 12

Under Pub. L. No. 83-566 Section 12, NRCS must inform and consult with USFWS for listed and nonlisted fish and wildlife resources.

3.1.2 State of Oregon

3.1.2.1 ORS 468B, Water Quality

ORS 466B sets effluent limitations, describes the implementation of the CWA, and sets permit requirements. It prohibits any person from causing pollution of any waters of the state or placing or

causing to be placed any wastes in a location where such wastes are likely to escape or be carried into the waters of the state by any means. The statute also prohibits the discharge of wastes into waters of the state if the discharge reduces the quality of such waters below the water quality standards established by rule for such waters by the Environmental Quality Commission. Additionally, this statute sets policies for preventing contamination of groundwater and guidance for activities that may affect Oregon's groundwater resources.

3.1.2.2 Section 401 Water Quality Certification

Pursuant to Section 401 of the CWA, a Section 401 water quality certification by DEQ is required for compliance with federal licensing or permitting agencies (Oregon Administrative Rule [OAR] 340-048). For certification, the applicant must show that the action will not result in exceedance of water quality standards set forth in OAR 440-041 and OAR 340-048.

Applicants must submit a prefiling meeting request to DEQ at least 1 month prior to submitting the Section 404 application to USACE. After the Section 404 application is submitted, DEQ certifies whether the project meets state water quality standards and does not endanger waters of the state or United States or wetlands and forwards the application to the EPA for review. Comments on the Section 404 application are addressed by the applicant. The DEQ water quality certification process requires a land use compatibility statement signed by the local government land use authority to ensure that permits affecting land use are compatible with local government comprehensive plans. Upon completion of the EPA review and after the land use compatibility statement is signed, Section 401 certification is issued by DEQ.

3.1.2.3 1200-CA Construction Stormwater Permit

A NPDES 1200-CA permit is issued pursuant to ORS 468B.050 and Section 402 of CWA. DEQ requires this permit for construction activities on sites that cover 1 or more acres and could potentially generate stormwater runoff into surface waters or conveyance systems leading to surface waters of the state (OAR 40-045-0015). This permit requires a temporary erosion and sediment control plan, a list of selected best management practices (BMPs) for a project, and a schedule for implementing the BMPs. Guidance on preparing an erosion and sediment control plan is provided in the DEQ March 2022 Construction Stormwater Application and Forms Manual (DEQ 2022a).

3.1.2.4 ORS 196.795-990, Oregon Removal-Fill Law

Oregon's removal-fill law requires individuals or entities that plan to remove or fill material in wetlands or waterways of the state to obtain a removal-fill permit from the Oregon Department of State Lands (DSL). The removal-fill law applies to all landowners, whether private individuals or public agencies. The purpose of the law is to ensure protection and the best use of Oregon's water resources for home, commercial, wildlife habitat, public navigation, fishing, and recreational uses. A permit is required if an activity involves removing or filling 50 cubic yards or more of material in a wetland or waterway of the state. For activities in state-designated Essential Salmonid Habitat (ESH), State Scenic Waterways, and compensatory mitigation sites, a permit is required for any amount of removal or fill.

3.1.2.5 OAR Division 412, Fish Passage

OAR Division 412, Fish Passage, prohibits the construction, abandonment, or major replacement of an artificial obstruction across any waters in the state containing native migratory fish without fish

passage. Fish passage regulations are administered by ODFW. Fish passage plans for artificial obstructions must have approval from ODFW and meet the requirement of OAR 635-412-0035.

3.1.2.6 OAR Division 635, Oregon Endangered Species Act and Sensitive Species Rule

The Oregon Endangered Species Act (OAR 635-100-0100 to 0130) goal is to manage state-listed threatened and endangered species and their habitats so that the condition of these species improves a point where delisting is warranted. For species not covered under ESA but listed as threatened or endangered by ODFW, an incidental take permit submitted to ODFW is required for projects that impact these species (OAR 635-100-0170). The Oregon Sensitive Species Rule (OAR 635-100-0040) focuses on fish and wildlife conservation, management, and research on species that need conservation attention, and helps to prevent these species from becoming listed as threatened or endangered.

3.1.2.7 OAR Division 660, Oregon Statewide Planning Goals and Guidelines

In Oregon, Goal 6 instructs local governments to consider protecting air, water, and land resources from pollution and pollutants when developing comprehensive plans (OAR 660-015). The relevant pollutants considered include (but are not limited to) solid waste, water waste, and thermal pollution. The goal asks cities and counties to designate areas suitable for use in controlling pollution. It calls on them to use a variety of market, zoning, and management tools in creating these outcomes.

3.1.3 Jackson County

3.1.3.1 Comprehensive Plan

The Jackson County Comprehensive Plan (Jackson County 2005) contains issues, goals, and policies to guide the County's long-range general land use planning decisions including goals and policies for water quality and the proper management of water areas, watersheds, and groundwater resources. DEQ is the lead agency referenced in the comprehensive plan for regulating and managing water quality in Jackson County.

3.2 Design Standards

3.2.1 Endangered Species Act

Assuming the Project is permitted under Section 404 of the CWA through USACE, compliance with the ESA would be required to protect ESA-listed fish runs and associated critical habitats. Project design for elements affecting ESA-listed fish habitat, including in-stream resources and stormwater management, would follow Standard Local Operating Procedures (SLOPES) for Stormwater, Transportation or Utilities actions authorized by USACE in Oregon that may affect endangered species under the authority of NMFS under Section 7 of the ESA (NMFS 2014b). Procedures include general construction measures for project timing, fish capture and release, fish passage, drilling and boring, stockpiling materials, erosion control, work area isolation, and site restoration. Design and construction of utility line stream crossings would be applied where feasible for Project implementation.

3.2.2 ODFW Fish Passage Criteria

The project design would follow criteria outlined in OAR 635-412-0035 Fish Passage Criteria, administered by ODFW, for in-water work in waterbodies that contain native migratory fish.

Temporary artificial obstruction criteria include guidelines for project timing, fish passage, work area isolation, fish salvage, and site restoration. If required, restored drainages would be designed to provide for up- and downstream migration for all life history stages of species determined to occur within the given waterbody.

4. Affected Environment

4.1 Study Area

The study area for fish and aquatic species includes the existing canal alignment, the Modernization Alternative footprint and proposed alignment options, and all waterbodies affected by District operations and infrastructure. These waterbodies include North Fork Little Butte Creek; South Fork Little Butte Creek; Lake Creek; Osborne Creek; Wyant, Grasshopper, Owens, and Eagle Gulch drainages; Unnamed Drainages 1 to 10; Little Butte Creek; the Rogue River; Fish Lake; and Fourmile Lake (see Table 5-1, Figure 5-1, and Figure 5-2).

4.2 Resource Identification and Evaluation Methods

4.2.1 Published Sources and Databases

Sources used to conduct this fish and aquatic species analysis include the following:

- Google Earth Aerial Imagery (1984–2023)
- National Oceanic and Atmospheric Administration (NOAA) EFH Mapper (NOAA 2024)
- NMFS ESA Critical Habitat Mapper (NMFS 2024)
- Oregon Biodiversity Information Center (ORBIC 2023)
- ODFW Fish Habitat Distribution and Barriers Webmap (ODFW 2024)
- ODFW Threatened, Endangered, and Candidate Fish and Wildlife Species List (ODFW 2021a)
- DSL Essential Salmonid Habitat Map (DSL 2023)
- USFWS Critical Habitat Mapper (USFWS 2024a)
- USFWS Environmental Conservation Online System (USFWS 2024b)
- USFWS Information, Planning, and Consultation (IPaC) System Official Species List (USFWS 2025)

Table 5-1. Waterbodies Associated with District Operations and those that could be impacted by the Modernization Alternative

Name	Associated River Miles	Size	Tributary To	Project Nexus
North Fork Little Butte Creek	Confluence with Little Butte Creek to outlet of Fish Lake (RM 16)	N/A	Little Butte Creek	Flow timing and quantity in North Fork Little Butte Creek is largely controlled by discharge from Fish Lake. Water is diverted from North Fork Little Butte Creek at RM 0.9 into the JSC for use by MID and RRVID. Water diversion cannot exceed 125 cfs.
South Fork Little Butte Creek	Confluence with Little Butte Creek to JSC diversion point (RM 1.1)	N/A	Little Butte Creek	Water is diverted from South Fork Little Butte Creek at RM 1.1 into the JSC for use by MID and RRVID. Water diversion cannot exceed 100 cfs.
Lake Creek	Mouth of creek to siphon (RM 0.25)	N/A	Little Butte Creek	The JSC traverses underneath Lake Creek via an existing concrete siphon.
Osborne Creek	Mouth of creek to siphon (RM 0.7)	N/A	Little Butte Creek	The JSC traverses underneath Osborne Creek via an existing concrete siphon.
Wyant Gulch	Mouth of creek to siphon (RM 0.27)	N/A	Little Butte Creek	The JSC traverses underneath Wyant Gulch via an existing concrete siphon.
Grasshopper Gulch and Eagle Gulch	Mouth of creek to JSC (RM 0.28/1.05)	N/A	Little Butte Creek	Grasshopper and Eagle gulches flow into the JSC. A headgate allows a mixture of stream and canal water to continue downslope.
Owens Gulch	Mouth of creek to JSC (RM 0.58)	N/A	Little Butte Creek	Owens Gulch flows into the JSC. No headgate is present. The waterbody begins 100+ feet downslope of the JSC due to groundwater discharge.
Unnamed Drainages 1–6, 8, and 9	Mouth of creek to JSC (RM 0.05 to 0.72)	N/A	Little Butte Creek	These unnamed drainages flow into the JSC. No headgate is present. The waterbody begins 100+ feet downslope of the JSC due to groundwater discharge.
Unnamed Drainages 7 and 10	Mouth of creek to JSC (RM 0.48/1.45)	N/A	Little Butte Creek	These unnamed drainages flow into the JSC. A headgate allows a mixture of stream and canal water to continue downslope.
Little Butte Creek	Confluence with the Rogue River to confluence of North Fork Little Butte Creek and South Fork Little Butte Creek (RM 17.2)	N/A	Rogue River	Water diverted from North Fork Little Butte Creek and South Fork Little Butte Creek are diverted into the JSC which alters flow volume in Little Butte Creek.

Name	Associated River Miles	Size	Tributary To	Project Nexus
Rogue River	Former Gold Ray Dam (RM 126) to confluence with Little Butte Creek (RM 132)	N/A	Pacific Ocean	Water diverted from North Fork Little Butte Creek and South Fork Little Butte Creek is diverted into the JSC which alters flow volume in the Rogue River.
Fish Lake	N/A	7,900 AF	Outlets into North Fork Little Butte Creek	MID and RRVID hold a water right of 7,900 AF of primary storage in Fish Lake. Water levels are controlled by MID.
Fourmile Lake	N/A	15,600 AF	Outlets into Fish Lake	MID and RRVID hold a water right of 15,600 AF of primary storage in Fourmile Lake. Water levels are controlled by MID.

AF = acre-feet; cfs = cubic feet per second; JSC = Joint System Canal; MID = Medford Irrigation District; RM = river mile; RRVID = Rogue River Valley Irrigation District

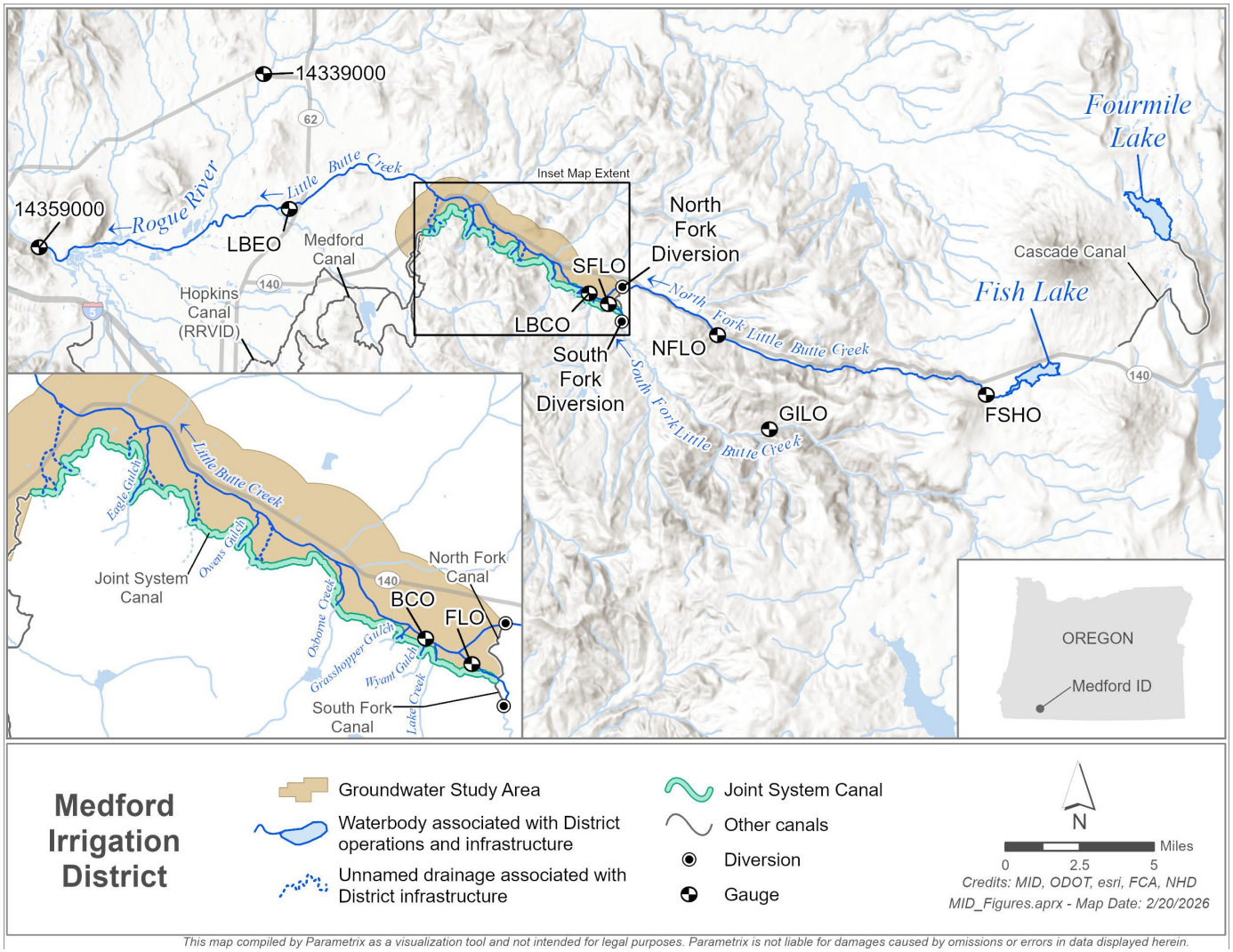


Figure 5-1. Waterbodies Associated with District Operations and Infrastructure

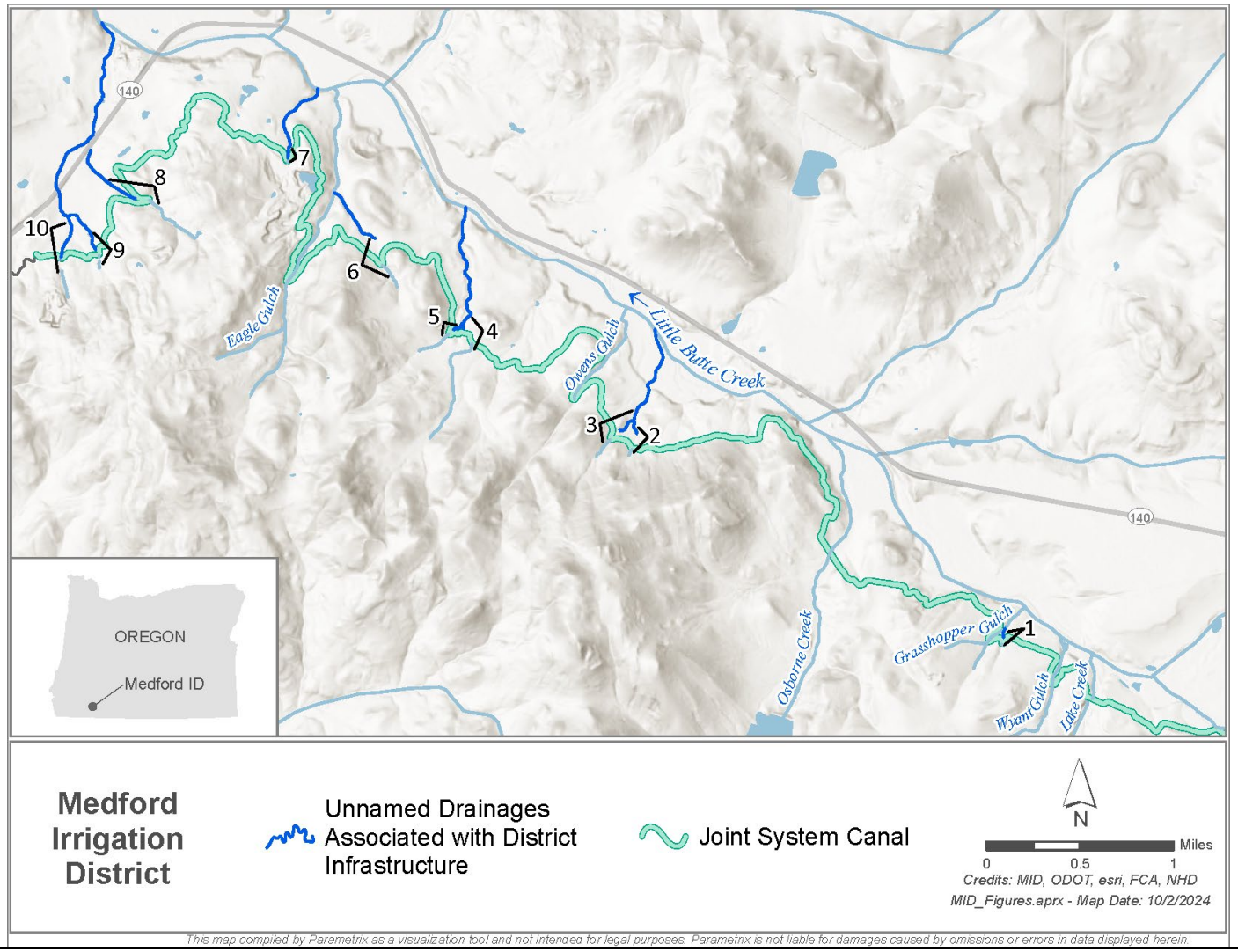


Figure 5-2. Unnamed Drainages Associated with District Operations

4.2.2 Field Visits and Surveys

Wetland and water delineation surveys were conducted throughout the project area in April and May 2024. The surveys identified wetlands and other waters of the state regulated by DSL and waters of the United States regulated by USACE within the project area. The surveys delineated the boundaries in addition to characterizing stream substrate, bank conditions, and riparian communities. Riparian communities are discussed in detail in the Terrestrial Ecology and Wetlands Technical Report and in the Wetland Delineation Report.

4.3 Existing Conditions

4.3.1 General Fish and Aquatic Species

Waterbodies within the study area provide habitat to 15 documented species of fish and aquatic species (Table 5-1 and Table 5-2). Protected native fish species present include coho salmon (*Oncorhynchus kisutch*), spring and fall Chinook salmon (*O. tshawytscha*), summer and winter steelhead (*O. mykiss*), coastal cutthroat (*O. clarkii*), rainbow trout (*O. mykiss),* and Pacific lamprey (*Entosphenus tridentata).* Nonnative fish species are not abundant within the study area and are primarily restricted to Fish and Fourmile lakes; the species include brook trout (*Salvelinus fontinalis)* and lake trout (*Salvelinus namaycush)*. Northwestern pond turtle (NWPT) is known to occur in the Upper Rogue River basin and is recorded using habitats in and adjacent to Little Butte Creek (USFWS 2023; ORBIC 2023).

Waterbodies within the study area are listed as EFH for Chinook and coho salmon (NOAA 2024). The Rogue River, Little Butte Creek, North Fork Little Butte Creek, South Fork Little Butte Creek, and Lake Creek are also listed as ESH (DSL 2023).

Table 5-2. Fish and Aquatic Species found in the Upper Rogue River and Little Butte Creek Watershed

Common Name	Scientific Name	Upper Rogue River [a]	Little Butte Creek Watershed [b]	Native	Threatened/ Endangered Status
Brook trout	*Salvelinus fontinalis*	No	Yes	No	-
Chinook salmon (spring and fall)	*Oncorhynchus tshawytscha*	Yes	Yes [c]	Yes	State sensitive.
Coastal cutthroat	*O. clarkii*	Yes	Yes	Yes	-
Coho salmon	*O. kisutch*	Yes	Yes	Yes	Federally threatened.
Klamath smallscale sucker	*Catostomus rimiculus*	Yes	Yes	Yes	-
Lake trout	*Salvelinus namaycush*	No	Yes	No	-
Mountain whitefish [c]	*Prosopium williamsoni*	Yes	Yes	Yes	-
Pacific lamprey	*Entosphenus tridentata*	Yes	Yes	Yes	State sensitive. Federal species of concern.

Common Name	Scientific Name	Upper Rogue River [a]	Little Butte Creek Watershed [b]	Native	Threatened/ Endangered Status
Rainbow trout	*Oncorhynchus mykiss*	Yes	Yes	Yes	-
Redside shiner	*Richardsonius balteatus*	Yes	Yes	Yes	-
Rogue smallscale sucker	*Catostomus rimiculus*	Yes	No	Yes	-
Steelhead (summer and winter)	*Oncorhynchus mykiss*	Yes	Yes	Yes	State sensitive.
Tiger trout	*Salmo trutta* × *Salvelinus fontinalis*	No	Yes	No	-
Tui chub	*Siphateles bicolor*	No	Yes	Yes	-
Umpqua pikeminnow	*Ptychocheilus umpquae*	Yes	No	Yes	-
Northwestern pond turtle	*Actinemys marmorata*	Yes	Yes	Yes	State sensitive. Proposed to be listed as federally threatened.

Adapted from ODFW, 2024, Oregon Fish Habitat Distribution and Barriers; ORBIC, 2023.

a Rogue River from river mile (RM) 126 to confluence with Little Butte Creek (RM 132).

b Includes all species known to occur in either Little Butte Creek, North Fork Little Butte Creek, and South Fork Little Butte Creek from mouth to diversion (RM 1.1), Lake Creek from mouth to siphon (RM 0.25), Fish Lake, and Fourmile Lake.

c Likely present based upon known presence in the basin and habitat characteristics.

4.3.2 Federally Listed Fish and Aquatic Species

4.3.2.1 Southern Oregon/Northern California Coast Coho Salmon

The Southern Oregon/Northern California Coast (SONCC) coho salmon Evolutionarily Significant Unit (ESU) was listed as threatened under the ESA in 1997. Activities cited as responsible for the decline of this species' ESU include logging, road building, grazing, mining, stream channelization, dams, wetland loss, artificial propagation, over-fishing, water withdrawals, and unscreened diversions for irrigation (62 F.R. 24588).

Within the Rogue River, coho salmon runs were over 100,000 in the 1800s (Meengs and Lackey 2005). Early threats such as commercial fishing and dam building initially reduced population abundance. Commercial fishing ended in 1934 due in large part to a continued meager harvest (NMFS 2012). Development of the upper Rogue River Valley continued to put stressors on SONCC coho salmon. Currently, the 12-year average for spawning adults in the Rogue River is 6,717 (NMFS 2016). SONCC coho within the Rogue River have experienced a positive population trend within the last 35 years (NMFS 2016).

Within the interior Rogue River Watershed, SONCC coho salmon is broken into three subpopulations that are functionally independent. The Upper Rogue River subpopulation constitutes SONCC coho salmon within the study area (NMFS 2016). The Upper Rogue River subpopulation is a core population with a moderate risk of extinction (NMFS 2016) and is limited by agriculture and development (NMFS 2014a). The 20-year average for spawning adults passing through former Gold

Ray Dam in the Upper Rogue River is 4,805 individuals (NMFS 2014a). Data from the former dam also indicate that the Upper Rogue River coho subpopulation is increasing (NMFS 2014a).

Within the study area, coho salmon spawn, rear, and migrate. The Rogue River within the study area is primarily used for rearing and migration, whereas the Little Butte Creek watershed is primarily used for spawning and rearing (ODFW 2024). The Little Butte Creek Watershed is highly productive and is estimated to spawn and rear approximately 10 percent of the Rogue River Basin coho population (BLM and USFS 1997). Among watersheds sampled, Little Butte Creek consistently produces the largest amount of smolts within the Rogue River Basin with an approximate average of 28,559 smolts produced annually between 1998 and 2004 (ODFW 2004).

Coho salmon within the study area spawn between November 1 and January 31 (NMFS 2012). Eggs are generally incubating from November 1 through May 31. Eggs will thereafter hatch, and juveniles rear within their natal streams until they transition to smolts and emigrate out to the ocean between February 15 and June 30. Returning spawning adults will migrate back between October 1 and January 31.

Critical habitat for SONCC coho salmon includes all accessible waterways, substrates, and adjacent riparian zones between the Elk River in Oregon and the Mattole River in California (64 F.R. 24049). Critical habitat contains the following:

1. *Space for individual and population growth, and for normal behavior;*
2. *food, water, air, light, minerals, or other nutritional or physiological requirements;*
3. *cover or shelter;*
4. *sites for breeding, reproduction, or rearing offspring; and, generally,*
5. *habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species.*

In addition to these factors, NMFS focused on known physical and biological factors (also referred to as primary constituent elements and/or essential features) that are essential to the conservation of the species. These essential features include, but are not limited to, spawning sites, water quality and quantity, food resources, and riparian vegetation (64 F.R. 24049). Waterbodies recorded to contain individuals of SONCC coho salmon are assumed to contain these requirements and would be considered critical habitat (Figure 5-1). Waterbodies without recorded presence of SONCC coho salmon are assumed to lack these requirements and are assumed not to be considered critical habitat. Fish Lake Dam is identified as a dam that blocks access to historically occupied SONCC coho salmon habitat, and upstream habitat was excluded from critical habitat designation (64 F.R. 24049). Waters assumed to be SONCC coho salmon critical habitat within the study area are shown in Figure 5-3.

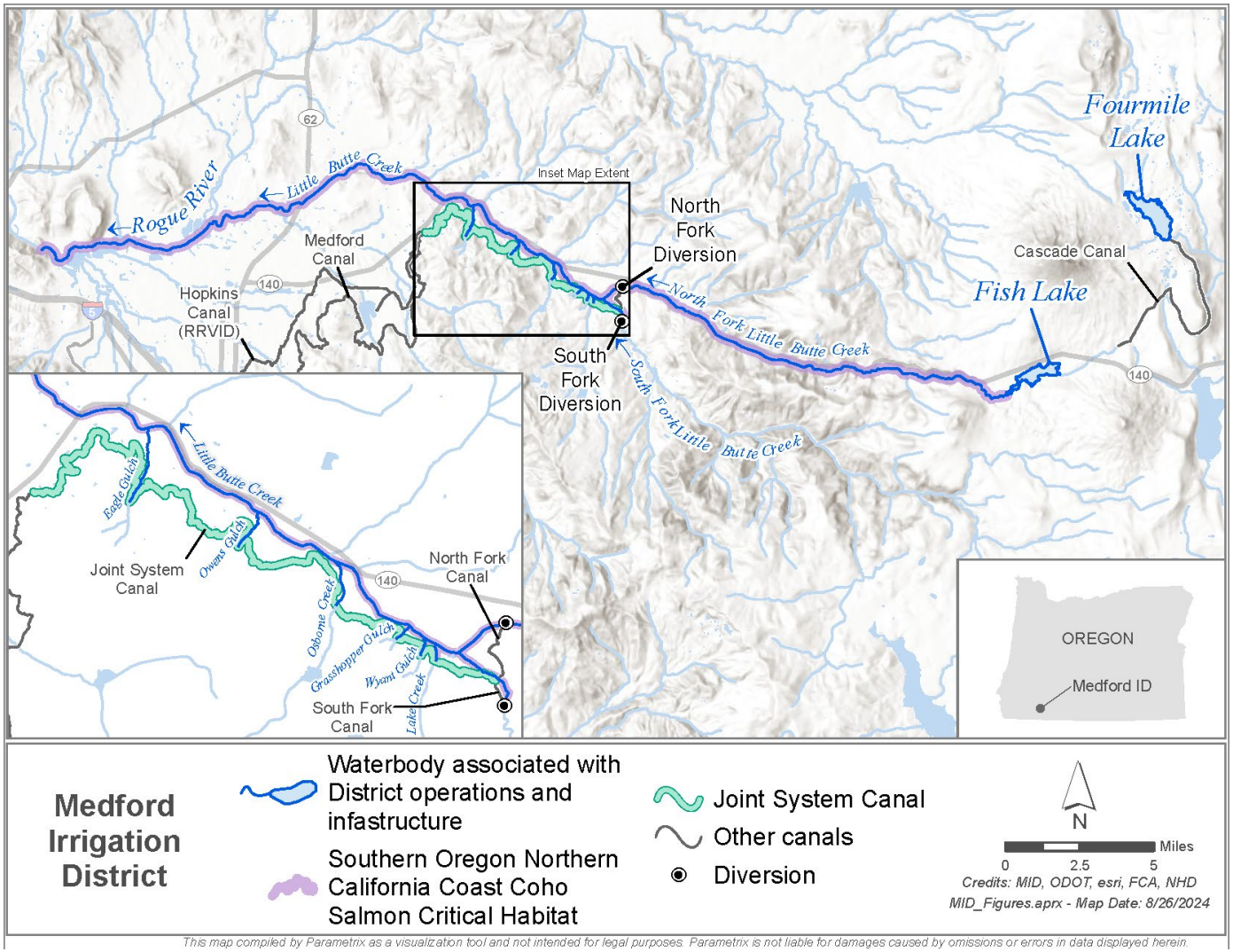


Figure 5-3. Southern Oregon/Northern California Coast Coho Salmon Critical Habitat within the Study Area

Waterbodies within the study area are impacted by Bureau of Reclamation (Reclamation) operations and maintenance of the Rogue River Basin Project. Reclamation's Rogue River Basin Project includes water collection facilities in the headwater of South Fork Little Butte Creek. These water collection facilities, operated and maintained under contract by Talent Irrigation District (TID), divert water from six headwater streams within the South Fork Little Butte Creek watershed and transport the collected water via South Fork Collection Canal and Dead Indian Creek Canal into the Klamath River Basin and into Howard Prairie Reservoir. Diversions occur mainly during winter and spring and divert an annual average of 14,800 acre-feet (NMFS 2012). Diversion from these headwater streams results in a reduction in streamflows and available habitat for fish and aquatic species within South Fork Little Butte Creek and Little Butte Creek. As a result of the diversion, modeled flows in South Fork Little Butte Creek have a median decline of 1 to 7 cubic feet per second (cfs) between July and November and a median decline of 7 to 49 cfs between December and May. Loss of flow within South Fork Little Butte Creek, a tributary of Little Butte Creek, results in a loss of flow within Little Butte Creek from a median decline of 0 to 6 cfs between July and November and a median decline of 7 to 55 cfs between December and May. Reductions in flow within South Fork Little Butte Creek slightly reduce rearing habitat for juveniles whereas reductions in flow within Little Butte Creek moderately reduce rearing habitat for juveniles (NMFS 2012). In addition, SONCC coho salmon within South Fork Little Butte Creek are further impacted by delayed migration and displacement or stranding as a result of TID's flow management. NMFS, in 2012, issued a biological opinion on the Rogue River Basin Project stating the project is unlikely to jeopardize SONCC coho salmon or result in the adverse modification of the species' critical habitat. In the biological opinion, NMFS provided an incidental take statement which describes the conservation measures necessary to minimize the impact of the take which include reduction in TID's diversions within the headwaters of South Fork Little Butte Creek, minimum flows in Little Butte Creek and South Fork Little Butte Creek (see the Water Resources Technical Report, Section 5.3.2), minimize diversion ramping, and place large woody debris within Little Butte Creek and South Fork Little Butte Creek.

4.3.2.2 Northwestern Pond Turtle (Proposed for Listing)

USFWS proposed to list NWPT as threatened under the ESA on October 3, 2023 (88 F.R. 68370) and no final determination for listing has been made. In Oregon, NWPT abundance is highest in the Willamette, Umpqua, Klamath, and Rogue river drainages (Rosenberg et al. 2009). Holland (1994) reported low densities of NWPT in the Rogue River Basin with some moderately sized populations of 30 or more individuals. Manzo et al. (2021) recorded a population of up to 50 individuals within the Upper Rogue River Basin. Within the study area, NWPT is known to occur in Little Butte Creek and may occur within the Rogue River and Little Butte Creek tributaries (USGS 2018; ORBIC 2023; USFWS 2023). Within the project area, NWPT was observed basking along the bank of the JSC during the Parametrix field investigations in April and June 2024.

NWPT is semi-aquatic, using terrestrial and aquatic habitats for various life history phases. Terrestrial environments are needed for nesting and aestivation, whereas aquatic environments are used for breeding and feeding (USFWS 2023). Both aquatic and terrestrial environments are used for basking, overwintering, and movement or dispersal (USFWS 2023). Aquatic environments used by NWPT include intermittent streams, canals, lakes, and reservoirs. The species prefer aquatic environments that have standing or slow-moving water and that contain abundant basking sites and underwater shelter sites (USFWS 2023). NWPT may be found in some larger rivers but is generally restricted to areas near the riverbank or in adjacent backwater habitat where the current is slower and where basking sites exist (WDW 1994). Streams, rivers, and artificial and natural small ponds with muddy bottoms, abundant basking sites, aquatic refugia, and slow-moving or standing water are the most common and preferred habits for the species (Bury and Germano 2012; ODFW 2023b).

NWPT generally stays within approximately 1,640 feet of waterbodies; nest sites are 167 feet from water, on average (USFWS 2023). NWPT has been documented to disperse as far as 4.3 miles upstream and 3.1 miles overland (Holland 1994). Oviposition generally occurs from May through July, with northern populations having later egg deposition than southern populations (Bury et al. 2012). Nests are excavated in compact dry soils that are loose enough to allow excavation and typically have high clay or silt content. Areas with sparsely vegetated soils and high solar exposure provide suitable conditions for nesting (USFWS 2023; ODFW 2023b). NWPT is extremely sensitive to disturbance during nesting and may abandon nest excavation in response to nearby disturbance (Holland 1994).

After hatching in fall, the young may overwinter in the nest (ODFW 2023b). In western Oregon, NWPT may delay emergence until the following spring and stay within 6 feet of the nest for up to 59 days after emergence (Rosenberg 2013). During late spring, summer, and early fall, the species primarily occupy aquatic environments, foraging on aquatic invertebrates, small vertebrates, carrion, and plant material (Holland 1994). To properly thermoregulate, NWPT intermittently basks in and out of the water. Basking sites are an integral habitat requirement for NWPT as thermoregulation supports physiological functions such as metabolism, reproduction, and growth (USFWS 2023). During the hottest time of the year (late summer) or prolonged dry periods, NWPT seeks shelter under wood and duff in areas of moist forest or shrub habitat where it enters a period of dormancy called aestivation (USFWS 2023).

Adult NWPT can overwinter in aquatic environments (in bottom sediments of ponded areas) or in upland areas (under leaf litter or duff in moist shrublands and forested habitats; Reese and Welsh 1997). Adult NWPT overwintering in aquatic habitats requires a soft, muddy layer at the bottom of ponds to insulate against extreme temperatures, along with water that is sufficiently deep (approximately 4 feet) throughout the duration of hibernation (ODFW 2015).

Populations of NWPT rangewide are anticipated to decrease due to threats such as habitat loss and fragmentation, altered hydrology, predation (native and nonnative species), competition (nonnative species), road mortality, collection, contaminants, and climate change. Within the Little Butte Creek Watershed, NWPT is within the Southwest Oregon Analysis Unit (AU-9; USFWS 2023). The AU-9 unit was estimated to have a 9 percent probability of extinction by 2050 (USFWS 2023). The probability of extinction increases with time, with a 32 percent and 49 percent probability of extinction by 2075 and 2100, respectively (USFWS 2023).

4.3.3 State-Listed Fish and Aquatic Species

ODFW maintains a list of native wildlife species in Oregon that have been determined to be either threatened or endangered according to criteria set forth by OAR 635-100-0105. SONCC coho salmon is state-listed as threatened by ODFW and is discussed in Section 5.3.2.1. No other species that are state-listed threatened, endangered, or candidate fish or aquatic species are known to occur within the study area.

NWPT is listed as sensitive by ODFW (2021b) and is discussed in Section 5.3.2.2. The Rogue Chinook salmon species management unit (SMU), Rogue SMU winter-run steelhead, and Pacific lamprey are also listed as sensitive by ODFW. The winter-run steelhead Rogue SMU was determined to not be at risk in regard to its near-term sustainability (ODFW 2005). The Pacific lamprey SMU within the study area includes the Rogue River Basin in addition to other coastal watersheds (excluding the Columbia River) and its near-term sustainability was determined to be at risk (ODFW 2005).

4.3.4 Fish and Aquatic Species Habitat and Migration

The study area is used by a variety of anadromous and resident fish and aquatic species (Table 5-2 and Table 5-3). Anadromous species—such as Chinook salmon, coho salmon, steelhead, and Pacific lamprey—use waterbodies in the study area for adult and smolt migration, juvenile rearing, and spawning. Resident fish and aquatic species—such as coastal cutthroat, rainbow trout, redside shiner, NWPT, and mountain whitefish—use waterbodies in the study area for foraging, migration, overwintering, juvenile rearing, spawning and breeding (ODFW 2024).

Streams within the study area support habitats required for the life stages of anadromous and resident fish and aquatic species. However, habitat quality is limited by land use impacts such as agriculture, grazing, irrigation diversion and impoundments, forestry, and road and residential development (NMFS 2012). Agricultural encroachment of the floodplain has resulted in a narrowed riparian area with few side channels. A narrow riparian area has likely resulted in reduced recruitment of large wood in these streams and has, overall, caused a decline in structural complexity. Loss of riparian vegetation has also resulted in an over 50 percent reduction in shading of rivers in the Upper Rogue River Watershed which has elevated stream temperatures (DEQ 2008). Numerous diversion dams within the Little Butte Watershed have altered channel geomorphology and substrate composition, and they pose partial barriers to fish movement. Numerous stream crossings in the watershed further limit stream geomorphology and riparian areas.

Migratory fish passage has recently improved within the Rogue River Watershed. Savage Rapids Dam, Gold Hill Diversion Dam, and Gold Ray Dam were all removed along the Rogue River from 2008 to 2010, greatly improving passage conditions for migratory anadromous and resident fish. The Savage Rapids Dam was particularly harmful to migration of SONCC coho salmon, wherein an estimated 22 percent of migrating coho were killed each year by the dam (USFWS 1981).

Water quality and quantity are impacted by water diversion and flood irrigation. Water diversions limit habitat availability within streams and result in elevated temperature and lower dissolved oxygen. Flood irrigation can result in tailwater runoff into waterbodies which harms water quality parameters such as turbidity, temperature, and nitrogen and phosphorus concentrations. As a result of water management and flood irrigation, in addition to land use impacts in the watershed, all waterbodies within the study area are included on the Oregon Section 303(d) impaired list for water quality parameters such as temperature, dissolved oxygen, sedimentation, and phosphorus (DEQ 2022b). Water quality impairments and habitat loss due to reduced water quantity further limit habitat quality for anadromous and resident fish and aquatic fish species.

Poor water quality within the JSC likely acts as a point and nonpoint source of pollution to nearby waterbodies. Irrigation water conveyance in the JSC results in water temperatures to increase and turbidity levels to elevate. Impaired water within the JSC is able to enter nearby waterbodies through canal seepage and incidental headgate release, degrading water quality in the receiving streams. Incidental headgate release into tributaries of Little Butte Creek (Grasshopper Gulch, Eagle Gulch, Unnamed Drainages 7 and 10) during the irrigation season likely elevates temperatures and turbidity levels within these waterbodies which may have an associated effect on downstream waterbodies such a Little Butte Creek. Canal seepage water may be further degraded along its flow path to receiving waterbodies as it passes through agricultural fields, potentially resulting in elevated temperature, *E. coli* concentrations, and turbidity levels as is observed for flood irrigation tailwater in the area.

More information on current water quality within the study area can be found in the Water Resources Technical Report, Section 5.3.3.

The JSC within the project area does not support game fish and salmonids. Vertical plate fish screens compliant with ODFW standards were installed on the North Fork and South Fork diversions in the early 2000s to prevent entrainment of fish and aquatic species. The diversion structures on each creek are partial barriers to fish passage and are listed on the ODFW Fish Passage Priority List (ODFW 2024). These partial barriers are impediments to fish movement within the Little Butte Creek Watershed. The JSC supports habitat for NWPT and may serve as habitat for other aquatic reptiles or amphibians.

Table 5-3 and the following sections summarize fish and aquatic species habitat in each waterbody affected by District operations. Other waterbodies within the study area not listed in Table 5-3 do not have records of historic or current fish presence. A native migratory fish habitat determination conducted by ODFW during the winter of 2025 determined that within the vicinity of the JSC, Wyant, Owens, Eagle, and Grasshopper gulches in addition to Unnamed Drainages 1-10 lacked suitable habitat for native fish.

Table 5-3. Fish and Aquatic Species found in Study Area Streams and Lakes within the Little Butte Creek Watershed

Common Name	North Fork Little Butte Creek	South Fork Little Butte Creek [a]	Lake Creek [b]	Little Butte Creek	Fish Lake	Fourmile Lake
Brook trout	Yes	No	No	No	Yes	Yes
Chinook salmon (spring)	No	Yes	No	Yes	No	No
Chinook salmon (fall)	Yes	Yes	No	Yes	No	No
Coastal cutthroat	Yes	Yes	Yes	Yes	Yes	No
Coho salmon	Yes	Yes	Yes	Yes	No	No
Klamath smallscale sucker [c]	Yes	Yes	Yes	Yes	No	No
Lake trout	No	No	No	No	No	Yes
Mountain whitefish [c]	Yes	Yes	Yes	Yes	No	No
Pacific lamprey	Yes	Yes	No	Yes	No	No
Rainbow trout	Yes	Yes	Yes	Yes	Yes	Yes
Redside shiner	No	Yes	Yes	Yes	No	No
Steelhead (summer and winter)	Yes	Yes	Yes	Yes	No	No
Tiger trout	No	No	No	No	Yes	No
Tui chub	No	No	No	No	Yes	No

Common Name	North Fork Little Butte Creek	South Fork Little Butte Creek [a]	Lake Creek [b]	Little Butte Creek	Fish Lake	Fourmile Lake
Northwestern pond turtle	Yes [c]	Yes [c]	Yes [c]	Yes	Yes [c]	Yes [c]

Adapted from ODFW, 2024, Oregon Fish Habitat Distribution and Barriers; ORBIC, 2023.

a South Fork Little Butte Creek from mouth to diversion (river mile [RM] 1.1).

b Lake Creek from mouth to siphon crossing (RM 0.25).

c Likely present based upon known presence in the basin and habitat characteristics.

4.3.4.1 North Fork Little Butte Creek

North Fork Little Butte Creek contains numerous anadromous and resident fish species (Table 5-3) and is of moderate habitat quality for these species. The stream is largely intact with only the lower 4.5 miles of the stream having adjacent heavy agricultural usage. However, several diversion dams and culverts pose partial barriers to fish movement and prevent access to tributaries within the stream system. The riparian areas are fairly intact in undisturbed portions along the creek but are limited by valley width. Flow within the stream is consistent due to Fish Lake which regulates flow and retains runoff from high precipitation events.

During the summer, flow within the majority of the creek is relatively high compared to flow in other streams due to releases from Fish Lake (see the Water Resources Technical Report, Section 5.3.2). Higher flow maintains higher habitat availability and colder temperatures during a time in which other streams have lower flows and higher temperatures. However, flows below the JSC diversion are lower than normal during the summer. Below the JSC diversion, water withdrawal results in a 50 percent decline in stream flow resulting in higher temperatures (DEQ 2008). The stream is listed as impaired by DEQ due to high temperatures resulting from water withdrawal, tailwater discharge, and water management which limit habitat potential (DEQ 2022b; see the Water Resources Technical Report, Section 5.3.3). Lower flows in winter and spring due to retention of water in Fish Lake limit habitat availability during spawning time periods for trout, salmonids, and steelhead within the stream. Chinook and coho salmon, in addition to steelhead, are known to spawn within North Fork Little Butte Creek. In addition, prevention of high-flow events limits geomorphic processes that support and create instream and riparian habitats.

4.3.4.2 South Fork Little Butte Creek

South Fork Little Butte Creek contains numerous anadromous and resident fish species (Table 5-3). South Fork Little Butte Creek within the study area is of low to moderate quality for anadromous and resident fish and aquatic species. Heavy agricultural usage limits the riparian zone and results in reduced shading and increased bank erosion. Several diversion dams, bridges, and culverts pose partial barriers to fish movement and hinder access to tributaries within the stream system. During the non-irrigation season, the stream has a typical hydrograph for the area with high flows that maintain habitat availability during overwintering and spawning time periods, and peak flow events from storm events that create riparian and instream habitat complexity. Chinook and coho salmon, in addition to steelhead, are known to spawn within South Fork Little Butte Creek. However, flows in this portion of South Fork Little Butte Creek are heavily influenced by water diversions during the irrigation season. Diversions result in minimum flow conditions occurring earlier in the season (mid-June) and for those minimum flow conditions to be lower. Flow within the creek below the diversion point for the JSC is particularly low during the irrigation season which severely limits habitat availability for rearing juveniles and resident adults. Low flows during the summer likely result in the

stream being impaired for temperature (see the Water Resources Technical Report, Section 5.3.3). South Fork Little Butte Creek is also listed by DEQ as being impaired for flow modification and habitat modification which further limits the habitat potential of the stream (DEQ 2022b).

4.3.4.3 Lake Creek

Lake Creek contains several anadromous and resident fish species (Table 5-3). The JSC traverses underneath Lake Creek at RM 0.25. Lake Creek within the study area is of low to moderate quality for fish and aquatic species. Heavy agricultural usage limits the riparian zone and results in reduced shading and increased bank erosion.

The stream has no hydrologic data. During the non-irrigation season, the stream likely has a typical hydrograph for the area with high flows that maintain habitat availability during overwintering and spawning time periods, and peak flow events from storm events that create riparian and instream habitat complexity. Coho salmon and steelhead are known to spawn in Lake Creek (ODFW 2024). During the summer, flows are likely low due to a smaller catchment size and upstream private diversions. Low flows result in higher temperatures and reduced habitat availability for rearing juveniles and resident adults.

Lake Creek is listed as impaired by DEQ for temperature, sedimentation, and habitat modification which further limits habitat potential for fish and aquatic species (DEQ 2022b; see the Water Resources Technical Report, Section 5.3.3).

4.3.4.4 Osborne Creek

The JSC traverses underneath Osborne Creek at RM 0.7. No hydrologic data exists for Osborne Creek. Osborne Creek within the study area is a 7-foot-wide perennial stream with highest flows likely occurring during precipitation events in winter and spring. Osborne Creek within the study area is of moderate quality for fish and aquatic species. Water quality in the creek during the irrigation season is likely extremely poor due to return inflow from flood irrigation. Heavy agricultural usage limits the riparian zone and results in reduced shading and increased bank erosion. High rates of bank erosion and irrigation return inflow result in high inputs of fine sediment. A private dam on Osborne Creek above the study area dampens peaks flows which prevents the creation of instream habitats and may reduce the ability of the stream to flush out inputs of fine sediment. Stream substrate largely consists of sand with small amounts of gravel within the project area. The stream has no recorded fish species present (ODFW 2024). However, no barriers to fish movement are present and fish from Little Butte Creek—such as Mountain whitefish, redside shiner, and Klamath smallscale sucker—are likely present. Salmonids and Pacific lamprey occurring within Little Butte Creek likely opportunistically use habitats in Osborne Creek for rearing but are unlikely to use Osborne Creek for spawning as high sediment inputs have resulted in siltation of gravel beds.

4.3.4.5 Wyant Gulch

The JSC traverses underneath Wyant Gulch via a siphon at RM 0.27. No hydrologic data is available for Wyant Gulch. The 3-foot-wide stream is likely intermittent upslope of the JSC and perennial downslope of the JSC. The waterbody is of low quality for fish and aquatic species. Water quality in the creek during the irrigation season is likely extremely poor due to return inflow from flood irrigation. The entirety of flow within Wyant Gulch is diverted out of the stream 0.15 miles upslope of the JSC. The entirety of Wyant Gulch is retained within a private reservoir 0.2 miles downslope of the JSC; the reservoir prevents upstream migration for fish in Little Butte Creek into the creek. The JSC siphon crossing is likely also a barrier to upstream movement within the creek. Due to limited habitat availability, seasonal dewatering, and poor water quality, it is unlikely that a sustaining population of

fish is present within the creek. Within the vicinity of the JSC, it was determined that habitat in Wyant Gulch was not suitable for native migratory fish.

4.3.4.6 Grasshopper and Eagle Gulches

Grasshopper and Eagle gulches flow into the JSC at RM 0.28 and 1.05, respectively. A headgate allows a mixture of stream and canal water to continue downslope at both locations. No hydrologic data are available for Eagle or Grasshopper gulches. During field work in April and June 2024, these streams upslope of the JSC did not contain flowing water. These streams downslope of the JSC contained flowing water due to incidental headgate releases of canal water into the stream and groundwater inputs which are augmented by canal seepage. The widths of these streams are, on average, 6 feet.

Habitat quality is moderate within these waterbodies. Agricultural activities limit the riparian area and result in poor water quality within these waterbodies. During high flows, fish can migrate into Grasshopper Gulch from Little Butte Creek. Due to limited habitat availability within Grasshopper Gulch, it is unlikely there is a self-sustaining population of fish within this stream. Migration into Eagle Gulch from Little Butte Creek is prevented by a private reservoir at RM 0.1 on Eagle Gulch. A self-sustaining population of fish may be present with Eagle Gulch given the 0.9 miles of stream length available within the waterbody. Species within Eagle Gulch may include rainbow trout, redside shiner, and Klamath smallscale sucker. Within the vicinity of the JSC, it was determined that habitat in Eagle Gulch and Grasshopper Gulch was not suitable for native migratory fish.

4.3.4.7 Owens Gulch

Owens Gulch flows into the JSC at RM 0.58. No headgate is present. The waterbody begins over 100 feet downslope of JSC and is fed by groundwater discharge which is augmented by canal seepage. No hydrologic data are available for Owens Gulch. During field work in April and June 2024, Owens Gulch did not have flow upslope of the JSC but contained flow downslope of the canal indicating that the stream is intermittent upslope of and perennial downslope of the JSC. Owens Gulch has an average stream width of 5 feet.

Habitat quality is moderate within Owens Gulch. Agricultural activities limit the riparian area and result in poor water quality within this stream. At RM 0.12, Owens Gulch flows into a drainage ditch that discharges into Little Butte Creek. The drainage ditch outfall and two culverts (at RM 0.1 and RM 0.2) likely prevent upstream migration of fish from Little Butte Creek. Given the size and poor habitat quality, it is unlikely Owens Gulch contains a self-sustaining population of fish. Within the vicinity of the JSC, it was determined that habitat in Owens Gulch was not suitable for native migratory fish.

4.3.4.8 Unnamed Drainages 1 to 6, 8, and 9

Unnamed Drainages 1 to 6, 8, and 9 flow into the JSC. No headgates are present, and the waterbodies begin to form again over 100 feet downslope of the JSC due to groundwater discharge which is augmented by canal seepage. These waterbodies flow into Little Butte Creek from RM 10.1 to 16.5. No hydrologic data are available for these unnamed drainages. During field work in April and June 2024, these streams did not contain flowing water upslope of the JSC. Due to their small watersheds, these drainages are intermittent. Downslope portions of these drainages below the JSC likely have a higher frequency of flow due to higher rates of groundwater discharge that are augmented by canal seepage. Downslope portions of these unnamed drainages have estimated lengths that vary from 0.05 to 0.72 miles. The average width of these streams is 3 feet.

Habitat quality is poor within these drainages. Agricultural activities limit the riparian area and result in poor water quality within these drainages. These largely intermittent drainages have limited habitat availability due to private dams and culverts that limit fish passage within these systems. During high flows, fish may migrate into Unnamed Drainage 1 from Little Butte Creek and use habitats there for rearing. With the exception of Unnamed Drainage 1, these drainages lack connectivity with Little Butte Creek due to artificial obstructions such as private dams used for stock ponds and culverts. Given these drainages are intermittent and lack connectivity with Little Butte Creek, it is unlikely they contain self-sustaining populations of fish. Within the vicinity of the JSC, it was determined that habitat in these waterbodies was not suitable for native migratory fish.

4.3.4.9 Unnamed Drainages 7 and 10

Unnamed Drainages 7 and 10 flow into the JSC at RM 0.48 and 1.45, respectively. A headgate allows a mixture of stream and canal water to continue downslope at both locations. Unnamed Drainages 7 and 10 flow into Little Butte Creek at RM 11.3 and 10.1, respectively. No hydrologic data are available for these unnamed drainages. During field work in April and June 2024, these streams did not contain flowing water upslope of the JSC. Due to their small watersheds, these drainages are intermittent. Downslope portions of these drainages below the JSC likely have a higher frequency of flow due to incidental headgate release of canal water and higher rates of groundwater discharge that are augmented by canal seepage. The average width of these streams is 3 feet.

Habitat quality is poor within these waterbodies. Agricultural activities limit the riparian area and result in poor water quality within these drainages. These intermittent drainages have limited habitat availability due to private dams and culverts that limit the passage of fish within the streams and prevent upstream migration of fish from Little Butte Creek. Given these drainages lack connectivity with Little Butte Creek, it is unlikely they contain self-sustaining populations of fish within these drainages. Within the vicinity of the JSC, it was determined that habitat in Unnamed Drainage 7s and 10 was not suitable for native migratory fish.

4.3.4.10 Little Butte Creek

Little Butte Creek contains numerous anadromous and resident fish species (Table 5-3). Little Butte Creek is of moderate quality for anadromous and resident fish and aquatic species. Heavy agricultural usage limits off-channel habitat and the riparian zone and results in reduced shading and increased bank erosion. Flood irrigation in adjacent agricultural lands further degrades water quality and habitat quality within Little Butte Creek. The lower reach of Little Butte Creek (RM 0 to 3.1) generally has an intact floodplain with side channel and backwater habitats.

Chinook and coho salmon, in addition to steelhead, are known to spawn within Little Butte Creek. During the non-irrigation season, the stream has a typical hydrograph for the area with high flows that maintain habitat availability during overwintering and spawning time periods, and peak flow events from storm events that create riparian and instream habitat complexity. Flows in Little Butte Creek are heavily influenced by water diversions during the irrigation season. Diversions result in base flow conditions occurring earlier in the season (mid-June) and for those base flow conditions to be lower. During the summer, over 60 percent of Little Butte Creek's flow is diverted for agricultural irrigation (DEQ 2008). Lower flow increases water temperature (DEQ 2008), reduces habitat availability, and limits access to side channel and backwater habitats for rearing juveniles and resident adults.

Little Butte Creek is listed as impaired by DEQ for temperature, dissolved oxygen, sedimentation, and phosphorus, which further limits habitat potential for fish and aquatic species within the stream (DEQ 2022b; see the Water Resources Technical Report, Section 5.3.3).

4.3.4.11 Rogue River

The Rogue River contains numerous anadromous and resident fish species (Table 5-2). The Rogue River within the study area is of relatively high quality for anadromous and resident fish and aquatic species. Although the Rogue River's floodplain is limited by agricultural land development, gravel mining, and industrial development, the river still has a robust riparian area with access to side channels and backwater areas that provide unique habitat for fish and aquatic species. During the non-irrigation season, the river has a typical hydrograph for the area with high flows that maintain habitat availability during overwintering and spawning time periods, and peak flow events from storms that create riparian and instream habitat complexity. Chinook and coho salmon, in addition to steelhead, are known to spawn within the Rogue River within the study area. The river has higher than normal flows during the summer due to releases from Lost Creek Lake, a reservoir with 465,000 AF of storage on RM 157 of the Rogue River. Higher flows during summer maintain higher than normal habitat availability for rearing juveniles and resident and migratory adults.

The Rogue River within the study area is listed as impaired by DEQ for temperature and biological criteria, which limits habitat potential for fish and aquatic species (see the Water Resources Technical Report, Section 5.3.3).

4.3.4.12 Fourmile Lake

Fourmile Lake is 740-acre reservoir constructed in 1922 with a maximum depth of 170 feet. The lake is not actively stocked, but it has remnant populations from historic stocking with species including brook trout, rainbow trout, and lake trout (Table 5-3). Fourmile Lake is of low quality for fish and aquatic species. Lake level oscillations as a result of water release for District water management result in rocky shorelines that provide no vegetative structure or cover. Resident fish populations must rely on two small tributaries for spawning. Water from Fourmile Lake is transported by the Cascade Canal to Fish Lake. An intake screen to prevent debris from entering Cascade Canal within Fourmile Lake likely acts as a barrier preventing movement of fish into the canal. The canal terminates near Fish Lake wherein the water infiltrates highly permeable volcanic material that conveys the water via subsurface groundwater movement into Fish Lake (DEQ 2008).

The waterbody is not impaired for any water quality parameters on the DEQ Section 303(d) list.

4.3.4.13 Fish Lake

Fish Lake contains several resident species, and it is stocked annually by ODFW with up to 10,000 fish with species including brook trout, rainbow trout, and tiger trout (ODFW 2023a). Tiger trout is a sterile hybrid between brook and brown trout. The Fish Lake Dam's spillway may provide downstream passage for stocked fish during certain times of the year. Brook trout has been observed directly downstream of the dam in North Fork Little Butte Creek (ODFW 2024).

Fish Lake is of low to moderate quality for fish and aquatic species. Fish Lake is a 483-acre lake with a maximum depth of 31 feet and an average depth of 18 feet. Lake level oscillations as a result of water release for District water management result in rocky shorelines that provide no vegetative structure or cover. The lake is isolated from downstream waterbodies, and resident fish populations must rely on small springs for spawning . Fish populations within the lake are likely only supported by continual stocking.

Fish Lake is listed as impaired by DEQ for pH and harmful algal blooms which further limit habitat potential for fish and aquatic species (see the Water Resources Technical Report, Section 5.3.3).

5. Impact Assessment Methodology and Data Sources

5.1 Long-Term Impact Assessment Methods

Long-term impacts of the Modernization Alternative and its alignment options on fish and aquatic species were assessed based upon the potential of project design to affect fish and aquatic species due to the Project's impacts on habitat availability and habitat quality in the Little Butte Creek watershed. Long-term impacts of the No Action Alternative were assessed based on the presumed absence of Project impacts that would otherwise be associated with the Modernization Alternative.

5.2 Short-Term Impact Assessment Methods

Short-term impacts of the Modernization Alternative and its alignment options on fish and aquatic species were assessed based upon the potential for construction activities to affect habitat availability and habitat quality in the Little Butte Creek watershed in addition to the potential of the Project to harm individuals. Short-term impacts of the No Action Alternative were assessed based on the presumed absence of construction activities that would otherwise be associated with the Modernization Alternative.

5.3 Indirect Impact Assessment Methods

Indirect impacts include those that are not a direct result of the Project but would potentially occur later in time or farther in distance as a result of the alternatives. Potential indirect impacts were determined by evaluating how the alternatives could change conditions for fish and aquatic species in light of the existing development, climate impacts, and ongoing water resource and land use trends occurring in the Upper Rogue River Basin.

5.4 Cumulative Impact Assessment Methods

Known past, ongoing, and reasonably foreseeable future actions with potential to affect fish and aquatic species in the study area were identified through desktop research and review of recent and pending irrigation modernization projects in the Upper Rogue River Basin and Little Butte Creek Watershed. Cumulative actions in the study area include previous development and other ongoing, authorized, or proposed modernization projects by MID and other irrigation districts. Based on the analysis of potential long-term impacts of the No Action and Modernization Alternatives, it was determined whether the alternatives have the potential to result in additive impacts on fish and aquatic species that are also impacted by other past, present, and future projects.

6. Environmental Consequences

6.1 Long-Term Impacts

6.1.1 No Action

Under the No Action Alternative, no federal funding would be provided under Pub. L. No. 83-566 for system modernization improvements. The existing JSC would remain unpiped, and MID's delivery system within the project area would remain in its current condition. Modernization of MID's infrastructure along the JSC would not be reasonably certain to occur.

No water would be saved under the No Action Alternative. Losses associated with seepage and evaporation would continue at current levels. Canal seepage and incidental headgate release would continue to deteriorate water quality for waterbodies that receive these inputs. Water delivery reliability for District patrons would not improve, and current concerns regarding water availability and inefficient water delivery for agricultural use in addition to risk of infrastructure failure would not be addressed. As the ongoing shift in precipitation patterns in the Upper Rogue River Basin continues, the No Action Alternative would potentially contribute to continued reductions in streamflow during the summer, decreased water delivery reliability, increased water temperatures and deterioration in surface water quality, and declines in aquatic and riparian habitat conditions.

Under the No Action Alternative, existing conditions would remain unchanged and conditions for fish and aquatic species would continue to deteriorate owing to climatic shifts in the Upper Rogue River Basin. If construction does not take place, there would be minimal to no overall long-term impacts to fish and aquatic species.

6.1.2 Modernization Alternative (Future With Federal Investment)

6.1.2.1 Joint System Canal

Under the Modernization Alternative, piping the JSC (canal only; does not include siphons discussed below) would be within the existing canal alignment. Piping the JSC would result in a combined water savings of approximately 5,057 acre-feet per year (AF/year). To meet the demands of MID and RRVID patrons, 3,793 AF/year (75 percent) of saved water would be retained by MID; 1,264 AF/year (25 percent) would remain within source waterbodies in South Fork Little Butte Creek. Piping the JSC would eliminate canal seepage and incidental headgate releases of irrigation water which would reduce hydrologic input and sources of thermal and contaminant pollution to waterbodies that receive these artificial sources of hydrology. Piping and burying the JSC would prevent the canal from intercepting and capturing flow from 13 streams (Grasshopper, Owens, and Eagle gulches, and Unnamed Drainages 1 to 10). These streams would be reconnected with their downslope counterparts by a bioengineered stream channel that would convey streamflow over the piped JSC. In coordination with ODFW, it was determined that fish passage would not be required for stream reconnection as suitable habitat for native migratory fish is absent at these locations. Fish passage on these stream crossings would not provide appreciable benefit to fish populations as the upslope portions of these systems are intermittent and would generally provide less than 0.5 miles of stream habitat.

As a result of the Project, the quantity of and quality of water within waterbodies affected by District operations and infrastructure would be impacted and have associated effects on fish and aquatic species. In general, the Project would have seasonal alterations to flow volumes in waterbodies. Increased water volumes in waterbodies increases the available habitat for fish and aquatic species to use, whereas decreased water volumes constrict habitat usage. Increased water volumes also generally results in colder water temperatures as the increased body of water moderates temperature fluctuations and requires a longer period of time for it to warm up. Reduced temperature can alleviate stress on species within the study area that prefer colder temperatures, such as salmonids which include rainbow trout, coastal cutthroat, Chinook salmon, SONCC coho salmon, and steelhead. Reduced temperatures can also result in higher dissolved oxygen concentrations which improves habitat quality by improving growth rates of fish and aquatic species. Conversely, higher temperatures can increase stress on species that prefer colder water and reduce dissolved oxygen concentration that may reduce growth rates of fish and aquatic species.

Reconnection of 13 streams (Grasshopper, Owens, and Eagle gulches; Unnamed Drainages 1 to 10) with their up- and downslope counterparts would increase discharge during high flow events. Restoration of these higher flow events would allow downslope portions of these waterbodies to have normal flooding frequency and intensity that had been previously disrupted by the stream's interception with the JSC. Common flood events (10-year flood or less) have been shown to reset riparian-stream zone morphology (Dean and Schmidt 2013), benefit aquatic and riparian ecology (Townsend et al. 1997; Talbot et al. 2018), and improve the quality of salmonid spawning habitat (Wheaton et al. 2010).

The Project would also eliminate canal seepage and incidental headgate releases from the JSC, which are sources of thermal, turbidity, and *E. coli* pollution for waterbodies that receive these artificial sources of hydrology (see the Water Resources Technical Report for more details). Elevated turbidity from incidental headgate releases of irrigation water may cause gill tissue damage, physiological stress, and behavioral changes to fish (NMFS 2002).

Project impacts to hydrology and water quality within waterbodies affected by District operations and infrastructure are summarized below in Table 7-1 and are discussed in detail in the Water Resources Technical Report. The effects on fish and aquatic species as a result of changes to hydrology and water quality are also summarized below in Table 7-1 and are discussed in detail below for each waterbody affected by District operations and infrastructure.

Table 7-1. Impacts of the Modernization Alternative on Waterbodies Associated with District Operations and Infrastructure

Name	*Irrigation Season* Hydrology	*Irrigation Season* Water Quality	*Irrigation Season* Fish and Aquatic Species	*Non-irrigation Season* Hydrology	*Non-irrigation Season* Water Quality	*Non-irrigation Season* Fish and Aquatic Species
South Fork Little Butte Creek (RM 0-1.1)	On average, streamflow would increase by approximately 6.47 cfs (106 percent) in August and September. Minimum flows in August and September will be 12.12 cfs.	Increased flows in August and September would reduce stream temperatures and increase dissolved oxygen concentrations.	Increased habitat availability and habitat quality.	No change.	No change.	No change.
North Fork Little Butte Creek (RM 0– 0.9)	On average, flow would increase by approximately 4.6 cfs (13 percent) during May and June.	Increased flows in May and June would reduce stream temperatures and increase dissolved oxygen concentrations.	Increased habitat availability and habitat quality.	Insignificant increase in flows.	No change.	No change.
North Fork Little Butte Creek (RM 0.9–16)	On average, flow would decrease by approximately 1.4 cfs (-2 percent) during the irrigation season. During dry years, streamflow would increase by approximately 26.5 cfs (79 percent) during the month of September.	Decreased flows during the irrigation season would minorly increase stream temperature and decrease dissolved oxygen concentrations. Increased flow during September of dry years would significantly decrease stream temperatures and increase dissolved oxygen concentrations.	Minor decrease in habitat availability and habitat quality during the irrigation season. Major increased in habitat availability and quality during September of dry years.	Insignificant increase in flows.	No change.	No change.
Lake Creek	No change.	No change.	No change.	No change.	No change.	No change.

Name	*Irrigation Season* Hydrology	*Irrigation Season* Water Quality	*Irrigation Season* Fish and Aquatic Species	*Non-irrigation Season* Hydrology	*Non-irrigation Season* Water Quality	*Non-irrigation Season* Fish and Aquatic Species
Osborne Creek and Wyant Gulch	Decreased flows from reduced groundwater discharge from loss of canal seepage.	Elimination of nonpoint source pollution from piping the JSC would improve water quality.	Decreased habitat availability but improved habitat quality.	No change.	No change.	No change.
Grasshopper Gulch, Eagle Gulch, Unnamed Drainages 7 and 10	Decreased flows due to loss of incidental headgate release and reduced groundwater discharge from loss of canal seepage.	Elimination of point source and nonpoint source pollution from piping the JSC would improve water quality.	Decreased habitat availability but improved habitat quality.	Increased flows.	Reduced stream temperature and increased dissolved oxygen concentration.	Increased habitat availability and habitat quality.
Owens Gulch and Unnamed Drainages 1–6, 8, and 9	Decreased flows from reduced groundwater discharge from loss of canal seepage.	Elimination of nonpoint source pollution from piping the JSC would improve water quality.	Decreased habitat availability but improved habitat quality.	Increased flows.	Reduced stream temperature and increased dissolved oxygen concentration.	Increased habitat availability and habitat quality.
Little Butte Creek	On average, flow in Little Butte Creek from RM 10.2 to 17.2 would increase by approximately 3.5 cfs (4%) during the irrigation season.	Elimination of point source and nonpoint source pollution from piping the JSC would improve water quality throughout the creek. Increased flow from RM 10.2 to 17.2 would also improve water quality by decreasing stream temperatures and increasing dissolved oxygen concentrations.	Increased habitat availability and habitat quality.	Minor increase in flows.	Minor reduction in stream temperature and minor increase in dissolved oxygen concentration.	Minor Increase in habitat availability and habitat quality.
Rogue River	No change.	Insignificant improvement in water quality.	No change.	Insignificant increase in flows.	Insignificant improvement in water quality.	No change.

Name	*Irrigation Season* Hydrology	*Irrigation Season* Water Quality	*Irrigation Season* Fish and Aquatic Species	*Non-irrigation Season* Hydrology	*Non-irrigation Season* Water Quality	*Non-irrigation Season* Fish and Aquatic Species
Fish Lake and Fourmile Lake	Reduced drawdown of the lakes would increase water stored in the lakes by 16 percent on average during the irrigation season.	Increased water volume in the lakes would decrease water temperature and increase dissolved oxygen concentration.	Increased habitat availability and habitat quality.	Reduced drawdown of the lakes would increase water stored in the lakes by 20 percent on average during the non-irrigation season.	Increased water volume in the lakes would decrease water temperature and increase dissolved oxygen concentration.	Increased habitat availability and habitat quality.

cfs = cubic feet per second; JSC = Joint System Canal; RM = river mile

General Fish and Aquatic Species Habitat

South Fork Little Butte Creek (RM 0 to 1.1)

Higher flows during August and September would increase habitat availability, decrease stream temperatures, and reduce dissolved oxygen concentration. This stream reach and timing was prioritized for restoring water instream owing to the extremely low flows downstream of the South Fork Little Butte Creek diversion (RM 1.1) which creates a migratory barrier for local fish populations, especially during late summer characterized by high temperatures. Ensuring a minimum flow of 12.12 cfs within this waterbody during late summer will improve the ability of aquatic species to migrate through this reach.

Overall, improvements to water quality and increased flow in South Fork Little Butte Creek would increase habitat availability and habitat quality in addition to improving migratory corridors for resident fish populations. Thus, piping the JSC would result in moderate long-term benefits to fish and aquatic species that occur within this waterbody.

North Fork Little Butte Creek (RM 0 to 0.9)

When MID is only relying on natural flow (May and June), an additional 4.6 cfs on average would be bypassed at the North Fork Little Butte Creek Diversion because that water is not needed at that time due to piping of the JSC. The 4.6 cfs of bypassed water would increase flows in this waterbody by 13% on average during the months of May and June. Higher flows during this timeframe would improve water quality, increase habitat availability and improve habitat quality by reducing stream temperature and increasing dissolved oxygen concentration. Thus, increase in flows would result in minor long-term benefits to fish and aquatic species that occur within this waterbody.

North Fork Little Butte Creek (RM 0.9 to 16)

Decreasing releases from Fish Lake after piping would result in a 1.4 cfs average decline in flows in North Fork Little Butte Creek (RM 0.9 to 16) during the irrigation season, decreasing streamflow by 2 percent. This decline in flow would minorly decrease habitat availability, increase stream temperature, and reduce dissolved oxygen concentration. Because of the relatively low magnitude of decline in flow, habitat availability and habitat quality in this waterbody are not anticipated to be significantly impacted during the irrigation season. Conversely, during dry years, streamflow would increase by approximately 26.5 cfs during September which would increase streamflow by 79 percent. This increase in flow would majorly increase habitat availability, increase stream temperatures, and reduce dissolved oxygen concentrations.

Alteration of flow patterns in this reach of North Fork Little Butte Creek incidentally help to moderate extremes in habitat quantity and quality during the irrigation season. Currently during dry years, insufficient water storage in Fish Lake and Fourmile Lake result in low streamflow in North Fork Little Butte Creek during September which reduces habitat availability and can impair habitat quality by significantly increasing water temperatures when air temperatures are still elevated. As a result of the Project, there will be sufficient water storage in Fish Lake and Fourmile Lake which will allow for adequate water releases during September of dry years which will prevent severe depletions in flow, habitat quantity, and quality in this reach of North Fork Little Butte Creek. Overall, the Project would have minor long-term benefits to fish and aquatic species that occur within this waterbody owing to maintaining of habitat quantity and quality during dry years. Although this waterbody will experience small declines in flow during the majority of irrigation seasons, the relative impact of this decline is minor and is not anticipated to have detectable population effect on fish and aquatic species.

Lake Creek

The Project is not anticipated to have long-term impacts on the hydrology or water quality of Lake Creek. Thus, the Project would have no long-term effect on fish and aquatic species within Lake Creek.

Osborne Creek and Wyant Gulch

During the irrigation season, elimination of canal seepage into these waterbodies would improve habitat conditions for fish and aquatic species by reducing water temperature and increasing dissolved oxygen concentration. However, the loss of canal seepage would also reduce groundwater discharge inputs into these waterbodies which could reduce flows and result in a decline in habitat availability. However, improvements to water quality would enhance the productivity of available habitat and would, overall, result in minor long-term benefits to fish and aquatic species that occur within these waterbodies.

No known federal or state-listed species are present within these waterbodies (ODFW 2024). Federal and state-listed species in Little Butte Creek—such as Chinook salmon, SONCC coho salmon, Pacific lamprey, and steelhead—may opportunistically use habitats for rearing within Osborne Creek as no barrier to migration is present within Osborne Creek. The increased productivity of aquatic habitats within Osborne Creek as a result of the Project would benefit these federal and state-listed species.

Grasshopper Gulch, Eagle Gulch, and Unnamed Drainages 7 and 10

During the irrigation season, elimination of canal seepage and incidental headgate releases into these waterbodies would improve habitat conditions for fish and aquatic species by reducing water temperature, increasing dissolved oxygen concentration, and reducing turbidity. However, the loss of these artificial sources of water would reduce flows within these waterbodies and result in a decline in habitat availability.

During the non-irrigation season, reconnection of the up- and downslope portions of these streams over the piped JSC would result in higher peak flows. Restoration of these higher flows would allow downslope portions of these waterbodies to have normal flooding frequency and intensity that would increase habitat diversity and quality for fish and aquatic species.

Overall, improvements to water quality and restored natural hydrology of these waterbodies would enhance the productivity of available habitats and would result in minor long-term benefits to fish and aquatic species that occur within these waterbodies.

Owens Gulch and Unnamed Drainages 1 to 6, 8, and 9

During the irrigation season, elimination of canal seepage into these waterbodies would improve habitat conditions for fish and aquatic species by reducing water temperature, increasing dissolved oxygen concentration, and reducing turbidity. However, the loss of canal seepage would also reduce groundwater discharge inputs into these waterbodies which could reduce flows and result in a decline of habitat availability.

The conveyance of water upslope of the JSC to the downslope portion of these waterbodies would likely create additional stream habitat for these waterbodies. The current ongoing interception of these waterbodies by the JSC for the last century has resulted in the stream channel downslope of the JSC reverting to terrestrial habitat. By allowing upslope flows to continue downslope, surface hydrology and erosion processes would likely revert the former channels of these waterbodies back

to fish and aquatic species habitat. It is estimated that for each of these waterbodies, over 150 feet of stream habitat would be created.

During the non-irrigation season, reconnection of the up- and downslope portions of these streams over the piped JSC would result in higher peak flows. Restoration of these higher flows would allow downslope portions of these waterbodies to have normal flooding frequency and intensity that would increase habitat diversity and quality for fish and aquatic species.

Overall, improvements to water quality and restoration of natural hydrology to these waterbodies would enhance the productivity of available habitats and would result in minor long-term benefits to fish and aquatic species that occur within these waterbodies.

Little Butte Creek

During the irrigation season, elimination of canal seepage and incidental headgate releases into 13 streams that are tributaries to Little Butte Creek would improve habitat conditions for fish and aquatic species by reducing water temperature, increasing dissolved oxygen concentration, and reducing turbidity within Little Butte Creek. Furthermore, flows in Little Butte Creek would likely increase in its most upstream portion (RM 10.2 to 17.2) by 3.5 cfs or 4 percent. The increased flows in this portion of Little Butte Creek would result from increased tributary input from North Fork Little Butte Creek and South Fork Little Butte Creek. Increased flow in Little Butte Creek is not anticipated to occur below RM 10.2 due to decreased tributary input from the 15 smaller tributaries and from the elimination of incidental headgate release and canal seepage.

During the non-irrigation season, reconnection of the up- and downslope portions of 13 streams over the piped JSC that are tributaries of Little Butte Creek would result in higher peak flows in Little Butte Creek. Increased inputs from tributaries would, in part, restore higher flows in Little Butte Creek that would increase habitat diversity and quality for fish and aquatic species.

Overall, improvements to water quality and increased flow in Little Butte Creek would increase habitat availability and the productivity of habitats and would result in minor long-term benefits to fish and aquatic species that occur within this waterbody.

Rogue River

The Project is not anticipated to have long-term impacts on the hydrology or water quality of the Rogue River. Thus, the Project would have no long-term effect on fish and aquatic species within the Rogue River.

Fish Lake and Fourmile Lake

The Project would result in these lakes having reduced drawdowns which would increase water volumes in these waterbodies. Water storage is estimated to increase by 16 percent during the irrigation season and 20 percent during the non-irrigation season. Increased water volumes would have minor long-term effects on fish and aquatic species as it would increase habitat availability, decrease water temperature, and improve dissolved oxygen concentration.

Federally Listed Fish and Aquatic Species

SONCC Coho Salmon

Project impacts on North Fork Little Butte Creek, South Fork Little Butte Creek, and Little Butte Creek would have long-term beneficial effects on the life stages of SONCC coho salmon.

During the irrigation season, the following would be expected:

- Increased flows in North Fork Little Butte Creek and South Fork Little Butte Creek below MID diversion points and the most upstream portion of Little Butte Creek (RM 10.2 to 17.2) would increase habitat availability for rearing juveniles and improve passage conditions for outmigrating smolts.
- Improved water quality throughout Little Butte Creek would improve habitat quality for rearing juveniles and improve passage conditions for outmigrating smolts.
- Alterations in flow patterns in North Fork Little Butte Creek above MID's diversion (RM 0.9 to 16) would minorly decrease habitat availability and quality for rearing juveniles and outmigrating smolts in most years during the irrigation season. During dry years in September, increased flow would majorly increase habitat availability and quality for rearing juveniles.

During the non-irrigation season, increased flows in Little Butte Creek would improve upstream passage conditions for returning spawning adults, improve water quality for incubating eggs, and increase habitat availability and quality for rearing juveniles.

Overall, the Project would improve habitat availability and quality in North Fork Little Butte Creek, South Fork Little Butte Creek, and Little Butte Creek and it would have minor long-term benefits to SONCC coho salmon.

Northwestern Pond Turtle

The Project would impact NWPT from piping and burial of the JSC and from alterations to water volumes and flow within waterbodies associated with District operations and infrastructure. Overall, the Project would have a minor long-term impact to NWPT due to a net decrease in habitat availability.

Joint System Canal

Piping and burial of the JSC would permanently remove habitat used by NWPT. The JSC provides relatively deep and slow-moving water that the species uses for foraging and hiding. Individuals that currently use the JSC would be able to migrate to nearby reservoirs, stock ponds, and natural waterbodies. However, piping and burial of the JSC would have moderate long-term impacts on NWPT as it would reduce habitat availability for the species within the Little Butte Creek Watershed.

Waterbodies Associated with District Operations and Infrastructure

Project effects on waterbodies associated with District operations and infrastructure would generally benefit NWPT by increasing habitat availability for foraging and hiding. During the irrigation season, the following would be expected:

- Increased flows in North Fork Little Butte Creek and South Fork Little Butte Creek below MID diversion points and the most upstream portion of Little Butte Creek (RM 10.2 to 17.2) would increase habitat availability.
- Alterations in flow patterns in North Fork Little Butte Creek above MID's diversion (RM 0.9 to 16) would minorly decrease aquatic habitat availability in most years during the irrigation season. Aquatic habitat availability would majorly increase in dry years in September.
- Increased water volumes in Fish Lake and Fourmile Lake would increase habitat availability and increase inundation of vegetation.

Thus, the Project would have minor long-term benefits to NWPT that occur along these segments of waterbodies associated with District operations and infrastructure.

State-Listed Fish and Aquatic Species

Impacts to state-listed threatened coho salmon are discussed above in the section, SONCC Coho Salmon. Impacts to state-listed sensitive NWPT are also discussed above in the Northwestern Pond Turtle section

The Project would have beneficial effects on state-listed sensitive species such as Rogue SMU winter-run steelhead, Rogue SMU Chinook salmon, and Pacific lamprey due to improvements to habitat availability and habitat quality in South Fork Little Butte Creek, North Fork Little Butte Creek, and Little Butte Creek.

6.1.2.2 Existing Siphon Updates and Canal Loop Improvements

Lake Creek Siphon

Option 1 (Existing Alignment) and Option 2 (Adjacent Alignment)

The existing 563-foot-long siphon would be upgraded in its current alignment or adjacent alignment. The siphon would be constructed beneath Lake Creek, and there would be no long-term impact to fish and aquatic species.

Wyant Gulch Siphon

Option 1 (Existing Alignment)

Under this route option, the existing 145-foot-long siphon would be upgraded in its current alignment and all permanent impacts would be within the existing canal alignment. The siphon would be constructed beneath Wyant Gulch, and there would be no long-term impact on fish and aquatic species.

Option 2 (New Alignment)

Under this route option, a new siphon would be constructed downslope of the existing canal under Wyant Gulch. The new siphon would be approximately 512 feet in length and would avoid approximately 1,689 feet of in-canal piping and the need to upgrade the existing siphon. The existing 145-foot siphon would be filled in place with controlled low-strength material. The siphon would be constructed beneath Wyant Gulch, and there would be no long-term impact to fish and aquatic species.

Osborne Creek Siphon

Option 1 (Existing Alignment) and Option 2 (Adjacent Alignment)

The existing 1,094-foot-long siphon could be upgraded in its current alignment, either through slip lining or replacement, and all permanent impacts would be within the existing canal alignment. Alternatively, a new siphon could be built adjacent to the existing siphon with the existing siphon retired in place. The siphon would be constructed beneath Osborne Creek, and there be no long-term impact to fish and aquatic species.

Grasshopper Segment

Option 1 (Existing Alignment)

Under this route option, no siphon would be constructed at Grasshopper Gulch. The new pipeline would be installed in the existing canal alignment, and all permanent impacts would be within the existing canal alignment. A channel would be constructed on top of the buried pipeline to convey Grasshopper Gulch over the infrastructure and reconnect the stream. Beneficial long-term effects to Grasshopper Gulch are discussed in Section 7.1.2.1, and there would be no further long-term impact to fish and aquatic species associated with piping the JSC at Grasshopper Gulch.

Option 2 (Siphon)

Under this route option, a new siphon would be constructed downslope of the existing canal under Grasshopper Gulch. The new siphon would be approximately 438 feet in length and would avoid 1,521 feet of in-canal piping. The siphon would be constructed underneath Grasshopper Gulch, and the retired canal where Grasshopper Gulch intersects the JSC would be recontoured and irrigation infrastructure removed to reconnect the upslope and downslope portions of the stream. Beneficial long-term effects to Grasshopper Gulch are discussed in Section 7.1.2.1, and there would be no further long-term impact to fish and aquatic species associated with the Grasshopper Siphon.

Owens Segment

Option 1 (Existing Alignment)

Under this route option, no siphon would be constructed at Owens Gulch. The new pipeline would be installed in the existing canal alignment, and all permanent impacts would be within the existing canal alignment. A channel would be constructed on top of the buried pipeline to convey Owens Gulch over the infrastructure and reconnect the stream. Beneficial long-term effects to Owens Gulch are discussed in Section 7.1.2.1, and there would be no further long-term impact to fish and aquatic species associated with piping the JSC at Owens Gulch.

Option 2 (Siphon)

Under this route option, the new Owens Siphon would be constructed downslope of the existing canal under Owens Gulch. The siphon would be approximately 537 feet in length, and it would avoid 2,268 feet of in-canal piping. The siphon would be constructed underneath Owens Gulch. The retired canal where Owens Gulch intersects the JSC would be recontoured, and irrigation infrastructure would be removed to reconnect the upslope and downslope portions of the stream. Impacts to Owens Gulch are discussed in Section 7.1.2.1, and there would be no further long-term impact to fish and aquatic species associated with the Owens Siphon.

Eagle Gulch Segment

Option 1 (Existing Alignment)

Under this route option, no siphon would be constructed at Eagle Gulch. The new pipeline would be installed in the existing canal alignment, and all permanent impacts would be within the existing canal alignment. A channel would be constructed on top of the buried pipeline to convey Eagle Gulch over the infrastructure and reconnect the stream. Beneficial long-term effects to Eagle Gulch are discussed in Section 7.1.2.1, and there would be no further long-term impact to fish and aquatic species associated with piping the JSC at Eagle Gulch.

Option 2 (Siphon)

Under this route option, a new siphon would be constructed downslope of the existing canal under Eagle Gulch. The new siphon would be approximately 1,001 feet in length and would avoid 4,802 feet of in-canal piping. The siphon would be constructed underneath Eagle Gulch, the retired canal where Eagle Gulch intersects the JSC would be recontoured, and irrigation infrastructure would be removed to reconnect the upslope and downslope portions of the stream. Beneficial long-term effects to Eagle Gulch are discussed in Section 7.1.2.1, and there would be no further long-term impact to fish and aquatic species associated with the Eagle Gulch Siphon.

6.2 Construction Impacts

6.2.1 Impacts from Pipe Construction

6.2.1.1 Joint System Canal

General Fish and Aquatic Species Habitat

Potential short-term impacts of piping the JSC (canal only, does not include the siphons discussed in Section 7.2.1.2) would be attributed to construction activities and would be expected to abate following completion of construction.

Potential short-term construction impacts would depend on the following:

- Area of total disturbance adjacent to waterbodies.
- Impacts from fine sediment and contaminants (e.g., hydraulic oil, fuel).
- Erosion or soil characteristics.
- Streambank or slope steepness.

Short-term impacts to habitat quality are anticipated because 13 streams (Grasshopper, Owens, and Eagle gulches, and Unnamed Drainages 1 to 10) intermittently flow into the JSC, especially during the non-irrigation season when construction would occur. At the locations of these drainages and the JSC, the work area would be isolated with sandbag cofferdams and temporary water management would maintain flows downstream and out of the work area. During construction, there could be minor short-term impacts to habitat quality for fish and aquatic species as a result of the placement and removal of the cofferdams and temporary water management system that may result in sediment mobilization and increased turbidity. Construction at these locations would involve regrading and establishing a bioengineered channel to reconnect the up- and downslope portions of these waterbodies. The channel could be composed of natural streambed materials underlain by erosion-resistant material to ensure the integrity of the pipeline. In coordination with ODFW, it was determined that fish passage would not be required as suitable habitat for native migratory fish is absent at these stream locations.

Construction activities could potentially affect surface water quality by facilitating increased erosion and mobilization of sediment in stormwater. The accidental discharge of fuels, fluids, and construction materials could impact both surface water quality via stormwater runoff and groundwater quality via infiltration. These short-term impacts would be avoided or minimized through implementation of BMPs during construction to control erosion and pollution. Work is proposed adjacent to South Fork Little Butte Creek and at Grasshopper Gulch, Owens Gulch, Eagle Gulch, and

Unnamed Drainages 1 to 10; therefore, there could be minor short-term impacts to water quality in these waterbodies.

Construction-phase erosion and sediment control measures would be installed during project construction to prevent stormwater runoff from mobilizing sediment and pollutants into surface water. MID or its construction contractor would be required to provide an erosion and sediment control plan as part of its 1200-CA construction stormwater permit application; the plan would detail the measures to be implemented and approaches for maintaining them. Pollution control and spill prevention BMPs would be implemented to avoid and minimize impacts from accidental spills of fuels, fluids, solvents, oils, and other hazardous materials typically associated with construction vehicles and equipment. A construction-phase spill prevention control and countermeasures plan would include protocols for storing and handling hazardous substances, as well as cleanup response protocols to be used in the event of inadvertent releases.

Proposed BMPs to reduce or control environmental health hazards would likely include but may not be limited to the following:

- Routinely inspect equipment, tools, and vehicles for leaks or damage.
- Promptly repair or replace leaking connections, pipes, hoses, and valves.
- Use drip pans under equipment when maintaining, repairing, or servicing in the field.
- Remove oil and grease buildup on equipment.
- Use nontoxic solvents whenever possible.
- Keep spill kit, including cleanup materials such as dry absorbent materials, on-site for prompt cleanup of small spills related to equipment failure.
- Prohibit discharge of wastewater to stormwater drains or surface stormwater facilities such as ditches and swales.
- Perform equipment and vehicle maintenance in areas that prevent discharges to storm drain systems or surface stormwater facilities.
- Collect and properly manage (recycle or dispose of) used materials: grease, oil, oil filters, antifreeze, cleaning solutions, lead-acid batteries, tires, and hydraulic and transmission fluids.
- Clean surfaces following any discharge or spill incident.

Construction-phase erosion, sediment, and pollution control and spill prevention BMPs would minimize the potential for stormwater runoff to mobilize sediment and pollutants into surface waters and prevent the introduction of contaminants into surface water. Following construction, new pipelines would be buried. All disturbed areas would be recontoured and planted with a seed mix of native grasses and forbs in consultation with NRCS, thus mitigating the potential for soil erosion and the mobilization of sediments in stormwater. The potential for soil erosion along the banks of the JSC would be eliminated where the open canal is replaced with a buried pipe. Herbaceous riparian vegetation would be established along the banks of reconnected channels that convey drainages across the piped JSC.

Based on the foregoing, short-term impacts to fish and aquatic species' natural habitat would be minor. However, the JSC is used as aquatic habitat by reptiles and amphibians and construction would permanently remove this artificial habitat. Thus, piping the JSC would have moderate -short-term impacts to aquatic species within this artificial habitat.

Federally Listed Fish and Aquatic Species

SONCC Coho Salmon

Piping the JSC adjacent to South Fork Little Butte Creek could result in sediment loading into the waterbody during the non-irrigation season which could impact SONCC coho salmon spawning adults or incubating eggs. However, sediment and erosion control BMPs would be in place and ground disturbance would occur more than 30 feet away from South Fork Little Butte Creek. Thus, piping the JSC would have negligible effects on SONCC coho salmon as the potential for sediment mobilization into South Fork Little Butte Creek would be minimized by sediment and erosion control BMPs and vegetated riparian cover. Other waterbodies that may be impacted by sediment mobilization (Grasshopper Gulch, Owens Gulch, Eagle Gulch, and Unnamed Drainages 1 to 10) do not contain these species.

Northwestern Pond Turtle

NWPT is unlikely to be present during piping construction for the JSC. Construction would occur during the non-irrigation season (late fall/winter) when NWPT is either overwintering or in its natal nests (delayed emergence). Piping the JSC would result in ground disturbance within the canal and the adjacent access road. Adult NWPT is unlikely to overwinter in the canal where ground disturbance would occur; individuals that overwinter in the project area would do so in forested areas where leaf litter is present as water is not consistently present within the JSC from October to February. Nesting is also unlikely to occur on the access road where ground disturbance would occur as the access road consists of either dense riparian vegetation or compacted gravels that are frequently disturbed by District employees using the road and are thus unsuitable for NWPT nesting. During construction, piping the JSC is not anticipated to have an impact on NWPT.

State-Listed Fish and Aquatic Species

Impacts to state-listed threatened species coho salmon are discussed above. Impacts to state-listed sensitive species NWPT are also discussed above.

Construction of the Project would have similar effects on state-listed sensitive species such as Rogue SMU winter-run steelhead, Rogue SMU Chinook salmon, and Pacific lamprey as discussed above for SONCC coho salmon.

6.2.1.2 Siphons

Upgrade Existing Siphon

Under this route option for the Lake Creek, Osborne Creek, and Wyant siphons, the existing siphons would be upgraded by either sliplining the current siphon, removing the current siphon and replacing it, or decommissioning the current siphon and constructing a siphon adjacent to it. The appropriate siphon construction method would be determined for each siphon prior to construction and may include a condition assessment of existing siphons.

Sliplining the existing siphon would result in minimal ground disturbance and not involve in-water work. Thus, sliplining would have no effect on fish and aquatic species or habitats. However, the existing siphon has been in place for over 70 years and its long-term structural integrity and limits on pipe diameter size may make this option infeasible. Decommissioning the existing siphon would involve backfilling the siphon with controlled low-strength material. Decommissioning would not involve in-water work and would not involve ground disturbance adjacent to waterbodies and thus would have no effect on fish and aquatic species or habitats.

Replacing the existing siphon or constructing an adjacent siphon would involve vegetation clearing, trenching, equipment mobilization and staging, and backfilling of trenches after pipe installation for the project areas outside of waterbodies. Construction-phase erosion, sediment, and pollution control and spill prevention BMPs as discussed above in Section 7.2.1.1 would be employed to minimize stormwater runoff to waterbodies. Ground disturbance within the siphon alignments would have similar effects to fish and aquatic species habitat as discussed above in Section 7.2.1.1. Furthermore, Lake Creek contains SONCC coho salmon and ground disturbance within the siphon alignments would be similar as that discussed in Section 7.2.1.1. Ground disturbance during the non-irrigation season would have minor short-term impacts on NWPT; suitable nesting and overwintering sites are present within the siphon alignments and construction may harm individuals present as the species would be unable to vacate the area during this timeframe.

The siphon could be constructed across the waterbody using a variety of methods including a cut and cover trench or jack-and-bore method similar to how a utility crosses a road or railroad. Potential construction methods and their effects on fish and aquatic species are discussed below.

Trenching

Trenching approximately 10 to 14 feet below the bottom of the active streambed would be used to place the new siphon. The abandoned siphon would be backfilled with controlled low-strength material, and the work area would be restored to initial conditions including restoring riparian vegetation and reestablishing preexisting contours and streambed material. Proposed BMPs to reduce or control environmental hazards during trenching would likely include but may not be limited to the following:

- Trenching would occur within the ODFW-preferred work period for Rogue River tributaries above Marial, Oregon (June 15 to September 15).
- The work area within the waterbody would be isolated by cofferdams.
- The isolated area would be dewatered with an appropriately sized fish screen until a shallow area of water is present. Fish salvage would remove all individuals present within the isolated area and relocate them downslope of the isolated work area.
- Temporary water management would maintain flows downstream and provide for downstream fish passage.

General Fish and Aquatic Species Habitat

During construction, there would be minor short-term impacts to fish and aquatic species as a result of placing and removing cofferdams and temporary water management which would limit habitat availability, momentarily reduce water quality from sediment mobilization, and result in the harm of fish and aquatic species that are salvaged within the isolated work area. In addition, temporary removal and reestablishment of riparian vegetation would result in minor short-term impacts to water quality due to reduced shading and increased water temperature.

Federally Listed Fish and Aquatic Species

SONCC Coho Salmon

Trenching in Lake Creek would potentially impact juvenile SONCC coho salmon. Trenching in the ODFW-preferred work period for Lake Creek is generally outside of the outmigrating time period for smolts (February 15 to June 30) and the inmigrating time period for spawning adults (October 1 to January 31). Juvenile SONCC coho salmon may still be present within the project area and may be harmed by temporary water quality impairments and from fish salvage. Thus, trenching would have

minor short-term impacts on SONCC coho salmon. SONCC coho salmon may also occur in Osborne Creek and would have similar impacts as discussed for Lake Creek.

Northwestern Pond Turtle

Trenching is not anticipated to impact NWPT as stream habitats that may be disturbed during trenching consist of shallow riffles and are not suitable habitat for the species. Trenching would also occur during the active season for NWPT, and ground disturbance would not impact nesting or overwintering individuals of the species. Individuals that may be present within the area would be expected to vacate the area and not be harmed by trenching.

State-Listed Fish and Aquatic Species

Impacts to state-listed threatened species coho salmon are discussed above. Impacts to state-listed sensitive NWPT are also discussed above.

Construction of the Project would have similar effects on state-listed sensitive species such as Rogue SMU winter-run steelhead an Rogue SMU Chinook salmon which are documented to occur in Lake Creek and may occur in Osborne Creek. Pacific lamprey is not documented to occur in Lake Creek or Osborne Creek, but suitable habitat is present. Construction associated with trenching may disrupt the migration of spawning adult Pacific lamprey and thus would have a minor short-term impact on the species.

Boring

Jack and bore would involve the establishment of two pits on either side of the waterbody. The two pits would be used to install the siphon approximately 4 to 8 feet below the bottom of the active streambed, and the stream would not be disturbed. Boring could occur outside the ODFW-preferred in-water work period as no in-water work would be needed. Proposed BMPs to reduce or control environmental health hazards during boring would likely include but may not be limited to the following:

- All equipment fuels and fluids, waste, and loose soil must be contained.
- Erosion and sediment controls will be placed around pits.
- An adequate supply of materials must be kept on hand for erosion control and containment of drilling fluids.
- Drilling operators must report drilling fluid spills and have a contingency plan for the inadvertent return of drilling fluid.

General Fish and Aquatic Species Habitat

Construction within 50 feet of waterbodies may result in a short-term increase in the potential for sediment loading into waterways and increasing turbidity, which may have a minor short-term effect on habitat quality for fish and aquatic species.

Federally Listed Fish and Aquatic Species

SONCC Coho Salmon

SONCC coho salmon may occur in Lake Creek and may occur in Osborne Creek. Boring underneath these waterbodies would have similar effects on this species as the effects discussed in Section 7.2.1.1. Overall, boring would have negligible effect on the species as sediment mobilization would be minimized by sediment and erosion control BMPs and vegetated riparian cover.

Northwestern Pond Turtle

Boring would have no effect on NWPT as the species would not be impacted by a short-term increase in turbidity. Boring could occur outside of the in-water work window which could correspond to NWPT overwintering and nesting time periods. If ground disturbance associated with boring occurs during the non-irrigation season, this action would have minor short-term impacts on NWPT as suitable habitat for overwintering and nesting is present adjacent to waterbodies and individuals may be harmed.

State-Listed Fish and Aquatic Species

Impacts to state-listed threatened species coho salmon are discussed above. Impacts to state-listed sensitive species NWPT are also discussed above.

Construction of the Project would have similar effects on state-listed sensitive species such as Rogue SMU winter-run steelhead, Rogue SMU Chinook salmon, and Pacific lamprey as discussed above for SONCC coho salmon.

Existing Route (No Siphon)

Under this route option for Grasshopper, Owens, and Eagle gulches, siphons would not be constructed. Impacts to fish and aquatic species under this route option are similar to those described in Section 7.2.1.1.

New Siphon Route

Under this route option for Wyant, Grasshopper, Owens, and Eagle Gulch siphons, new siphons would be constructed. Construction of the new siphons would likely involve vegetation clearing, trenching, equipment mobilization and staging, and backfilling of trenches after pipe installation for the project areas outside of waterbodies. Construction of a new siphon across a waterbody may also occur using a variety of methods including a cut and cover trench or jack-and-bore method. The effects of these construction methods on fish and aquatic species are discussed above in the section, Upgrade Existing Siphon.

6.2.2 Potential Off-Site Staging Areas

The construction contractor could potentially select one or more off-site staging areas outside the project area. These sites would be used to store or assemble materials that would then be transported by truck to the construction site.

Areas that have been previously disturbed and are accessible via existing access routes would be prioritized. In some locations, specifically at new siphons, construction access would need to be created before delivering pipe or equipment into construction areas. This could include vegetation clearing within the construction area and temporary disruption of existing land uses. Appropriately sized construction equipment would be used to minimize disturbance in the construction area.

Potential staging areas have been identified at the following locations:

- Three areas within Jackson County Tax Lot 362E5500:
  - → Adjacent to the JSC, west of the junction of the North Fork Canal and the South Fork Canal (Bench Flume 1 staging area).
  - → Adjacent to S Fork Little Butte Creek Road, west of an unnamed creek crossing this road, south of the Main Canal/JSC (Diversion Road staging area).

  - → Adjacent to the JSC east of the existing Lake Creek Siphon (Turnaround staging area).
- One area within Jackson County Tax Lot 362E7701 adjacent to the JSC at the west end of the existing Lake Creek Siphon (Lake Creek Siphon staging area).
- One area within Jackson County Tax Lot 362E19100 adjacent to the JSC at the south end of the proposed Grasshopper Siphon (Grasshopper Siphon staging area).
- One area overlapping Jackson County Tax Lots 361E10300 and 361E10302 adjacent to the Main Canal/JSC, south of the northward turn of Little Butte Creek, south of Lake Creek Loop Road (Bench Flume 2 staging area).
- Two areas wholly within Jackson County Tax Lot 361E10302:
  - → Adjacent to the JSC at the south end of the Osborne Siphon (Osborne staging area 1).
  - → Adjacent to the Main Canal/JSC at the north end of the Osborne Siphon (Osborne staging area 2).
- One area within Jackson County Tax Lot 361E14100, north of the JSC between two unnamed creek drainages, south of Little Butte Creek (Panther Crushing staging area).
- One area within Jackson County Tax Lot 361E08700, west of the Bradshaw Drop and north of the Hopkins Canal.

The contractor would be responsible for relevant local land use or local, state, or federal environmental permitting required for use of a chosen site. Therefore, it is assumed that because of regulatory and time constraints on the contractor, any site chosen would need to be already developed with road access. Potential staging areas listed above would not involve ground disturbance within waterbodies, and they are not located within 50 feet of a waterbody. Erosion and sediment control measures would be employed to minimize the potential for runoff from staging areas. Furthermore, staging areas consist of either compacted road material or dense pasture grasses that are not suitable for NWPT nesting or overwintering. Thus, staging materials in these areas would have no impact on fish and aquatic species.

6.3 Cumulative Effects

The combined, incremental effects of past, present, and reasonably foreseeable actions are referred to as cumulative effects. While they may be insignificant by themselves, cumulative effects accumulate over time from one or more sources and can result in the degradation of important resources. The Project could potentially contribute to cumulative effects on fish and aquatic species when considered in combination with other development and conservation projects in the Little Butte Creek Watershed.

6.3.1 No-Build Alternative

Under the No Action Alternative, no federal funding would be forthcoming to support the Project and modernization of MID would not take place. No new direct effects on fish and aquatic species would result from the Project, and existing conditions would remain unchanged. The Project would, therefore, not contribute to cumulative impacts to fish and aquatic species over current conditions.

6.3.2 Modernization Alternative

Past actions over the last 130 years that have affected fish and aquatic species in the Little Butte Creek Watershed include urban and agricultural development, construction and maintenance of the roadway network, logging, water impoundment projects, and other irrigation projects. Since the early 2000s, various water conservation projects conducted by the NRCS Oregon Regional Conservation Partnership Program, Jackson Soil and Water Conservation District, and nongovernmental organizations such as the Rogue River Watershed Council and Trout Unlimited have resulted in improved habitat availability and quality for fish and aquatic species within waterbodies in the Little Butte Creek Watershed. These projects include removal of push-up dams, conversion from flood to sprinkler irrigation, decommissioning of roads, floodplain rehabilitation, and instream water rights transfers. In 2012, NMFS issued a biological opinion for the Reclamation Rogue River Basin Project which included operations of MID, RRVID, and TID. The biological opinion increased flow and habitat complexity in South Fork Little Butte Creek and Little Butte Creek by mandating minimum flows in these waterbodies, reducing the TID diversion rates, and requiring that large woody debris be placed within these waterbodies.

Guidance documents will further promote activities that will improve water quality and habitat quality for fish and aquatic species within the Little Butte Creek Watershed. The Inland Rogue Agricultural Water Quality Management Area Plan (ODA 2022) addresses water pollution coming from private agricultural land. The plan identifies educational programs, suggested land treatments, management activities, and monitoring to reduce water pollution from agricultural lands. Actions are voluntary, but noncompliance with Agricultural Water Quality Management Area Rules is subject to enforcement by the Oregon Department of Agriculture. Prohibited conditions outlined in the plan will prevent the further degradation of waterbodies by minimizing sediment inputs and riparian vegetation destruction and preventing exceedance of water quality standards from irrigation return flows. The Water Quality Improvement Plan for Little Butte Creek Watershed (RRWC 2018) outlines numerous realistic projects and initiatives to achieve compliance with water quality standards for Section 303(d)-listed streams. These projects focus on attaining more instream water rights, decreasing temperature by increasing shading by riparian vegetation, and reducing bacteria loading into waterbodies within the Little Butte Creek Watershed.

The impact on the Little Butte Creek Watershed of the Klamath Basin Adjudicator granting a large senior priority claim for water (including water stored in Fourmile Lake) by the federal government on behalf of Reclamation, USFWS, and the Klamath Tribes is yet to be determined. When Klamath Tribes asserted its Claim 622 that led to a call on Fourmile Lake by OWRD in 2023, releases from Fourmile Lake were delayed by a month and did not result in a significant disruption to MID and RRVID operations. Recent funding provided by the state of Oregon to RVVID for construction of a reservoir outfall into the Klamath Basin would provide a conveyance pathway for water stored in Fourmile Lake to senior water rights holders in the Klamath Basin. Future calls on Fourmile Lake by the Klamath Tribes may decrease the amount of stored water MID releases from Fourmile Lake, which would result in lower storage levels in Fish Lake and lower flows in North Fork Little Butte Creek.

Future irrigation canal piping projects may improve habitat availability and quality by increasing streamflow. MID and RRVID secured an EPA Community Grant for Phase 1 of the Joint System Canal Pipeline Project for Fiscal Year 2022. This project includes piping the North Fork Canal and South Fork Canal to eliminate water losses from the current open unlined canal. RRVID also proposes to modernize irrigation infrastructure by piping or lining opens canals and laterals in RRVID. The RRVID project would reduce conveyance and operational losses over the irrigation season and improve MID's ability to efficiently provide water to its patrons. The project is sponsored by RRVID, with

planning funding from NRCS. The Phase 1 piping project and RRVID irrigation modernization project may result in changes to streamflow in North Fork Little Butte Creek as described for this Project and may involve reduced diversion from diversion points on North Fork Little Butte Creek and South Fork Little Butte Creek.

Under the Modernization Alternative and its alignment options, implementation of the Project could contribute to increased habitat availability and quality for fish and aquatic species. Other past, present, and reasonably foreseeable future actions are anticipated to result in overall beneficial effects on fish and aquatic species, although they would also contribute cumulatively to reductions in artificial canal aquatic habitat used by reptiles and amphibians. Overall, the Modernization Alternative would be expected to have a minor beneficial contribution to overall beneficial cumulative effects on fish and aquatic species.

6.4 Compliance with Laws, Regulations, and Standards

The Project would comply with all federal, state, and local laws and regulations that would be triggered by the Project's construction activities. Permits would be applied for and acquired before Project construction begins. Regulatory compliance as detailed below would be required for the Project regardless of the alignment option.

6.4.1 Federal

6.4.1.1 Clean Water Act, 1977 as Amended, 33 U.S.C. 1251–1376

Section 303(d) Impaired Waters and Total Maximum Daily Loads

Section 303(d) water quality impairments of temperature, flow modification, dissolved oxygen, *E. coli*, sedimentation, and phosphorus within waterbodies associated with District operations and infrastructure would be beneficially improved by the Project. The Project would result in a reduction in loading of pollutants that have TMDLs in the Rogue River Basin such as thermal pollution and *E. coli.*

Section 401 Water Quality Certification

The Project must comply with state water quality requirements and standards. The construction-phase BMPs outlined in Sections 7.2.1 and 7.2.2 would align with the water pollution control requirements to ensure water quality requirements are met. If the pipeline goes through wetlands, anti-seep collars or equivalent technology must be installed to prevent draining of the wetlands. The joint permit application submitted to USACE would be forwarded to DEQ to ensure the Project does not endanger waters of the United States. Water quality certification would be issued by DEQ in coordination with USACE.

Section 402 National Pollutant Discharge Elimination System Permits

Ground disturbance during construction, which has the potential to mobilize sediments or contaminants in stormwater runoff, would be subject to the requirements of CWA Section 402. These would be addressed via the requirement to obtain a 1200-CA construction stormwater permit through DEQ. BMPs developed under this permit would avoid or minimize the potential for erosion and for sediments or contaminants to enter waterbodies and, thus, would limit the potential for short-term detrimental impacts on the environment during construction.

Section 404 for Permitting Discharge of Dredge or Fill Material

The majority of the JSC would not be considered a water of the United States and is not jurisdictional to USACE under Section 4 of the CWA (i.e., canal and infrastructure constructed in uplands). However, USACE takes jurisdiction over canals that were constructed in wetlands or in a tributary or relocated to a tributary. Thus, the former areas of 13 drainages that currently flow into the JSC and associated natural wetlands would be considered jurisdictional. Furthermore, waterbodies that may be affected by siphon construction would also be considered jurisdictional as they are tributaries to a traditional navigable waterway.

On July 24, 2020, USACE and EPA signed a memorandum providing a clear, consistent approach regarding the application of exemptions from regulation under Section 404(f)(1)(C) of the CWA for the construction or maintenance of irrigation ditches and the maintenance of drainage ditches. Project actions would qualify as construction, which is only an exempt activity if it is subject to the recapture provision based on the two-part test: (1) Project actions would not convert an area of water to a use it was not previously subject to, and (2) it would not impair flow or circulation of waters or reduce the reach of waters of the United States. Thus, project actions would likely not pass the two-part test of the recapture provision and activities would be considered exempt.

If project activities are not considered exempt from Section 404 regulation, the Project could likely be permitted under Nationwide Permit 58 Utility Line Activities for Water and Other Substances and/or Nationwide Permit 27 Aquatic Habitat Restoration, Establishment, and Enhancement Activities. Permitting under a Nationwide Permit would require submission of a joint permit application to USACE. The Project would result in no net loss of waters of the United States. Because the Project is likely considered a self-mitigating action, it would not result in a loss of waters, and would improve aquatic habitat, no mitigation for waters would be required.

6.4.1.2 Endangered Species Act of 1973 and Amendments, 16 U.S.C. § 1531 et seq.

In coordination with NOAA, NRCS determined that the Modernization Alternative's effects on SONCC coho salmon fit under the Oregon and Washington NRCS Aquatic Habitat Conservation Programmatic Biological Opinion (ORWAC). Applicable conservation measures would be incorporated into project design and construction to meet NRCS's ESA Section 7 obligations for SONCC coho salmon. NRCS also coordinated with USFWS regarding effects on the proposed northwestern pond turtle; NRCS and USFWS determined that conferencing for the species was not necessary.

6.4.1.3 Magnuson-Stevens Fishery Conservation and Management Act of 1976 and Amendments, 16 U.S.C. 1801 et seq.

The USACE Section 404 CWA permit that would be required for the Project includes consultation with NMFS for potential impacts to EFH for Chinook and coho salmon. An EFH assessment would be prepared for consultation with NMFS and submitted along with any biological assessment. 7.4.1.2

6.4.1.4 Fish and Wildlife Coordination Act of 1934 and Amendments, 16 U.S.C. § 661 et seq.

The Project would ultimately increase flow in streams and other waterbodies and would improve conditions for fish and wildlife resources. MID is coordinating with USFWS and with other agencies including ODFW for guidance on the Project to minimize impacts on fish and wildlife resources, which would be incorporated into Project implementation. This coordination satisfies the requirements of the Fish and Wildlife Coordination Act.

6.4.1.5 Public Law 83-566 Section 12

The NRCS State Technical Committee would contact USFWS for its recommendations regarding fish and wildlife resources in relation to the Modernization Alternative prior to Project implementation.

6.4.2 State

6.4.2.1 ORS 468B, Water Quality

The Project would have overall beneficial impacts on waters of the state by removing sources of pollution, and as such it would align with policies articulated in ORS 468B. By complying with Section 401 and 1200-CA as discussed below, the Project is compliant with policies in ORS 468B.

6.4.2.2 Section 401 Water Quality Certification

The Project would result in a net benefit to water quality and would comply with water quality standards set forth in OAR 440-041 and OAR 340-048. The construction-phase BMPs outlined in Section 7.2.1 and 7.2.2 would align with the water pollution control requirements to ensure water quality requirements are met during construction when water quality may be temporarily impaired. The DEQ water quality certification process requires a land use compatibility statement signed by the local government land use authority to ensure that permits affecting land use are compatible with local government comprehensive plans. The joint permit application submitted to USACE would also be submitted to DEQ for water quality certification to ensure the Project does not endanger waters of the state.

6.4.2.3 1200-CA Construction Stormwater Permit

The Project would require a 1200-CA permit submitted to DEQ that includes a temporary erosion and sediment control plan, a list of selected BMPs, and a schedule for implementing the BMPs. Implementation of these measures during construction is intended to avoid or minimize detrimental impacts to the environment by controlling erosion and the release of sediment or contaminants into waterbodies.

6.4.2.4 ORS 196.795-990, Oregon Removal-Fill Law

Before Project implementation begins, MID would be required to consult with DSL. A wetland and waters determination report is in progress for the project area; the report will be submitted to DSL for concurrence of aquatic resource boundaries and for a determination of the jurisdictional status of these resources within the project area.

Per Oregon removal-fill statute, OAR 141-085-0515(9), an irrigation ditch is not jurisdictional under Oregon removal-fill permitting if it meets both of the following criteria:

- The ditch is operated and maintained for the primary purpose of irrigation.
- The ditch is dewatered outside of the irrigation season except for isolated puddles in low areas.

Therefore, the majority of the JSC would not be considered jurisdictional. However, DSL takes jurisdiction over canals that were created in waters of the state (OAR 141-085-0515(8)). Thus, the former areas of 13 drainages that currently flow into the JSC and any portions of the JSC that may have been created within naturally occurring wetlands or waters would be considered jurisdictional.

Furthermore, waterbodies that may be affected by siphon construction would also be considered jurisdictional, as they are intermittent and perennial streams OAR 141-085-0515(3).

The Project would result in temporary and permanent impacts to jurisdictional waters and result in an overall uplift through reconnection of 13 drainages and a reduction of diversion rates. Temporary impacts to jurisdictional waters would require an individual permit and submission of a joint permit application for removal-fill authorization. The Project would result in no net loss of waters of the state, and no mitigation would be required.

6.4.2.5 OAR Division 412, Fish Passage

The Project may trigger fish passage requirements due to abandonment and major replacement of artificial obstructions along Wyant, Grasshopper, Owens, and Eagle gulches in addition to Unnamed Drainages 1 to 10 (OAR 635-412-0020[1][2]). Fish passage for reconnected channels would not be required if it is determined that no native migratory fish are present, or were historically present, in the waterbody (OAR 635-412-0020 [1]). The ODFW conducted a Native Migratory Fish Determination for 14 streams (unnamed drainages 1-10, Wyant Gulch, Grasshopper Gulch, Owens Gulch, and Eagle Gulch) during the winter of 2025. The ODFW determined that these streams lacked suitable native migratory fish habitat within the vicinity of the JSC and that fish passage would not be required for drainage reconnection and restoration.

Temporary in-water construction activities would be considered an artificial obstruction which must provide for fish passage according to the criteria set forth in OAR 635-412-0035(10) if the waterbody contains native migratory fish. This includes standard construction BMPs such as working within the ODFW-designated in-water work window, providing for streamflow and fish passage during construction, isolating the construction area from flow, removing fish from the isolated work area prior to construction, and rewatering the stream appropriately following construction. Fish passage plan approval is not required for temporary construction activities.

6.4.2.6 OAR Division 635, Oregon Endangered Species Act and Sensitive Species Rule

ODFW would comment upon the joint application submitted to DSL to ensure the Project is compliant with the Oregon Endangered Species Act for potential impacts to those species with a status of threatened or endangered in Oregon. Construction BMPs would minimize short-term affects to SONCC coho salmon. No other state-listed threatened or endangered species would be impacted by the Project, and no consultation or coordination with ODFW in regards to the Oregon Endangered Species Act and Sensitive Species Rule is required for the Modernization Alternative's implementation.

6.4.2.7 OAR Division 660, Oregon's Statewide Planning Goals and Guidelines

Overall, the Project would have beneficial impacts on water, and as such it would align with the provisions of Oregon Statewide Planning Goal 6 through compliance with the CWA and DEQ standards and regulations.

6.4.3 Jackson County

6.4.3.1 Comprehensive Plan

The Project is consistent with the Jackson County Comprehensive Plan's Environmental Quality Policies whose fundamental goal is "to ensure and improve the quality of the County's natural environment and resources in a responsible manner which will maintain and enhance the life sustaining environment." Another policy pertinent to that the Project is consistent with within the comprehensive plan is to "Conserve the water resources of Jackson and protect, manage and improve the quality of surface and groundwaters, for the propagation of wildlife and for domestic, agricultural, industrial, recreational and other beneficial uses." The Project's benefits to waterbodies would improve the quality of Jackson County's natural resources, surface water quality, wildlife, and recreational uses.

6.5 Conclusion

The Modernization Alternative would result in minor temporary impacts to fish and aquatic species along the JSC alignment during construction of the Project. Construction impacts would be minimized by sediment and erosion BMPs, in-water work measures, and restoration of disturbed areas to initial conditions. Thus, temporary impacts would result in minor short-term impairment of habitat quality for fish and aquatic species.

Following construction, the Project would overall have moderate long-term benefits to water resources via improvements to habitat availability within waterbodies associated with District operations and infrastructure. Saved water, reduction in diversion rates, restoration of natural hydrology, and elimination of pollution sources would improve habitat conditions within 20 different waterbodies. The Project would have minor long-term adverse impacts to habitat availability for NWPT due to the loss of artificial habitats provided by the JSC. However, the Project would provide a net gain to fish and aquatic species by the improvements in habitat availability and quality in natural waterbodies.

In coordination with NOAA, NRCS determined that the Project's effects on SONCC coho salmon fit under the Oregon and Washington NRCS Aquatic Habitat Conservation Programmatic Biological Opinion (ORWAC). Applicable conservation measures would be incorporated into project design and construction to meet NRCS's ESA Section 7 obligations for SONCC coho salmon. NRCS also coordinated with USFWS regarding effects on the proposed northwestern pond turtle; NRCS and USFWS determined that conferencing for the species was not necessary.

7. Mitigation Measures

Overall, the proposed action is expected to have beneficial long-term effects on fish and aquatic species in the Little Butte Creek Watershed. As a result, no long-term mitigation measures are proposed.

Avoidance and minimization measures would be implemented during construction to ensure that adverse effects on fish and aquatic species are prevented to the greatest extent practicable. Post-construction mitigation and restoration actions would be implemented following construction to ensure that post-construction site conditions do not contribute to ongoing effects on fish and aquatic resources. These are discussed in greater detail in Section 7.2.

8. Contacts and Coordination

NRCS, FCA, and Parametrix met with Kate Wells (NMFS Willamette Branch chief) and Alyssa Garcia (NMFS natural resource management specialist) on January 11, 2024, to discuss the project and potential impacts to SONCC coho salmon. FCA and Parametrix met with Mac Barr (ODFW Statewide Fish Passage Coordinator), Danette Faucera (ODFW Water Policy Coordinator), and Peter Samarin (ODFW District Fish Biologist) on November 21, 2024, to discuss the project and potential requirements for fish passage for drainage reconnection. FCA, Parametrix, and MID coordinated and worked with ODFW to conduct a Native Migratory Fish Determination for waterbodies associated with drainage reconnection to determine the potential requirements for fish passage. Coordination with NMFS and other federal and state agencies with authority over fish and aquatic resources for the Project is ongoing, and guidance received will be incorporated in Project planning.

9. Preparers

Name	Professional Affiliation	Education	Years of Experience
Colton Kyro	Parametrix	MS, Systems Ecology BS, Ecosystem Science	5
Taya K. MacLean, MS, PWS	Parametrix	MS, Biology BS, Forestry Professional Wetland Scientist	25

10. References

BLM and USFS (Bureau of Land Management and U.S. Forest Service). 1997. Little Butte Creek Watershed Analysis. Version 1.2. BLM Medford District Office and USFS Rogue River National forest.

Bury, R. B. and D. J. Germano. 2008. Actinemys marmorata (Baird and Girard 1852) – Western Pond Turtle, Pacific Pond Turtle. In Rhodin, A.G.J. et al. (Eds.), Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group. Chelonian Research Monographs No. 5, pp. 001.1-001.9.

Bury, R. B., H. H. Welsh Jr., D. J. Germano, and D. T. Ashton, editors. 2012. Western pond turtle: Biology, sampling techniques, inventory and monitoring, conservation, and management: Northwest Fauna No. 7. The Society for Northwestern Vertebrate Biology. Accessed October 2, 2024. http://pubs.er.usgs.gov/publication/70042665.

Dean, D.J. and J.C. Schmidt. 2013. The geomorphic effectiveness of a large flood on the Rio Grande in the Big Bend region: insights on geomorphic controls and post-flood geomorphic response. Geomorphology 201, 183–198. Accessed October 2, 2024. https://doi.org/10.1016/j.geomorph.2013.06.020.

DEQ (Oregon Department of Environmental Quality). 2008. Rogue River Basin Total Maximum Daily Load (TMDL). Accessed January 1, 2024. https://www.oregon.gov/deq/wq/tmdls/pages/tmdls-rogue-basin.aspx.

DEQ. 2022a. Construction Stormwater Application and Forms Manual. Accessed September 30, 2024. https://www.oregon.gov/deq/wq/Documents/wqp1200cInfo.pdf.

DEQ. 2022b. EPA Approved Integrated Report. Accessed January 11, 2024. https://www.oregon.gov/deq/wq/pages/epaapprovedir.aspx.

DSL (Department of State Lands). 2023. Essential Salmonid Habitat Map. Accessed January 12, 2024. https://maps.dsl.state.or.us/esh/.

Holland, D.C. 1994. The Western Pond Turtle; Habitat and History, 1993–1994 Final Report. Portland, OR. Accessed October 2, 2024. https://doi.org/10.2172/171287.

Jackson County. 2005. Jackson County Comprehensive Plan. Accessed September 17, 2024. https://www.jacksoncountyor.gov/departments/development_services/planning/comprehensive_plan.php#outer-1723.

Google Earth 7.3.6. 2024. 42.441549°, -122.674789°. 1984 to 2023. Accessed January 15, 2024. http://www.google.com/earth/index.html.

Manzo, S., Nicholson, E.G., Devereux, Z., Fisher, R.N., Brown, C.W., Scott, P.A. and Shaffer, H.B., 2021. Conservation of Northwestern and Southwestern Pond Turtles: Threats, Population Size Estimates, and Population Viability Analysis. Journal of Fish and Wildlife Management, 12(2):485–501.

Meengs, C.C. and R.T. Lackey. 2005. Estimating the size of historical Oregon salmon runs. Reviews in Fisheries Science. 13(1):51–66.

NMFS (National Oceanic and Atmospheric Administration National Marine Fisheries Service). 2002. Columbia River Federal Navigation Channel Improvements Project Biological Opinion. National Marine Fisheries Service, Northwest Region, Portland, Oregon.

NMFS. 2012. Endangered Species Act Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Future Operation and Maintenance of the Rogue River Basin Project (2012–2022), Rogue and Klamath River Basins (HUCs: 18010206, 17100308, 17100307), Oregon and California. National Marine Fisheries Service Northwest Region

NMFS. 2014a. Final Recovery Plan for the Southern Oregon/Northern California Coast Evolutionarily Significant Unit of Coho Salmon (*Oncorhynchus kisutch*). National Marine Fisheries Service. Arcata, CA.

NMFS. 2014b. Reinitiation of the Endangered Species Act Section 7 Programmatic Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Revisions to Standard Local Operating Procedures for Endangered Species to Administer Maintenance or Improvement of Stormwater, Transportation or Utility Actions Authorized or Carried Out by the U.S. Army Corps of Engineers in Oregon (SLOPES for Stormwater, Transportation or Utilities).

NMFS. 2016. 2016 5-Year Review: Summary & Evaluation of Southern Oregon/Northern California Coast Coho Salmon. National Marine Fisheries Service West Coast Region. Arcata, CA.

NMFS. 2024. National NMFS ESA Critical Habitat Mapper. Accessed September 2, 2024. https://noaa.maps.arcgis.com/apps/webappviewer/index.html?id=68d8df16b39c48fe9f60640692d0e318.

NOAA (National Oceanic and Atmospheric Administration). 2024. Essential Fish Habitat Mapper. NOAA Fisheries. Accessed January 12, 2024. https://www.habitat.noaa.gov/apps/efhmapper/?page=page_4.

OC and SONCC Status Review Team. 2023. Biological Status of Oregon Coast and Southern Oregon/Northern California Coastal Chinook Salmon: Report of the Status Review Team. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-189. https://doi.org/10.25923/0htj-5q59.

ODA (Oregon Department of Agriculture). 2022. Inland Rogue Agricultural Water Quality Management Area Plan. June 2022. Developed by ODA and Inland Rogue Local Advisory Committee. Accessed September 18, 2024. https://www.oregon.gov/oda/shared/Documents/Publications/NaturalResources/InlandRogueAWQMAreaPlan.pdf.

ODFW (Oregon Department of Fish and Wildlife). 2004. Upper Rogue Smolt Trapping Project, 2004. Oregon Department of Fish and Wildlife, Salem, OR.

ODFW. 2005. 2005 Oregon Native Fish Status Report Volume II: Assessment Methods & Population Results. Accessed January 1, 2024. https://www.dfw.state.or.us/fish/crp/native_fish_status_report.asp#winter_steelhead.

ODFW. 2007. Rogue Spring Chinook Salmon Conservation Plan. Accessed September 16, 2024 from https://www.dfw.state.or.us/fish/CRP/rogue_spring_chinook_conservation_plan.asp.

ODFW. 2013. Conservation Plan for Fall Chinook Salmon in the Rogue Species Management Unit. Accessed September 16, 2024. https://www.dfw.state.or.us/fish/CRP/rogue_fall_chinook_conservation_plan.asp.

Oregon Department of Fish and Wildlife (ODFW). 2015. Guidance for conserving Oregon's native turtles including best management practices. Oregon Dept. of Fish and Wildlife. 99 pp. Accessed January 13, 2024. https://www.dfw.state.or.us/wildlife/living_with/docs/ODFW_Turtle_BMPs_March_2015.pdf

ODFW. 2021a. Threatened, Endangered, and Candidate Fish and Wildlife Species. Accessed January 12, 2024. https://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_candidate_list.asp

ODFW. 2021b. Sensitive Species List. Accessed January 12, 2024. https://www.dfw.state.or.us/wildlife/diversity/species/docs/Sensitive_Species_List.pdf

ODFW. 2023a. Recreation Report Southwest Zone. Accessed December 12, 2023. https://myodfw.com/recreation-report/fishing-report/southwest-zone.

ODFW. 2023b. Northwestern Pond Turtle (Actinemys marmorata). The Oregon Conservation Strategy, Accessed January 11, 2024. https://oregonconservationstrategy.org/strategy-species/northwestern-pond-turtle/.

ODFW. 2024. Oregon Fish Habitat Distribution and Barriers. Accessed January 10, 2024. https://nrimp.dfw.state.or.us/FHD_FPB_Viewer/index.html.

ORBIC (Oregon Biodiversity Information Center). 2023. Rare, Threatened, and Endangered Species in the Vicinity of Site. Institute for Natural Resources, Portland State University, Portland, Oregon. Generated December 5, 2023.

Reese, D.A. and H.H. Welsh. 1997. Use of Terrestrial Habitat by Western Pond Turtles, *Clemmys marmorata*: implications for management. Pages 352–357 in Proceedings: Conservation, Restoration and Management of Tortoises and Turtles. New York Turtle and Tortoise Society, Mamaroneck, New York.

Rosenberg, D.K., Gervais, J., Vesely, D., Barnes, S., Holts, L., Horn, R., Swift, R., Todd, L. and Yee, C., 2009. Conservation assessment for western pond turtles in Oregon. Unpubl. Report, Oregon Wildlife Institute, Corvallis, OR. https://oregonwildlife.org/documents/wpt_cons_ass.pdf

RRWC (Rogue River Watershed Council). 2018. Water Quality Improvement Plan Little Butte Creek Watershed. Accessed September 18, 2024. https://drive.google.com/file/d/1Yv97uqjF1gfsNDcwrt5LadG2uI7i2m58/view.

Talbot, C.J., Bennett, E.M., Cassell, K., Hanes, D.M., Minor, E.C., Paerl, H., Raymond, P. A., Vargas, R., Vidon, P.G., Wollheim, W., Xenopoulos, M.A., 2018. The Impact of Flooding on Aquatic Ecosystem Services. Biogeochemistry 141, 439–461. https://doi. org/10.1007/s10533-018-0449-7.

Townsend, C.R., Scarsbrook, M.R., and S. Dolédec. 1997. The Intermediate Disturbance Hypothesis, Refugia, and Biodiversity in Streams. Limnol. Oceanogr. 42, 938–949. https://doi.org/10.4319/lo.1997.42.5.0938.

USFWS (U.S. Fish and Wildlife Service). 1981. Planning Aid Report from USFWS, Portland to USBR, Boise, Idaho, November 25, 1981. FWS, Ecological Services Field Office, Portland, Oregon. 4pp.

USFWS. 2023. Species Status Assessment Report for Northwestern Pond Turtle (*Acitnemys marmorata*) and Southwestern Pond Turtle (Actinemys pallida), Version 1.1, April 2023. U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office, Ventura, California.

USFWS. 2024a. Critical Habitat for Threatened and Endangered Species. Accessed January 17, 2024. https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77.

USFWS. 2024b. Environmental Conservation Online System. Accessed September 30, 2024. https://ecos.fws.gov/ecp/.

USFWS. 2025. Medford Irrigation District Infrastructure Modernization Project Official Species List. January 16, 2025. Project Code: 2024-0135676.

USGS (U.S. Geological Survey). 2018. Gap Analysis Project (GAP). Western Pond Turtle (*Actinemys marmorata*) rWPTUx_CONUS_2001v1 Habitat Map: U.S. Geological Survey data release. https://doi.org/10.5066/F7H993NJ.

WDW (Washington Department of Wildlife). 1994. Status of the Western Pond Turtle (*Clemmys marmorata*) in Washington. Unpublished report Washington Department of Wildlife Management Division.

Wheaton, J.M., Brasington, J., Darby, S.E., Merz, J., Pasternack, G.B., Sear, D., Vericat, D. 2010. Linking Geomorphic Changes to Salmonid Habitat at a Scale Relevant to Fish. River Res. Appl. 26, 469–486. https://doi.org/10.1002/rra.1305.