UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
Portland, Oregon 97232-1274

July 2, 2019

Refer to NMFS No:
WCR-2018-10032

Dawn Wiedmeier
Area Manager
Columbia–Cascades Area Office
U.S. Bureau of Reclamation
1917 Marsh Road
Yakima, Washington 98901

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation on Operation and Maintenance of the Umatilla Project and Umatilla Basin Project, Umatilla County, Oregon, HUC 17070103 (Umatilla), HUC 17070101 (Columbia–Lake Wallula).

Dear Ms. Wiedmeier:

Enclosed is a biological opinion (opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of operating the Umatilla Project and the Umatilla Basin Project in Umatilla County, Oregon. NMFS concludes in this opinion that the operation of the Umatilla and Umatilla Basin Projects is not likely to jeopardize the continued existence of the following ESA-listed species:

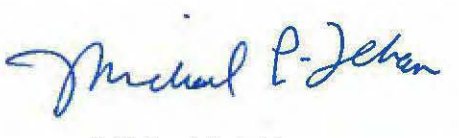
Middle Columbia River steelhead
Upper Columbia River steelhead
Snake River Basin steelhead
Snake River sockeye salmon
Upper Columbia River spring-run Chinook salmon
Snake River spring/summer-run Chinook salmon
Snake River fall-run Chinook salmon

NMFS also concludes that the proposed action is not likely to destroy or adversely modify designated critical habitat. As required by section 7 of the ESA, NMFS included reasonable and prudent measures with nondiscretionary terms and conditions that NMFS believes are necessary to avoid or minimize the effect of incidental take caused by this action.

This document also serves as consultation on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act (Act) and implementing regulations at 50 CFR Part 600. The Umatilla River basin has been designated as EFH for Chinook and coho salmon. NMFS concludes that the proposed action may adversely affect designated EFH for these species. As required by section 305(b)(4)(A) of the MSA, included are conservation recommendations that NOAA Fisheries believes will avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from the proposed action. As described in the enclosed consultation, 305(b)(4)(B) of the Act requires that a federal action agency must provide a detailed response in writing within 30 days of receiving an EFH conservation recommendation.

If you have any questions, please contact Scott Carlon in the Columbia Basin Branch at (503) 231-2379 or email scott.carlon@noaa.gov.

Sincerely,



Michael P. Tehan
Assistant Regional Administrator
Interior Columbia Basin Office
NOAA Fisheries, West Coast Region

Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation

Operation and Maintenance of the Umatilla Project and Umatilla Basin Project
Umatilla County, Oregon
HUC 17070103 (Umatilla), HUC 17070101 (Columbia–Lake Wallula)

NMFS Consultation No.: WCRO-2018-00272

Action Agency: U.S. Bureau of Reclamation

Affected Species and Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat	Is action Likely to Jeopardize the Species	Is Action Likely to Destroy or Adversely Modify Critical Habitat
Upper Columbia River spring Chinook salmon (*Oncorhynchus tshawytscha*)	Endangered	Yes	No	No
Upper Columbia River steelhead (*O. mykiss*)	Threatened	Yes	No	No
Snake River spring/summer Chinook salmon (*O. tshawytscha*)	Threatened	Yes	No	No
Snake River fall Chinook salmon (*O. tshawytscha*)	Threatened	Yes	No	No
Snake River sockeye salmon (*O. nerka*)	Endangered	Yes	No	No
Snake River steelhead (*O. mykiss*)	Threatened	Yes	No	No
Middle Columbia River steelhead (*O. mykiss*)	Threatened	Yes	No	No

Fishery Management Plan that Describes EFH in the Project Area	Does Action have an Adverse Effect on EFH	Are EFH Conservation Recommendations Provided
Pacific Coast salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service
West Coast Region

Issued By:

Michael P. Tehan
Assistant Regional Administrator

Date: July 2, 2019

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GLOSSARY OF ACRONYMS

A&P	abundance and productivity
BPA	Bonneville Power Administration
BRT	Biological Review Team
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHART	critical habitat analytical review team
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CWA	Clean Water Act
DPS	Distinct Population Segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FR	Federal Register
FURO	Furnish Canal gage
HID	Hermiston Irrigation District
HUC5	hydrologic unit code (fifth field)
ICTRT	Interior Columbia Technical Recovery Team
ITS	Incidental Take Statement
MCKO	Umatilla River flow gage near Pendleton
MCR	Middle Columbia River
MPG	major population group
MSA	Magnuson–Stevens Fishery Conservation and Management Act
MYKO	McKay Creek flow gage near Pilot Rock
NMFS	National Marine Fisheries Service
NOR	natural origin return
NPCC	Northwest Power and Conservation Council
ODFW	Oregon Department of Fish and Wildlife
Opinion	biological opinion
OSU	Oregon State University
OWRD	Oregon Department of Water Resources
PBF	physical or biological feature
PCE	primary constituent element
PIT	passive integrated transponder
Project	Umatilla Project and Umatilla Basin Project
Reclamation	U.S. Bureau of Reclamation
RM	river mile
RPM	reasonable and prudent measure
SBEO	Stanfield Branch Exchange Canal near Hermiston
SID	Stanfield Irrigation District
SR	Snake River
SRB	Snake River Basin
SS/D	spatial structure and diversity
UCR	Upper Columbia River

UCSRB	Upper Columbia Salmon Recovery Board
UMAO	Umatilla River flow gage near the town of Umatilla
UMDO	Umatilla River flow gage near Stanfield
UMMO	Umatilla River flow gage near Hermiston
UMUO	Umatilla River flow gage near Echo
USFWS	U.S. Fish and Wildlife Service
VSP	viable salmonid population
WEID	West Extension Irrigation District
WESO	Westland Canal near Echo
WID	Westland Irrigation District
YOKO	Umatilla River flow gage near Yoakum

1. INTRODUCTION

This introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.) and implementing regulations at 50 CFR 402. We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson–Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). A complete record of this consultation is on file at the NMFS Columbia Basin Branch office.

1.2 Consultation History

The NMFS completed its original ESA section 7 consultation on the operation and maintenance of the federal Umatilla Project and Umatilla Basin Project with the U.S. Bureau of Reclamation (Reclamation) on April 23, 2004 (NMFS 2004). Congress originally authorized the Umatilla Project in 1906 for irrigation and reauthorized the project in 1976 to include fish and wildlife and flood control. In 1988, Congress authorized the Umatilla Basin Project to allow water from the Columbia River to be used for irrigation in lieu of diverting Umatilla River water for the benefit of anadromous fish in the Umatilla Basin. For the purpose of this consultation, the Umatilla Project and Umatilla Basin Project are hereafter denoted as the Project.

NMFS (2004) was set to terminate after 10 years and thus expired on April 23, 2014. Accordingly, Reclamation reinitiated section 7 consultation on May 30, 2018. NMFS conferred with the Confederated Tribes of the Umatilla Indian Reservation regarding existing irrigation and instream flow operations on June 18, 2018 and July 2, 2019 (Brian Zimmerman and Gary James, respectively, pers. comm.).

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies (50 CFR 402.02). Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02). There are no interrelated or interdependent actions associated with this action.

Reclamation's proposed action is the continued operation and maintenance of its Project facilities in the Umatilla River basin. This includes five diversion dams and main canals, the Phase I and II Columbia River pumping plants, McKay and Cold Springs storage reservoirs, streamflow and canal gaging equipment and facilities to carry out water exchanges for irrigation and Umatilla River flow. The facilities are operated to meet authorized Project purposes, which include storage and delivery of irrigation water and anadromous fish mitigation.

Four irrigation districts are associated with the Project. These are the Westland Irrigation District (WID), Stanfield Irrigation District (SID), Hermiston Irrigation District (HID), and West Extension Irrigation District (WEID). In addition, a combination of 75 individuals and organizations have contracts with Reclamation for Project water stored in McKay Reservoir.

The historical operations of SID, HID, and WEID have been altered to help meet Umatilla River instream flow targets identified in the 1988 Project Environmental Impact Statement (Reclamation 1988). This is largely accomplished through the Phase I and II water exchange arrangements that help achieve flow targets by replacing water diversions from the Umatilla River with water pumped from the Columbia River. In addition to meeting irrigation demand, ongoing operations include an anadromous fish restoration program that is jointly implemented by Reclamation, Oregon Department of Fish and Wildlife (ODFW), Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Bonneville Power Administration (BPA), Northwest Power and Conservation Council (NPCC) and the Umatilla irrigation districts.

1.3.1 Phase I and II Exchange Operations

The Phase I and Phase II water exchange facilities were completed in 1992 and 1999, respectively. The program allows live flow and stored water released from McKay Reservoir to remain instream for fish while water pumped from the Columbia River is used for irrigation. The exchanges are triggered when Umatilla River flow drops to the target flows identified in Table 1.1. When an exchange is in place, some federal irrigation diversions from the Umatilla River are reduced or eliminated (Reclamation 2016).

Table 1.1. Umatilla River target flows from McKay Creek downstream to the Columbia River.

Period	Target Flow (cfs)
October 1–November 15	300
November 16–June 30	250
July 1–August 15	75
August 16–September 30	250

Phase I Operations

Phase I exchange facilities were constructed to deliver exchange water to WEID. Columbia River water is diverted at the McNary Dam left bank (looking downstream) fish ladder, conveyed 2 miles by a concrete-lined canal to a pumping plant near the city of Umatilla. Water is

then pumped through a three-quarter-mile pipeline into the existing WEID canal. This plant has five pumps with a total design capacity of 140 cubic feet per second (cfs) (Reclamation 2016).

The purpose of the WEID water exchange is to augment instream flows for the lower 3 miles of the Umatilla River when river flows approach or fall below seasonal target flows at Three Mile Dam at river mile (RM) 3. In exchange for receiving pumped Columbia River water, WEID reduces its Umatilla River diversion by up to 140 cfs at the Three Mile Diversion Dam, allowing the water to flow in channel to the Columbia River. The WEID water exchange is a bucket for bucket, simultaneous exchange. The primary operational months for the WEID water exchange are May–June and August–October. During summer months (July 1 to August 15), WEID irrigation water is diverted from the Umatilla River at the WEID canal or at their private pump at RM 0.5 on the Umatilla River (Reclamation 2016).

In operating the Phase I exchange, the Umatilla River Coordinator (Reclamation staff) notifies WEID of the amount of water that is protected at Three Mile Dam (McKay fish flow releases, plus SID and HID live flows foregone under senior water rights), and the amount that can be exchanged (the lesser of WEID's demand and the live flow available to divert). If the target flow is greater than the flow already protected, the amount that can be exchanged for pump water is the difference between the two (up to a maximum of 140 cfs).

Phase II Operations

Phase II water exchange facilities were constructed to serve HID and SID. The purpose of the water exchange is to provide Umatilla River instream flows from McKay Creek downstream to the Columbia River and to assure continued water deliveries to the irrigation districts. Major exchange facilities include the Columbia River Pumping Plant, Columbia–Cold Springs Reservoir Canal, Cold Springs Pumping Plant and various other canals and relift pumps (Reclamation 2016).

Exchange water from the Columbia River Pumping Plant (located on the left bank approximately 8.5 miles upstream from the mouth of the Umatilla River) is delivered to SID and HID when flows in the Umatilla River approach or fall below seasonal targets. Exchange facilities can pump a maximum of 240 cfs from the Columbia River. HID exchange water is stored or routed through Cold Springs Reservoir, and SID exchange water is delivered directly into the SID irrigation system (Reclamation 2016).

HID Phase II Exchange. The Phase II HID exchange involves the pumping of water to Cold Springs Reservoir from the Columbia River in exchange for foregone diversions from the Umatilla River by HID. HID forgoes Feed Canal diversions when there is less than 80 cfs of live flow above seasonal target flows in the Umatilla River.

Unless Umatilla River flows are at or below target flow, HID diverts Umatilla water into the Cold Springs Reservoir during the winter and spring months. If winter and spring diversions are foregone, HID accumulates exchange credits equal to the amount of the foregone diversions, with the credits accumulating over the course of the normal Cold Springs Reservoir refill period.

If at the end of the refill period, winter/spring flows have been sufficient in the Umatilla River to enable HID to divert their full storage right into Cold Springs, then the exchange credits are not used during the irrigation season and no water is pumped from the Columbia River to Cold Springs. Conversely, if the reservoir does not fill, then water can be pumped from the Columbia River into Cold Springs over the course of the irrigation season at slow rates, or at higher rates over shorter time period of favorable flows in the Columbia River. Water pumped from the Columbia River to Cold Springs Reservoir cannot exceed the total amount of exchange credits available (Reclamation 1988 and 2016).

HID can request pumped exchange water when Cold Springs storage is projected to be insufficient to meet HID's needs for the season. From 2000 to 2012, the average annual volume of Columbia River water pumped to HID under the exchange program was 11,718 acre-feet. Since 2012, the annual average volume has increased slightly to about 12,544 acre-feet (Reclamation 2016).

SID Phase II Exchange. Historically, SID diverted live Umatilla River flow and water releases from McKay Reservoir into the Furnish Canal for direct supply to district and other contracted users. Under the Phase II exchange, SID forgoes diverting live flow from the Umatilla River when decreasing river flow approaches the flow targets. This exchange is implemented from mid- to late spring when flows in the Umatilla River begin to decline. SID also exchanges up to 27,300 acre-feet of its contracted and reserved water stored in McKay Reservoir for Columbia River water. Practically all SID's McKay storage is exchanged except for periods when the Phase II facility is down for repair. Timing of the release of the exchanged storage is at the discretion of the CTUIR and the ODFW. Once the exchanged water is released from McKay it is protected from further appropriation in the Umatilla River down to the mouth. While the Phase II program for SID is designed to be a bucket for bucket exchange (every bucket withdrawn from the Columbia results in same bucket left in the Umatilla), it is not a real-time trade of water and does not balance in some years.

1.3.2 Cold Springs Reservoir

Cold Springs Dam, located on Cold Springs Creek near Hermiston, Oregon, was constructed in the early 1900s for storing a portion of winter and spring flow from the Umatilla River for irrigation. The reservoir has an active storage capacity of 38,330 acre-feet. Before the Phase II exchange program was completed, the reservoir was filled by diverting water via the Feed Canal (RM 29, near Echo, Oregon) from November to June and then released for irrigation from April through September (Reclamation 2016).

Live flow is still diverted from the Umatilla River from November to June to fill Cold Springs. However, diversions are foregone in exchange for pumped Columbia River water if flow conditions in the Umatilla River approach the target flows. Under a credit system, if November to June diversions for Cold Springs Reservoir are foregone, Columbia River pumping fills the reservoir during the spring or summer (Reclamation 2016).

1.3.3 McKay Dam and Reservoir

McKay Dam and reservoir are located on McKay Creek near Pendleton, Oregon. The reservoir has an active storage capacity of about 65,534 acre-feet with an additional 6,000 acre-feet of space reserved for flood control. Runoff is typically captured and stored from December through May each year. To reduce flood risk, storage is limited to a maximum of 29,000 acre-feet from the end of the irrigation season until December 1. From December 1 until February 28, the reservoir can fill to 61,700 acre-feet. From February 28 to March 31, the reservoir can fill to 65,534 acre-feet. Should the reservoir inflow exceed the allowable fill rate, releases occur to maintain the filling schedule but are held to a maximum of 1,000 cfs before April 1 when vacant space exceeds 6,000 acre-feet, and 2,000 cfs after April 1. If inflows are insufficient to follow the filling schedule, all available inflow over the minimum 10 cfs release is stored (Reclamation 2016)

Irrigation Storage and Delivery

Reclamation proposes to continue storing water in McKay Reservoir for delivery to WID and to 75 individual users who have current contracts with Reclamation. In years that the reservoir fills, the maximum volume stored in McKay for WID and the 75 contracts is 32,054 acre-feet and 5,973 acre-feet, respectively, for a total maximum volume of 38,027 acre-feet (Table 1.2) that can be delivered for irrigation when the reservoir fills. In years when McKay does not fill, irrigation deliveries to each contract are prorated according to contract provisions based on the actual volume of stored water available (Reclamation 2016).

Table 1.2. Maximum volume of McKay Reservoir storage for irrigation delivery when the reservoir has filled.

Contract	Maximum Volume Available (acre-feet)
WID	32,054
75 Individual Users	5,973
Contract Total	38,072

Mitigation and Instream Flow

Reclamation proposes to continue with delivery of water stored in McKay Reservoir for instream flow and other mitigation releases. Table 1.3 shows the maximum volumes of stored water that are available when the reservoir fills.

Table 1.3. Maximum amount of stored water made available from McKay Reservoir for mitigation and instream flow when the reservoir fills (Reclamation 2016).

Source	Maximum Volume Available (acre-feet)
SID	27,409
Non-Contract Water	177
WID Mitigation	1,500
Instream Leases	873
Total	29,959

Since implementation of the Phase II exchange, McKay Reservoir typically maintains higher water levels during the summer months than has occurred historically, since water will not be released for diversion by SID. SID's storage water in McKay is used by ODFW and CTUIR for enhancing stream flows and providing attraction flows for returning adult salmonids. CTUIR and ODFW have developed recommendations for augmenting flow using McKay Reservoir water releases. Table 1.4 displays these recommendations. This prioritization schedule is dynamic, so releases are not always the same from year to year. Depending on storage volumes, ODFW and CTUIR maximize or exceed these levels when available. Water supply estimates are made in late May or early June to determine if priority 3 flow releases can be accomplished that year without threatening the ability to meet priority 2 flow releases later in the fall. Storage levels in McKay Reservoir, and Umatilla River flows at Pendleton in late May are the most important parameters examined to determine if priority 3 flows can be made.

Table 1.4. Recommended minimum McKay Reservoir releases for the lower Umatilla River if targets identified in Table 1.1 cannot be achieved.

Release Period	Flow (cfs)	Target Species	Priority
Spring–June 30	150	Adult spring Chinook, juvenile fall Chinook outmigration, lamprey adults	1
July 1–September 30	50	Steelhead, coho, juvenile lamprey rearing, juvenile fall Chinook outmigration, adult lamprey	3
October 1–November 15	150	Adult fall Chinook, steelhead, and coho	2

Flows released for fish are protected instream to the mouth of the Umatilla River. The CTUIR and ODFW make request for releases through the River Coordinator and are responsible for monitoring Umatilla River flow. The Oregon Department of Water Resources' (OWRD) water master also monitors flows through the circuit of Hydromet gages.

1.3.4 McKay Creek Fish Barrier

In 1995, Reclamation and ODFW installed an adult fish barrier at the mouth of McKay Creek to exclude adult salmon and steelhead from taking advantage of the creek's cooler water during the early fall months. This was necessary because releases from McKay Reservoir would cease to begin refill at the end of each irrigation season resulting in the loss of fish and redds. The barrier is effective at excluding adult salmon and steelhead, but juvenile salmonids and other resident

fish can move through the barrier. Since 2001, Reclamation has released 10 cfs from the reservoir so that juvenile salmonids could continue to take advantage of habitat in the creek.

1.3.5 Fish Passage Facilities

The BPA contracts with the irrigation districts for the operation and maintenance of the fish protection facilities (fish ladders and screens) on an annual basis. These facilities currently meet NMFS' juvenile fish screen criteria (NMFS 2011). The CTUIR and ODFW staff oversee all passage efforts and conditions of these facilities on an annual basis. These agencies also oversee Westland and Three Mile Falls Dam trap and haul efforts during dry years when flows require fish to be trapped and hauled around low flow sections of stream. These agencies also determine the type and timing of needed maintenance to keep these facilities operating as designed and according to NMFS and ODFW-approved criteria. All drum screens at these federal facilities have been rescreened since their original installation dates to maintain NMFS and ODFW fish passage criteria.

1.3.6 Irrigation Operations

West Extension Irrigation District

The WEID currently irrigates roughly 9,234 acres of land and diverts live flow from the Umatilla River at Three Mile Falls Dam. The WEID normally uses about 68,000 acre-feet of water annually and has a variety of water rights to service its customers. During most of the irrigation season, WEID's demands are met from Umatilla River live flow, either by diversion of those flows or by using exchange water from the Columbia River. When WEID's demand is greater than available live flow or exchange water, demand is then met with their Columbia River secondary water right. This water right can be delivered through Phase I exchange facilities when capacity is available and WEID agrees to pay the conjunctive use charge or is delivered through WEID's pump station on the Umatilla River. In recent years, WEID has not purchased conjunctive use water from Reclamation because pumping costs have been lower with use their private facilities.

WEID's private pumping facility is near the mouth of the Umatilla River (RM 0.5) and uses a Columbia River water right from backwaters of the John Day Dam. This facility was constructed in 1968 and has three vertical turbine pumps with a combined design capacity of 90 cfs. The pumping station delivers water through a 770-foot long, 36-inch-diameter pipeline into the WEID main canal (a Reclamation canal) with a lift of about 120 feet. This pumping facility had fish screens installed in the late 1990s. WEID is currently working to obtain funds to purchase new screens for this facility. WEID typically pumps water from their private facility during peak demand periods, normally July and August, when their water demand cannot be met from diversions at Three Mile Falls Dam or Phase 1 Columbia River exchange flows.

WEID's irrigation return flows spill directly or seep to the Columbia River. Spill facilities are used for normal operations as well as for emergency situations. A spillway at the end of the main WEID canal drains water into the Columbia River west of Boardman, Oregon. Another drains water into the Umatilla National Wildlife Refuge and two ponds near Irrigon, Oregon. An

emergency spill facility also drains water directly into the Columbia River from the main WEID canal near their private pumping plant on the Umatilla River. Other emergency spill facilities near Coyote Springs (seeps into ground), at pond sites west of Irrigon, and the Umatilla National Wildlife Refuge, where the main canal intersects Interstate 84. Water quality monitoring data are not available on water drained directly into the Columbia River from WEID operations.

Westland Irrigation District

In 2004, WID signed a contract for the adjustment of its federally-recognized district boundaries. This contract is a supplement to the 1949 contract and allows WID to deliver project water to a maximum of 10,337 acres of land within the new federal boundaries, provided no more than 7,241 acres of included lands receive McKay Reservoir water from the district during any irrigation season. Further, no more than 14,678 acres within the federal boundaries can be irrigated during the irrigation season. Federal project water to WID comes exclusively from releases of stored water from McKay Reservoir. Both WID's diversion structure and canal system are privately owned and operated by WID.

Aside from entitlement to stored water in McKay Reservoir, WID has several live flow rights from the Umatilla River, including 1903 (33.9 cfs), 1907 (53.2 cfs), 1961 (35.72 cfs), and 1981 (2.25 cfs) rights. The Allen Canal branches off WID's canal before the Westland Canal near Echo (WESO) gage. The Allen Canal serves water users outside of WID, who have water rights independent of WID.

Using their live flow right, WID diverts roughly 60 cfs into the Westland Canal for delivery to a groundwater recharge project. This is not a Reclamation project. Diversions can begin about November 1 and last into the spring depending on river flows and senior water rights downstream.

Irrigation return flow from WID drains into the Umatilla River at RM 5. The F Canal Drain is at the end of a branch of the Westland Canal. Water quality monitoring of return flows is not available.

Stanfield Irrigation District

The Furnish Ditch Company started construction of diversion facilities in 1905 and later became the Stanfield Irrigation District (SID), which contracted with Reclamation to augment its natural flow rights with supplemental storage from McKay Reservoir. SID is entitled under Oregon State law to divert up to 34,700 acre-feet of water annually. As outlined in the permit, the 34,700 acre-feet was based on SID's historical average supply of Umatilla River and McKay Reservoir water. Current operations include water delivered to SID.

Historically, federal water delivered to SID came exclusively from storage in McKay Reservoir. The exchange agreement covers all SID's diversions, including water delivered under federal storage contract, which came from McKay Reservoir before the water exchanges were established. Historically, SID delivered water to 3,089 acres of land outside of their federally-recognized boundaries, using their 1965 live flow water right. In 2003, SID signed a new

supplemental contract, which adjusted the federal boundary to include the 3,089 acres of land within the federal boundary, of which 242 acres could be irrigated with McKay or Columbia River exchange water. In 2006, SID signed another supplemental contract that in conjunction with the 1949 and 2003 contracts allows SID to irrigate the 3,089 acres of land included in the 2003 federal boundary adjustment with water from McKay Reservoir and the Columbia River. In recent years, SID has been delivering federal project water to about 7,844 acres within their federally-recognized boundaries.

McKay Reservoir water contracted to, or historically used by SID (up to about 27,330 acre-feet), is now exchanged with Columbia River water and used to augment flows in the Umatilla River during periods for anadromous salmonid migration. However, some of SID's McKay storage is still used for irrigation because there are a few water users on the Furnish Canal near the headgate who cannot be served by the exchange facilities. Approximately 8 cfs serves 606 acres that are not part of the Columbia River pump exchange.

Under Phase II of the Umatilla Basin Project, SID agreed to leave virtually all their annual allotment of McKay Reservoir water in storage to be used for anadromous fish target flows and to reduce their Umatilla River diversion of natural flows, all in exchange for Columbia River water. During the irrigation season, SID diverts water from the Umatilla River as long as flow is above the established minimum target levels indicated in Table 1.1 above. When SID's water demand cannot be met by live flow diversions (or live flow exchange water), they call for Columbia River water in exchange for their McKay Reservoir storage. SID's live flow diversions from the Umatilla River are measured in the Furnish Canal gage (FURO). The Stanfield Branch Exchange Canal near Hermiston (SBEO) gage measures all Phase II exchange water coming from the Columbia River, and the CRSO gage measures operational spill water, and any requested exchange water for HID (delivered into Cold Springs Reservoir). SID retains the right to receive water from McKay Reservoir in the rare event of an outage at the Columbia River Pumping Plant where exchange water cannot be delivered.

Periods of water exchange are refined by calls made for fish migration water (within the target flow quantity) by CTUIR and ODFW. SID operates under 1992 and 1995 Exchange Agreements with Reclamation. The CTUIR and ODFW manage the timing and quantity of annual fish restoration water releases using SID's McKay Reservoir storage space. The Columbia River Pumping Plant will deliver water to canals and pumping facilities serving SID, and to Cold Springs Reservoir for release to HID. During the summer months, pumping will vary from about 50 to 240 cfs, with the full capacity being used only in years when both SID and HID are receiving exchange waters (when Cold Springs Reservoir cannot be filled due to exchange operations). SID's exchange water will be routed around Cold Springs Reservoir via the Cold Springs Pumping Plant, and then through the Stanfield Relift Pumping Plant to SID lands.

Irrigation return flows from SID empty into the Umatilla River at the Stanfield Canal Drain near RM 21.9. The Stanfield drain primarily carries return flow from SID and limited surface drainage from the intermittent Stage Gulch. Since 1996, the CTUIR has been monitoring the water quality of return flows in the Stanfield Drain.

Hermiston Irrigation District

Prior to 2003, HID had been delivering federal project water to about 9,725 acres within their federally-recognized boundaries, and to about 1,102 acres outside of their federally-recognized boundaries. Included in these lands are approximately 385 acres that are within the SID boundaries and 175 acres at the Oregon State University (OSU) Experiment Station that are authorized to receive federal project water. In 2003, HID signed a new contract with Reclamation, which adjusted the federal boundary for HID by including 1,076 acres of the above-listed 1,102 acres into HID's federal district boundary, including the 385 acres located within SID and the 175 acres of the OSU Experiment Station. HID's water rights are held in the name of the U.S. Government. HID's water rights allow live flow diversion of about 50,000 acre-feet of water each year through the Feed Canal, at a maximum rate of 280 cfs. At the discretion of the Watermaster, HID may divert up to 20 percent more water into Feed Canal to make up for seepage losses. The Feed Canal is typically operated during the fall and winter months from October through early April. In some years, however, canal operations continue through early May. HID also has live flow diversion rights at Maxwell Dam at a maximum rate of 75 cfs. However, the normal maximum diversion rate into Maxwell Canal is about 40 cfs. Diversions at Maxwell Dam typically occur between early April and mid-September and are not subject to target flow restrictions. HID's total annual use of water from Maxwell diversions and Cold Springs Reservoir releases combined is limited to 49,860 acre-feet.

Between 1996 and 1999, an average of 9,306 acre-feet of water was diverted annually at Maxwell Dam. Between 1997 and 1999, an average of 42,780 acre-feet of water was diverted annually into the Feed Canal from the Umatilla River. Due to improved HID operations the amount of water diverted at the Maxwell Diversion has significantly decreased since the late 1990s. From 2003 to 2009, an average of about 5,900 acre-feet of Umatilla water was delivered down the Maxwell Canal. Over the same period (2003 to 2009), an average of 39,630 acre-feet (range: 30,965-45,924 acre-feet) of water was diverted annually into the Feed Canal from the Umatilla River at the Feed Canal Diversion Dam. Since 2011 the average amount of Umatilla River water taken at the Maxwell Canal has been further reduced to 900 acre feet. This decrease in use is due to water conservation measures and changes in irrigation deliveries on district lands. Since 2011, an average of 29,860 acre-feet of water has been diverted annually into the Feed Canal and 12,544 acre-feet of water has been pumped from the Columbia River as exchange water. Taken together, the diversion of water at both the Feed and Maxwell Diversion Dams plus the water used from the Phase II Water Exchange Program have been far below the total HID water right of 49,860 acre-feet. Irrigation return flows from HID empty into the Umatilla River at three locations. The Maxwell Canal Drain is at RM 9, the Hermiston Canal South Drain at RM 7, and the Hermiston Canal North Drain at RM 5.5.

1.3.7 Monitoring

In 2005, Reclamation began a monitoring and evaluation program in the Umatilla Basin and contracted with the U.S. Fish and Wildlife Service (USFWS) to assist with development and implementation. The USFWS evaluated entrainment, injury and mortality of Middle Columbia River (MCR) steelhead, and Reclamation submitted annual reports to NMFS from 2006 through 2017.

Flow

Several stream gages have been installed in the Umatilla River and its tributaries for monitoring and regulation. Within the action area, six are located on the main river, three on tributaries plus additional gaging stations at the irrigation diversions and Project reservoirs. Table 1.5 (below) lists all of the major gaging stations relevant to the management of the Project. These gages are on Reclamation's Hydromet system, which collects data at 15-minute intervals and transmits it via satellite every hour to Reclamation's Pacific Northwest Regional Office in Boise, Idaho, and is available to the public. Reclamation, ODFW and CTUIR use these gages to monitor instream flow and releases for fish migration.

Fish Passage

Reclamation will contract with the USFWS to annually maintain existing passive integrated transponder (PIT) tag detection arrays at the Project canals (headgates and fish screens). Detection arrays will be operated continuously with data uploaded to Pacific States Marine Fisheries Commission's PIT Tag Information System. Reclamation will also develop a comprehensive report every fifth year following a similar format to the current annual reports. These reports include data on stream flow, diversions, fish entrainment and fish salvage.

Table 1.5. Hydromet gaging stations, Umatilla Basin Project (Reprinted from Reclamation 2016)

Station Name	Location	Station Name	Location
MYKO	McKay Creek near Pilot Rock	DLEO	Dillon Canal near Hermiston
MCK	McKay Reservoir near Pendleton	MAXO	Maxwell Canal near Hermiston
MCKO	McKay Creek near Pendleton	UMAO	Umatilla River at Umatilla
PDTO	Umatilla River at Pendleton	CSRO	Cold Springs Recharge Canal near Hermiston
BIRO	Birch Creek near Rieth	UBBO	Umatilla River below Butter Creek near Hermiston
YOKO	Umatilla River at Yoakum	FCSO	Feed Canal near Hermiston
FURO	Furnish Canal near Echo	CSAO	U.S. A Line Canal near Hermiston
UMUO	Umatilla River near Echo, below Feed Canal diversion	SBEO	Stanfield Branch Exchange Canal near Hermiston (Columbia River Phase II pump water)
FCEO	Feed Canal near Echo	WEIO 1	West Division main canal near Umatilla
ALNO	Allen Canal near Echo	CLS	Cold Springs Reservoir near Hermiston
WESO	Westland Canal near Echo	WEPO	WEID Pumps (Columbia River Phase I pump water)
UMDO	Umatilla River near Stanfield, below Dillon diversion	WEIO 2	West Division main canal below WEID pumps near Umatilla

If any of the 5-year reports indicate a significant decrease in survival or increase in entrainment, Reclamation will determine the cause and a solution. Additionally, Reclamation would report

yearly on ODFW's smolt-monitoring activities at Three Mile Dam in order to monitor the success of smolt outmigration from the Umatilla Basin. Finally, the CTUIR would continue to check Project canals between the headgates and fish screens for the presence of salmonids at the end of each irrigation season and conduct salvage operations if needed. Reclamation will report on the numbers of fish recovered each year as a further check on potential fish entrainment problems.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, federal action agencies consult with NMFS, and section 7(b)(3) requires that, at the end of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of" a listed species, which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This opinion relies on the definition of "destruction or adverse modification," which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features (PBFs) essential to the conservation of a species or that preclude or significantly delay development of such features (81 FR 7214)."

The designations of critical habitat use the term primary constituent element (PCE) or essential features. The new critical habitat regulations (81 FR 7414) replace this term with physical or biological features. The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

1. Identify the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
2. Describe the environmental baseline in the action area.
3. Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
4. Describe any cumulative effects in the action area.
5. Integrate and synthesize the above factors by: (1) reviewing the status of the species and critical habitat; and (2) adding the effects of the action, the environmental baseline, and cumulative effects to assess the risk that the proposed action poses to species and critical habitat.
6. Reach a conclusion about whether species are jeopardized, or critical habitat is adversely modified.
7. Suggest a reasonable and prudent alternative to the proposed action, if necessary.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

One factor affecting the status of ESA-listed species considered in this opinion, and aquatic habitat at large, is climate change. Climate change is likely to play an increasingly important role in determining the abundance and distribution of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. The largest hydrologic responses are expected to occur in basins with significant snow accumulation, where warming decreases snow pack, increases winter flows, and advances the timing of spring melt (Mote et al. 2014, Mote 2016). Rain-dominated watersheds and those with significant contributions from groundwater may be less sensitive to predicted changes in climate (Tague et al. 2013, Mote et al. 2014).

During the last century, average regional air temperatures in the Pacific Northwest increased by 1 to 1.4°F as an annual average, and up to 2°F in some seasons (based on average linear increase per decade; Abatzoglou et al. 2014; Kunkel et al. 2013). Warming is likely to continue during the next century as average temperatures are projected to increase another 3 to 10°F, with the largest increases predicted to occur in the summer (Mote et al. 2014). Decreases in summer precipitation of as much as 30 percent by the end of the century are consistently predicted across climate models (Mote et al. 2014). Precipitation is more likely to occur during October through March, less during summer months, and more winter precipitation will be rain than snow (ISAB 2007; Mote et al. 2014). Earlier snowmelt will cause lower stream flows in late spring, summer, and fall, and water temperatures will be warmer (ISAB 2007; Mote et al. 2014). Models consistently

predict increases in the frequency of severe winter precipitation events (i.e., 20-year and 50-year events), in the western United States (Dominguez et al. 2012). The largest increases in winter flood frequency and magnitude are predicted in mixed rain-snow watersheds (Mote et al. 2014).

Overall, about one-third of the current cold-water salmonid habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (Mantua et al. 2009). Higher temperatures will reduce the quality of available salmonid habitat for most freshwater life stages (ISAB 2007). Reduced flows will make it more difficult for migrating fish to pass physical and thermal obstructions, limiting their access to available habitat (Mantua et al. 2010). Temperature increases shift timing of key life cycle events for salmonids and species forming the base of their aquatic foodwebs (Crozier et al. 2011; Tillmann and Siemann 2011; Winder and Schindler 2004). Higher stream temperatures will also cause decreases in dissolved oxygen and may also cause earlier onset of stratification and reduced mixing between layers in lakes and reservoirs, which can also result in reduced oxygen (Meyer et al. 1999; Winder and Schindler 2004). Higher temperatures are likely to cause several species to become more susceptible to parasites, disease, and higher predation rates (Crozier et al. 2008; Wainwright and Weitkamp 2013).

As more basins become rain-dominated and prone to more severe winter storms, higher winter stream flows may increase the risk that winter or spring floods in sensitive watersheds will damage spawning redds and wash away incubating eggs (Goode et al. 2013). Earlier peak stream flows will also alter migration timing for salmon smolts and may flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and reducing smolt survival (McMahon and Hartman 1989; Lawson et al. 2004).

In addition to changes in freshwater conditions, predicted changes for coastal waters in the Pacific Northwest as a result of climate change include increasing surface water temperature, increasing but highly variable acidity, and increasing storm frequency and magnitude (Mote et al. 2014). Elevated ocean temperatures already documented for the Pacific Northwest are highly likely to continue during the next century, with sea surface temperature projected to increase by 1.0 to 3.7^{o}C by the end of the century (IPCC 2014). Habitat loss, shifts in species' ranges and abundances, and altered marine food webs could have substantial consequences to anadromous, coastal, and marine species in the Pacific Northwest (Tillmann and Siemann 2011).

Moreover, as atmospheric carbon emissions increase, increasing levels of carbon are absorbed by the oceans, changing the pH of the water. Acidification also impacts sensitive estuary habitats, where organic matter and nutrient inputs further reduce pH and produce conditions more corrosive than those in offshore waters (Feely et al. 2012, Sunda and Cai 2012).

Global sea levels are expected to continue rising throughout this century, reaching likely predicted increases of 10 to 32 inches by 2081–2100 (IPCC 2014). These changes will likely result in increased erosion and more frequent and severe coastal flooding and shifts in the composition of nearshore habitats (Tillmann and Siemann 2011). Estuarine-dependent salmonids such as chum and Chinook salmon are predicted to be impacted by significant reductions in rearing habitat in some Pacific Northwest coastal areas (Glick et al. 2007). Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon

and steelhead, while cooler ocean periods have coincided with relatively high abundances, and therefore these species are predicted to fare poorly in warming ocean conditions (Scheuerell and Williams 2005; Zabel et al. 2006). This is supported by the recent observation that anomalously warm sea surface temperatures off the coast of Washington from 2013 to 2016 resulted in poor coho and Chinook salmon body condition for juveniles caught in those waters (NWFSC 2015). Changes to estuarine and coastal conditions, as well as the timing of seasonal shifts in these habitats, have the potential to impact a wide range of listed aquatic species (Tillmann and Siemann 2011).

The adaptive ability of these threatened and endangered species is depressed due to reductions in population size, habitat quantity and diversity, and loss of behavioral and genetic variation. Without these natural sources of resilience, systematic changes in local and regional climatic conditions due to anthropogenic global climate change will likely reduce long-term viability and sustainability of populations in many of these ESUs (NWFSC 2015). New stressors generated by climate change, or existing stressors with effects that have been amplified by climate change, may also have synergistic impacts on species and ecosystems (Doney et al. 2012). These conditions will possibly intensify the climate change stressors inhibiting recovery of ESA-listed species in the future.

2.2.1 Status of the Species

For Pacific salmon and steelhead, we commonly use the four "viable salmonid population" (VSP) criteria (McElhany et al. 2000) to assess the viability of the populations that, together, constitute the species. These four criteria (spatial structure, diversity, abundance, and productivity) encompass the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. When these parameters are collectively at appropriate levels, they maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment.

Spatial structure refers both to the spatial distributions of individuals in the population and the processes that generate that distribution. A population's spatial structure depends on habitat quality and spatial configuration, and the dynamics and dispersal characteristics of individuals in the population.

Diversity refers to the distribution of traits within and among populations. These range in scale from DNA sequence variation in single genes to complex life history traits (McElhany et al. 2000).

Abundance generally refers to the number of naturally-produced adults (i.e., the progeny of naturally-spawning parents) in the natural environment (e.g., on spawning grounds).

Productivity, as applied to viability factors, refers to the entire life cycle (i.e., the number of naturally-spawning adults produced per parent). When progeny replace or exceed the number of parents, a population is stable or increasing. When progeny fail to replace the number of parents, the population is declining. McElhany et al. (2000) use the terms *population growth rate* and *productivity* interchangeably when referring to production over the entire life cycle. They also refer to *trend in abundance*, which is the manifestation of long-term population growth rate.

For species with multiple populations, once the biological status of a species' populations has been determined, we assess the status of the entire species using criteria for groups of populations, as described in recovery plans and guidance documents from technical recovery teams. Considerations for species viability include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as metapopulations (McElhany et al. 2000)

The summaries that follow describe the status of the seven ESA-listed species, and their designated critical habitats, that occur within the geographic area of this proposed action and are considered in this opinion. More detailed information on the status and trends of these listed resources, and their biology and ecology, are in the listing regulations and critical habitat designations published in the Federal Register (Table 2.1). These documents are available on the NMFS West Coast Region website (http://www.westcoast.fisheries.noaa.gov/).

Table 2.1. Listing status, status of critical habitat designations and protective regulations, and relevant Federal Register (FR) decision notices for ESA-listed species considered in this opinion. Listing status: 'T' means listed as threatened; 'E' means listed as endangered; 'P' means proposed for listing or designation.

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon *(Oncorhynchus tshawytscha)*			
Upper Columbia River spring-run	E 6/28/05; 70 FR 37160	9/02/05; 70 FR 52630	ESA section 9 applies
Snake River spring/summer-run	T 6/28/05; 70 FR 37160	10/25/99; 64 FR 57399	6/28/05; 70 FR 37160
Snake River fall-run	T 6/28/05; 70 FR 37160	12/28/93; 58 FR 68543	6/28/05; 70 FR 37160
Sockeye salmon *(O. nerka)*			
Snake River	E 8/15/11; 70 FR 37160	12/28/93; 58 FR 68543	ESA section 9 applies
Steelhead (*O. mykiss*)			
Middle Columbia River	T 1/5/06; 71 FR 834	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160
Upper Columbia River	T 1/5/06; 71 FR 834	9/02/05; 70 FR 52630	2/1/06; 71 FR 5178
Snake River Basin	T 1/5/06; 71 FR 834	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

Upper Columbia River Spring-run Chinook Salmon

A recovery plan is available for this species (UCSRB 2007). Achieving recovery (i.e., delisting the species) of each Evolutionarily Significant Unit (ESU) via sufficient improvement in the abundance, productivity, spatial structure, and diversity is the longer-term goal of the Upper Columbia Salmon Recovery Board (UCSRB) Plan. The plan calls for meeting or exceeding the same basic spatial structure and diversity criteria adopted from the Interior Columbia Technical Recovery Team (ICTRT) viability report for recovery (NWFSC 2015). None of the three populations are viable with respect to abundance and productivity (A&P), and they all have a greater than 25 percent chance of extinction in 100 years (UCSRB 2007).

Spatial Structure and Diversity. This species includes all naturally-spawned populations of Chinook salmon in all river reaches accessible to Chinook salmon in Columbia River tributaries upstream of the Rock Island Dam and downstream of Chief Joseph Dam (excluding the Okanogan River), the Columbia River upstream to Chief Joseph Dam, and progeny of six artificial propagation programs. The composite spatial structure and diversity (SS/D) risks for all three of the extant natural populations in this major population group (MPG) are rated at high

(Table 2.2). The natural processes component of the SS/D risk is low for the Wenatchee and Methow River populations and moderate for the Entiat River population. All three of the extant populations in this MPG are rated at high risk for diversity, driven primarily by chronically high proportions of hatchery-origin spawners in natural spawning areas and a lack of genetic diversity among the natural-origin spawners (ICTRT 2008; NWFSC 2015).

Table 2.2. Upper Columbia River Spring-run Chinook Salmon ESU population viability status summary.

Population	Abundance and productivity metrics*				Spatial structure and diversity metrics			Overall viability rating
	ICTRT minimum threshold	Natural Spawning Abundance	ICTRT Productivity	Integrated A&P Risk	Natural Processes Risk	Diversity Risk	Integrated SS/D Risk	
Wenatchee River 2005–2014	2,000	545 ↑ (311–1,030)	0.60 ↑ (0.27,15/20)	High	Low	High	High	High Risk
Entiat River 2005–2014	500	166 ↑ (78–354)	0.94 ↑ (0.18, 12/20)	High	Moderate	High	High	High Risk
Methow River 2005–2014	2,000	379 ↑ (189–929)	0.46 ○ (0.31, 16/20)	High	Low	High	High	High Risk

* Current abundance and productivity (A&P) estimates are geometric means. The range in annual abundance, standard error, and number of qualifying estimates for production are in parentheses. Upward arrows = current estimates increased from prior review. Oval = no change since prior review (NWFSC 2015). The Wenatchee, Entiat, and Methow River populations are considered a high risk for both A&P and composite spatial structure and diversity (SS/D), as they are noted in the above table.

Abundance and Productivity. Overall A&P remains rated at high risk for each of the three extant populations in this MPG/ESU (Table 2.2) (NWFSC 2015). The 10-year geometric mean abundance of adult natural-origin spawners has increased for each population relative to the levels reported in the 2011 status review, but natural origin escapements remain below the corresponding ICTRT thresholds. The combinations of current A&P for each population result in a high risk rating when compared to the ICTRT viability curves (NWFSC 2015).

Limiting Factors. Limiting factors include (UCSRB 2007):

- Effects related to hydropower system in the mainstem Columbia River , including reduced upstream and downstream fish passage, altered ecosystem structure and function, altered flows, and degraded water quality
- Degradation of floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream flow, and water quality
- Degraded estuarine and nearshore marine habitat
- Hatchery-related effects

- Persistence of non-native (exotic) fish species continues to affect habitat conditions for listed species
- Harvest in Columbia River fisheries

Snake River Spring/Summer-run Chinook Salmon

NMFS released a final recovery plan for this species in October of 2017 (NMFS 2017a). This species includes all naturally-spawned populations of spring/summer-run Chinook salmon originating from the mainstem Snake River and the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins, and from 11 artificial propagation programs (USDC 2014). The ICTRT recognized 27 extant and four extirpated populations of Snake River (SR) spring/summer-run Chinook salmon, and aggregated these into five MPGs that correspond to ecological subregions (Table 2.3) (ICTRT 2003; McClure et al. 2005). All extant populations face a “high” risk of extinction (NWFSC 2015).

Table 2.3. Major population groups, populations, and scores for the key elements of abundance and productivity (A&P), diversity, and spatial structure and diversity (SS/D), used to determine current overall viability risk for Snake River spring/summer-run Chinook salmon (NWFSC 2015). Risk ratings included very low (VL), low (L), moderate (M), high (H), very high (VH), and extirpated (E).

Major Population Groups	Spawning Populations (Watershed)	A&P	Natural Processes Risk	Diversity	Integrated SS/D	Overall Viability Risk
Lower Snake River	Tucannon River	H	L	M	M	H
	Asotin River	N/A	N/A	N/A	N/A	E
Grande Ronde and Imnaha rivers	Wenaha River	H	L	M	M	H
	Lostine/Wallowa River	H	L	M	M	H
	Minam River	H	L	M	M	H
	Catherine Creek	H	M	M	M	H
	Upper Grande Ronde R.	H	H	M	H	H
	Imnaha River	H	L	M	M	H
	Lookingglass Creek	N/A	N/A	N/A	N/A	E
South Fork Salmon River	Little Salmon River	*	L	L	L	H
	South Fork mainstem	H	L	M	M	H
	Secesh River	H	L	L	L	H
	EF/Johnson Creek	H	L	L	L	H
Middle Fork Salmon River	Chamberlin Creek	M	L	L	L	MT
	Big Creek	H	VL	M	M	H
	Lower Mainstem MF	*	M	M	M	H
	Camas Creek	H	L	M	M	H
	Loon Creek	H	L	M	M	H
	Upper Mainstem MF	H	L	M	M	H
	Sulphur Creek	H	L	M	M	H
	Bear Valley Creek	H	VL	L	L	H
	Marsh Creek	H	L	L	L	H
Upper Salmon River	Salmon Lower Main	H	L	L	L	H
	Salmon Upper Main	H (M)	L	L	L	H
	Lemhi River	H	H	H	H	H
	Pahsimeroi River	H (M)	M	H	H	H
	Salmon East Fork	H	L	H	H	H
	Yankee Fork	H	M	H	H	H
	Valley Creek	H	L	M	M	H
	North Fork	*	L	L	L	H
	Panther Creek	N/A	N/A	N/A	N/A	E

*Insufficient data

Limiting Factors. Limiting factors for this species include:

8. Degradation of floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream flow, and water quality.
9. Effects related to the hydropower system in the mainstem Columbia River, including reduced upstream and downstream fish passage, altered ecosystem structure and function, altered flows, and degraded water quality.
10. Harvest-related effects.
11. Predation.

Snake River Fall-run Chinook Salmon

NMFS released a final recovery plan for this species (NMFS 2017b). This species includes all naturally-spawned populations of fall-run Chinook salmon originating from the mainstem Snake River below Hells Canyon Dam; from the Tucannon River, Grande Ronde River, Imnaha River, Salmon River, and Clearwater River subbasins; and from four artificial propagation programs (USDC 2014).

The ICTRT identified three populations of this species, although only the lower mainstem population exists at present, and it spawns in the lower main stem of the Clearwater, Imnaha, Grande Ronde, Salmon and Tucannon rivers. The extant population of SR fall-run Chinook salmon is the only remaining population from an historical ESU that also included large mainstem populations upstream of the current location of the Hells Canyon Dam complex (ICTRT 2003; McClure et al. 2005). The population is at moderate risk for diversity and spatial structure (NWFSC 2015).

Updated Biological Risk Summary. The following is a summary from the status review update. More detailed information on the status and trends of these listed resources, and their biology and ecology are in the status update (NWFSC 2015).

Overall population viability for the Lower Mainstem SR fall-run Chinook salmon population is determined based on the combination of ratings for current A&P and combined spatial structure diversity (Table 2.4).

Table 2.4. Lower Mainstem Snake River fall-run Chinook salmon population risk ratings integrated across the four viable salmonid population metrics. Viability Key: HV–Highly Viable; V–Viable; M–Maintained; HR–High Risk; Green shaded cells–meets criteria for Highly Viable; Gray shaded cells–does not meet viability criteria (darkest cells are at greatest risk).

Population Risk Ratings	Very Low	Low	Moderate	High
Very Low (<1%)	HV	HV	V	M
Low (1-5%)	V	V	V Lower Main. Snake	M
Moderate (6-25%)	M	M	M	HR
High (>25%)	HR	HR	HR	HR

Limiting Factors. Limiting factors for this species include:

12. Degradation of floodplain connectivity and function and channel structure and complexity.
13. Harvest-related effects.
14. Loss of access to historical habitat above Hells Canyon and other Snake River dams.
15. Impacts from mainstem Columbia River and Snake River hydropower systems.
16. Hatchery-related effects.
17. Degraded estuarine and nearshore habitat.

Snake River Sockeye Salmon

Best available information indicates that the species, in this case the SR Sockeye Salmon ESU, is at high risk and remains at endangered status. We released a final recovery plan for this species on June 8, 2015 (NMFS 2015). Overall, the recovery strategy aims to reintroduce and support adaptation of naturally self-sustaining sockeye salmon populations in the Sawtooth Valley lakes.

Spatial Structure and Diversity. This species includes all anadromous and residual sockeye salmon from the SR Basin, Idaho, and artificially-propagated sockeye salmon from the Redfish Lake Captive Broodstock Program. The ICTRT treats Sawtooth Valley Sockeye salmon as the single MPG within the SR Sockeye Salmon ESU. The MPG contains one extant population (Redfish Lake) and two to four historical populations (Alturas, Petit, Stanley, and Yellowbelly Lakes) (NMFS 2015). At the time of listing in 1991, the only confirmed extant population included in this ESU was the beach-spawning population of sockeye salmon from Redfish Lake, with about 10 fish returning per year (NMFS 2015).

Abundance and Productivity. Adult returns in the last 6 years have ranged from a high of 1,579 fish in 2014 (including 453 natural-origin fish) to a low of 257 adults in 2012 (including 52 natural-origin fish). Sockeye salmon returns to Alturas Lake ranged from one fish in 2002 to 14 fish in 2010. No fish returned to Alturas Lake in 2012, 2013, or 2014 (NMFS 2015). Although total sockeye salmon returns to the Sawtooth Valley in recent years have been high enough to allow for some level of natural spawning in Redfish Lake, the hatchery program remains at its initial phase with a priority on genetic conservation and building sufficient returns to support sustained outplanting and recolonization of the species historic range (NMFS 2015; NWFSC 2015).

Limiting Factors. The key factor limiting recovery of SR sockeye salmon ESU is survival outside of the Stanley Basin. Portions of the migration corridor in the Salmon River are impaired by reduced water quality and elevated temperatures (IDEQ 2011). The natural hydrological regime in the upper mainstem Salmon River Basin has been altered by water withdrawals. Survival rates from Lower Granite dam to the spawning grounds are low in some years (e.g., average of 31 percent, range of 0–67 percent for 1991–1999) (Keefer et al. 2008). Keefer et al. (2008) conducted a radio tagging study on adult SR sockeye salmon passing upstream from Lower Granite Dam in 2000 and concluded that high in-river mortalities could be explained by "a combination of high migration corridor water temperatures and poor initial fish condition or parasite loads." Keefer et al. (2008) also examined current run timing of SR sockeye salmon versus records from the early 1960s, and concluded that an apparent shift to earlier run timing recently may reflect increased mortalities for later migrating adults. In the Columbia and lower Snake River migration corridor, predation rates on juvenile sockeye salmon are unknown, but terns and cormorants consume 12 percent of all salmon smolts reaching the estuary, and piscivorous fish consume an estimated 8 percent of migrating juvenile salmon (NOAA Fisheries 2011).

Upper Columbia River Steelhead

The Upper Columbia River (UCR) steelhead distinct population segment (DPS) was originally listed under the ESA in 1997. The Upper Columbia Recovery Plan calls for "…restoring the distribution of naturally-produced spring-run Chinook salmon and steelhead to previously occupied areas where practical, and conserving their genetic and phenotypic diversity" (UCSRB 2007). In 2015, the 5-year review for the UCR steelhead concluded the species should maintain its threatened listing classification (NWFSC 2015).

Spatial Structure and Diversity. The UCR steelhead DPS includes all naturally-spawned anadromous *O. mykiss* (steelhead) populations below natural and artificial impassable barriers in streams within the Columbia River Basin, upstream from the Yakima River, Washington, to the U.S.–Canada border, as well as six artificial propagation programs: the Wenatchee River, Wells Hatchery (in the Methow and Okanogan Rivers), Winthrop National Fish Hatchery, Omak Creek and the Ringold steelhead hatchery programs. NMFS has defined the UCR steelhead DPS to include only the anadromous members of this species (70 FR 67130). The UCR steelhead DPS is composed of three MPGs, two of which are isolated by dams.

With the exception of the Okanogan population, the UCR populations were rated as low risk for spatial structure. Each population is at high risk for diversity, largely driven by chronic high levels of hatchery spawners within natural spawning areas and lack of genetic diversity among the populations. The proportions of hatchery-origin returns in natural spawning areas remain extremely high across the DPS, especially in the Methow and Okanogan River populations.

Abundance and Productivity. Upper Columbia River steelhead populations have increased relative to the low levels observed in the 1990s, but natural origin A&P remain well below viability thresholds for three out of the four populations. The most recent estimates of natural-origin spawner abundance for each of the four populations in the UCR Steelhead DPS show fairly consistent patterns throughout the years. None of the populations have reached their recovery goal numbers during any of the years (500 for the Entiat, 2,300 for the Methow, 2,300 for the Okanogan, and 3,000 for Wenatchee). In spite of recent increases, natural origin A&P remain well below viability thresholds for three out of the four populations, and the Okanogan River natural-origin spawner abundance estimates specifically are well below the recovery goal for that population. Three of four extant natural populations are considered to be at high risk of extinction and one at moderate risk (Table 2.5).

Table 2.5. Summary of the key elements of abundance and productivity (A&P), diversity, and spatial structure and diversity (SS/D), and scores used to determine current overall viability risk for Upper Columbia River steelhead populations (NWFSC 2015). Risk ratings included very low (VL), low (L), moderate (M), high (H), and very high (VH).

Population (Watershed)	ICTRT Min Threshold	A&P	Natural Processes Risk	Diversity	Integrated SS/D	Overall Viability Risk
Wenatchee River	1,000	L	L	H	H	MT
Entiat River	500	H	M	H	H	H
Methow River	1,000	H	L	H	H	H
Okanogan River	750	H	H	H	H	H

Limiting Factors. Limiting factors for this species include (UCSRB 2007):

18. Adverse effects related to the mainstem Columbia River hydropower system
19. Impaired tributary fish passage
20. Degradation of floodplain connectivity and function, channel structure and complexity, riparian areas, large woody debris recruitment, stream flow, and water quality
21. Hatchery-related effects
22. Predation and competition
23. Harvest-related effects

Snake River Basin Steelhead

This ESU was first listed as endangered under the ESA in 1991. In October of 2017, NMFS released the final Snake River Spring/Summer-run Chinook Salmon and Steelhead Recovery Plan (NMFS 2017a). The overall viability ratings for natural populations in the Snake River Basin (SRB) steelhead DPS range from moderate to high risk. Four out of the five MPGs are not meeting the specific objectives in the draft Recovery Plan; the Grande Ronde MPG is tentatively rated as viable.

Spatial Structure and Diversity. The SR steelhead DPS includes all naturally-spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in streams in the Snake River Basin of southeast Washington, northeast Oregon, and Idaho, as well as six artificial production programs: the Tucannon River, Dworshak National Fish Hatchery, Lolo Creek, North Fork Clearwater River, East Fork Salmon River, and the Little Sheep Creek/Imnaha River Hatchery steelhead hatchery programs. With one exception, spatial structure ratings for all of the SRB steelhead populations were low or very low risk, given the evidence for distribution of natural production with populations. The exception was the Panther Creek population, which was given a high risk rating for spatial structure based on the lack of spawning in the upper sections. No new information was provided for the 2015 status update that would change those ratings (Table 2.6) (NWFSC 2015).

Table 2.6. Major population groups, populations, and scores for the key elements of abundance and productivity (A&P), diversity, and spatial structure and diversity (SS/D), used to determine current overall viability risk for Snake River Basin steelhead (NWFSC 2015). Risk ratings included very low (VL), low (L), moderate (M), high (H), and very high (VH). Maintained (MT) population status indicates that the population does not meet the criteria for a viable population but does support ecological functions and preserve options for recovery of the DPS.

Major Population Group	Spawning Populations (Watershed)	ICTRT min threshold	A&P	Diversity	Integrated SS/D	Overall Viability Risk*
Lower Snake River	Tucannon River	1,000	H?	M	M	H?
	Asotin Creek	500	M?	M	M	MT
Grande Ronde River	Lower Grande Ronde	1,000	**	M	M	MT?
	Joseph Creek	500	VL	L	L	Highly viable
	Upper Grande Ronde	1,500	V	M	M	Viable
	Wallowa River	1,000	H?	L	L	M?
Clearwater River	Lower Clearwater	1,500	M?	L	L	MT?
	South Fork Clearwater	1,000	H	M	M	H?/MT
	Lolo Creek	500	H	M	M	H?/MT
	Selway River	1,000	M?	L	L	MT?
	Lochsa River	1,000	M?H	L	L	MT?
Salmon River	Little Salmon River	500	M?	M	M	MT?
	South Fork Salmon	1,000	M?	L	L	MT?
	Secesh River	500	M?	L	L	MT?
	Chamberlain Creek	500	M?	L	L	MT?
	Lower MF Salmon	1,000	M?	L	L	MT?
	Upper MF Salmon	1,000	M?	L	L	MT?
	Panther Creek	500	M?	M	H	H?
	North Fork Salmon	500	M	M	M	MT?
	Lemhi River		**	M	M	MT
	Pahsimeroi River	1,000	M	M	M	MT?
	East Fork Salmon	1,000	M	M	M	MT?
	Upper Main Salmon	1,000	M	M	M	MT?
Imnaha	Imnaha River	1,000	M	M	M	M

* There is uncertainty in these ratings due to a lack of population-specific data.

** Insufficient data.

Abundance and Productivity. Population-specific adult population abundance is generally not available for the SRB steelhead due to difficulties conducting surveys in much of their range. Evaluations in the 2015 status review were done using both a set of metrics corresponding to those used in prior Biological Review Team (BRT) reviews, as well as a set corresponding to the specific viability criteria based on ICTRT recommendations for this DPS. The BRT level metrics were consistently done across all ESUs and DPSs to facilitate comparisons across domains. The most recent 5-year geometric mean abundance estimates for the two long-term data series of

direct population estimates (Joseph Creek and Upper Grande Ronde Mainstem populations) both increased compared to the prior review estimates; each of the populations increased an average of 2 percent per year over the past 15 years. Hatchery-origin spawner estimates for both populations continued to be low, and both populations are currently approaching the peak abundance estimates observed since the mid-1980s (NWFSC 2015).

Limiting Factors. Limiting factors for this species include (NMFS 2017a):

24. Adverse effects related to the mainstem Columbia River hydropower system
25. Impaired tributary fish passage
26. Degradation of floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream flow, and water quality
27. Increased water temperature
28. Harvest-related effects, particularly for B-run steelhead
29. Predation
30. Genetic diversity effects from out-of-population hatchery releases
31. Harvest-related effects
32. Effects of predation, competition, and disease

Middle Columbia River Steelhead

This species includes all naturally-spawned steelhead populations originating below natural and manmade impassable barriers from the Columbia River and its tributaries upstream of the Wind and Hood Rivers (exclusive) to and including the Yakima River; excluding steelhead originating from the Snake River Basin. This DPS does include steelhead from seven artificial propagation programs. The DPS does not currently include steelhead that are designated as part of an experimental population above the Pelton Round Butte Hydroelectric Project in the Deschutes River Basin, Oregon. The ICTRT (2003) identified 17 extant populations that fall into four MPGs: Cascade eastern slope tributaries (five extant and two extirpated populations), the John Day River (five extant populations), the Walla Walla and Umatilla rivers (three extant and one extirpated populations), and the Yakima River (four extant populations). Viability ratings for these populations range from extirpated to viable (NMFS 2009 and NWFSC 2015).

Table 2.7. MPGs, populations, and scores for the key elements [abundance & productivity (A&P), diversity, and spatial structure (SS)/diversity (D)] used to determine current overall viability risk for MCR steelhead (NMFS 2009; NWFSC 2015). Risk ratings included very low (VL), low (L), moderate (M), high (H), very high (VH), and extirpated (E). Maintained (MT) population status indicates that the population does not meet the criteria for a viable population but does support ecological functions and preserve options for recovery of the Distinct Population Segment.

Major Population Group	Population (Watershed)	A&P	Natural Processes Risk	Diversity	Integrated SS/D	Overall Viability Risk
Cascade Eastern Slope Tributaries	Fifteenmile Creek	M	VL	L	L	MT
	Klickitat River	M	L	M	M	MT
	Deschutes Eastside	L	L	M	M	Viable
	Deschutes Westside	H	L	M	M	H
	Rock Creek	*	M	M	M	H
	White Salmon	N/A	N/A	N/A	N/A	E
	Crooked River	N/A	N/A	N/A	N/A	E
John Day River	Upper John Day	M	VL	M	M	MT
	North Fork John Day	VL	VL	L	L	Highly Viable
	Middle Fork John Day	L	L	M	M	Viable
	South Fork John Day	L	VL	M	M	Viable
	Lower John Day Tribs	M	VL	M	M	MT
Walla Walla and Umatilla rivers	Umatilla River	M	M	M	M	MT
	Touchet River	H	L	M	M	H
	Walla Walla River	M	M	M	M	MT
Yakima River	Satus Creek	L	L	M	M	Viable
	Toppenish Creek	L	L	M	M	Viable
	Naches River	M	L	M	M	M
	Upper Yakima	M	M	H	H	H

* Re-introduction efforts underway (NMFS 2009)

***Updated Biological Risk Summary*.** The following is a summary from the status review update. More detailed information on the status and trends of these listed resources, and their biology and ecology are in the status update (NWFSC 2015).

There have been improvements in the viability ratings for some of the component populations, but the MCR steelhead DPS is not currently meeting the viability criteria described in the Middle Columbia Steelhead Recovery Plan (NMFS 2009). In addition, several of the factors cited by ICTRT (2005) remain as concerns or key uncertainties. Natural origin returns to the majority of populations in two of the four MPGs in this DPS increased modestly relative to the levels reported in the previous 5-year review. Abundance estimates for two of three populations with sufficient data in the remaining two MPGs (Eastside Cascades and Umatilla–Walla Walla) were marginally lower. Natural-origin spawning estimates are highly variable relative to minimum abundance thresholds across the populations in the DPS. Three of the four MPGs in this DPS include at least one population rated at low risk for A&P (NWFSC 2015). The survival gaps for the remaining populations are generally smaller than those for the other Interior Columbia Basin listed DPSs (NWFSC 2015). Updated information indicates that stray levels into the John Day River populations have deceased in recent years. Out of basin hatchery stray proportions,

although reduced, remain high in spawning reaches within the Deschutes River basin populations. In general, the majority of population level viability ratings remained unchanged from prior reviews for each MPG within the DPS.

Limiting Factors. Limiting factors for this species include:

33. Degradation of floodplain connectivity and function, channel structure and complexity, riparian areas, fish passage, stream substrate, stream flow, and water quality.
34. Mainstem Columbia River hydropower-related impacts.
35. Degraded estuarine and nearshore marine habitat.
36. Hatchery-related effects.
37. Harvest-related effects.
38. Effects of predation, competition, and disease.

***MCR steelhead in the Umatilla Basin*.** Adult steelhead returns to the basin have been monitored at Three Mile Falls Dam since 1967. Up through 1989, fish were enumerated by a mechanical counter and it is possible that adult steelhead returns were overestimated in some years because the counter could not account for steelhead that fell back over the dam and then re-ascended, counting the same fish at least two or three times, if not more. Beginning in 1990, however, all adult steelhead have been trapped and counted at Three Mile Falls Dam, which provides more accurate count data.

For the entire period from 1989 through 2016, the average total abundance for steelhead entering the Umatilla River was 3,048 fish per year (range 768–6,070). An annual average of 2,417 returning adult steelhead entered the basin between 1989 and 2003, with a peak of 5,524 adults returning in 2002. Of these total fish returns it is estimated that 1,594 fish were wild or naturally-produced steelhead, resulting in an average of 65.6 percent of the overall return being wild fish during this time period. The 1989 to 2003 run years were used to analyze Umatilla River steelhead abundance in NMFS (2004), the previous ESA consultation on the Project.

Since NMFS (2004), an annual average of 3,727 returning adult steelhead entered the basin between 2004 and 2016 with a peak run of 6,070 fish in 2014. An estimated 76.1 percent of this return period was made up of naturally-produced fish, which was an improvement from the 1989–2003 time period. Estimates of productivity based on female escapement and number of redds also suggests that there has been a trend of increasing productivity in the subbasin from the early 1990s to 2015 (Reclamation 2016).

2.2.2 Status of Critical Habitat

This section describes the status of designated critical habitat affected by the proposed action by examining the condition and trends of the essential PBFs of that habitat throughout the designated areas (Table 2.8). These features are essential to the conservation of the ESA-listed species because they support one or more of the species' life stages (e.g., sites with conditions that support spawning, rearing, migration and foraging).

Table 2.8. Physical and biological features of critical habitat designated for ESA-listed species considered in this opinion and corresponding species life history events.

Physical or Biological Features		Species Life History Event
Site Type	**Site Attribute**	
Umatilla River Basin		
Freshwater Rearing	Water quality Water quantity	Fry/parr/smolt growth and development
Freshwater Migration	Free of artificial obstruction Water quality Water quantity	Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Columbia River		
Freshwater Migration	Free of artificial obstruction Water quality	Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration

For most salmon and steelhead, NMFS's critical habitat analytical review teams (CHARTs) ranked watersheds within designated critical habitat at the scale of the fifth-field hydrologic unit code (HUC5) in terms of the conservation value they provide to each ESA-listed species that they support (NMFS 2005). The conservation rankings were high, medium, or low. To determine the conservation value of each watershed to species viability, the CHARTs evaluated the quantity and quality of habitat features, the relationship of the area compared to other areas within the species' range, and the significance to the species of the population occupying that area. Even if a location had poor habitat quality, it could be ranked with a high conservation value if it were essential due to factors such as limited availability, a unique contribution of the population it served, or is serving another important role.

A summary of the status of critical habitats considered in this opinion is provided in Table 2.9, below.

Table 2.9. Critical habitat, designation date, Federal Register citation, and status summary for critical habitat considered in this opinion.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Upper Columbia River spring-run Chinook salmon	9/02/05 70 FR 52630	Critical habitat encompasses four subbasins in Washington containing 15 occupied watersheds, as well as the Columbia River rearing/migration corridor. Most HUC5 watersheds with PBFs for salmon are in fair-to-poor or fair-to-good condition. However, most of these watersheds have some, or high, potential for improvement. We rated conservation value of HUC5 watersheds as high for 10 watersheds, and medium for five watersheds. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Federal Columbia River Power System.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Snake River spring/summer-run Chinook salmon	10/25/99 64 FR 57399	Critical habitat consists of river reaches of the Columbia, Snake, and Salmon rivers, and all tributaries of the Snake and Salmon rivers (except the Clearwater River) presently or historically accessible to this ESU (except reaches above impassable natural falls and Hells Canyon Dam). Habitat quality in tributary streams varies from excellent in wilderness and roadless areas, to poor in areas subject to heavy agricultural and urban development (Wissmar et al. 1994). Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Federal Columbia River Power System.
Snake River fall-run Chinook salmon	10/25/99 64 FR 57399	Critical habitat consists of river reaches of the Columbia, Snake, and Salmon rivers, and all tributaries of the Snake and Salmon rivers presently or historically accessible to this ESU (except reaches above impassable natural falls, and Dworshak and Hells Canyon dams). Habitat quality in tributary streams varies from excellent in wilderness and roadless areas, to poor in areas subject to heavy agricultural and urban development (Wissmar et al. 1994). Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Federal Columbia River Power System.
Snake River sockeye salmon	10/25/99 64 FR 57399	Critical habitat consists of river reaches of the Columbia, Snake, and Salmon rivers; Alturas Lake Creek; Valley Creek; and Stanley, Redfish, Yellow Belly, Pettit and Alturas lakes (including their inlet and outlet creeks). Water quality in all five lakes generally is adequate for juvenile sockeye salmon, although zooplankton numbers vary considerably. Some reaches of the Salmon River and tributaries exhibit temporary elevated water temperatures and sediment loads that could restrict sockeye salmon production and survival. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Federal Columbia River Power System.
Upper Columbia River steelhead	9/02/05 70 FR 52630	Critical habitat encompasses 10 subbasins in Washington containing 31 occupied watersheds, as well as the Columbia River rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some or a high potential for improvement. We rated conservation value of HUC5 watersheds as high for 20 watersheds, medium for eight watersheds, and low for three watersheds.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Snake River Basin steelhead	9/02/05 70 FR 52630	Critical habitat encompasses 25 subbasins in Oregon, Washington, and Idaho. Habitat quality in tributary streams varies from excellent in wilderness and roadless areas, to poor in areas subject to heavy agricultural and urban development (Wissmar et al. 1994). Reduced summer stream flows, impaired water quality, and reduced habitat complexity are common problems. Migratory habitat quality in this area has been severely affected by the development and operation of the dams and reservoirs of the Federal Columbia River Power System.
Middle Columbia River steelhead	9/02/05 70 FR 52630	Critical habitat encompasses 15 subbasins in Oregon and Washington containing 111 occupied watersheds, as well as the Columbia River rearing/migration corridor. Most HUC5 watersheds with PBFs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some or a high potential for improvement. We rated conservation value of occupied HUC5 watersheds as high for 80 watersheds, medium for 24 watersheds, and low for 9 watersheds.

Critical Habitat in the Umatilla River

The Umatilla River basin is designated critical habitat for MCR steelhead. The CHART rated habitat in the upper Umatilla River and Meacham Creek, upstream of the action area, as fair to good with a high potential for improvement. Birch Creek, which enters the Umatilla River within the action area, was also rated fair to good with a high potential for improvement. The Middle Umatilla River from Mission Creek (above the action area) to Alkali Canyon (within the action area) is rated fair to poor with some potential for improvement, and the lower Umatilla River downstream of Alkali Canyon is rated poor with some potential for improvement (NMFS 2005).

Much of the Umatilla River basin is listed as water-quality impaired on the Oregon Department of Environmental Quality's section 303(d) Clean Water Act list for parameters such as water temperatures, dissolved oxygen, sedimentation and toxicants (ODEQ 2001). Climate change, as described in Section 2.2, may reduce the conservation value of designated critical habitat in the action area.

The primary activity affecting critical habitat in the action area are water withdrawals for irrigated agriculture. The PBFs that support rearing and migration are affected by this activity. Most, if not all, steelhead spawn above Meacham Creek, which is above the action area. The Environmental Baseline section, below, describes the present condition of these PBFs in the action area.

2.3 Action Area

"Action area" means all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area includes the Umatilla River from its mouth upstream to McKay Creek, McKay Creek from its mouth upstream to and including McKay Reservoir, Cold Springs Creek from its mouth upstream to and including Cold Springs Reservoir, and the Columbia River from the Umatilla River upstream 8.5 river miles to the Reclamation's Columbia River Pumping Plant. The action area includes all land irrigated by federal project water. The Columbia River downstream of the Umatilla River is not within the action area, because the aggregate effects of all 19 Reclamation projects on streamflows in the mainstem Columbia River were considered in NMFS (2008 and 2014). The portion of the Umatilla River within the action area serves as rearing habitat for juvenile MCR steelhead and as a migratory corridor for both juvenile and adult MCR steelhead. McKay Creek, below McKay Reservoir, currently serves only as rearing habitat and a migratory corridor for juvenile MCR steelhead because of the adult barrier at its mouth. The portion of the Columbia River within the action area serves as a migratory corridor for juvenile and adult MCR steelhead, SRB steelhead, UCR steelhead, SR spring/summer-run chinook salmon (*O. tshawytscha*), SR fall-run chinook salmon, UCR spring-run chinook salmon, and SR sockeye salmon (*O. nerka*). This portion of the Columbia River also provides some rearing habitat for these species. The entire action area is designated EFH for fall- and spring-run Chinook salmon and coho salmon.

2.4 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

2.4.1 Umatilla Basin

The Umatilla River originates on the western slopes of the Blue Mountains in northeast Oregon and flows approximately 89 miles to the Columbia River, draining an area of about 2,290 square miles. It joins the Columbia River at RM 289 near the town of Umatilla, Oregon. The basin consists of the high relief of the Blue Mountains region and the Deschutes–Umatilla Plateau, a broad upland plain that slopes northward from the Blue Mountains to the Columbia River. Most of the basin is situated within Umatilla and Morrow Counties with a few small headwater tributaries originating in Union County. Roughly 51 percent is privately owned, 37 percent is managed by federal agencies (predominantly the U.S. Forest Service), 1 percent is owned by the state of Oregon, and about 11 percent lies within the boundaries of the Umatilla Indian Reservation. Forestlands within the basin are managed for timber harvest, grazing and recreation. Much of the Umatilla Basin is used for dryland farming and irrigated agriculture. Irrigation is the largest use of surface and groundwater (BPA 2006).

The basin experiences strong seasonal fluctuations in both temperature and precipitation with summer months consisting of warm days, cool nights and little precipitation. Winter month are colder and average temperatures are often just slightly above freezing. Most of the basin's

precipitation occurs during the fall, winter, and spring seasons. The climate is strongly influenced by elevation with dry conditions existing in the northwestern, low elevation portion of the basin. Precipitation in this area averages just 9 inches annually and falls mainly as rain. At higher elevations in the Blue Mountains, precipitation falls primarily as snow and averages around 55 inches per year (DeBano et al. 2016)

Most of the basin topography is gently sloping but the headwater areas in the Blue Mountains are steep, resulting in considerable bedload transport, which supplies a large volume of sand and gravel. These alluvial materials not only provide spawning gravel in the tributaries and upper mainstem Umatilla River, they also serve to store and transmit ground water, which contributes to late season streamflow in lower parts of the river (Ely 2001).

Habitat

The development of the Umatilla Project beginning in 1906 allowed large volumes of water to be stored and diverted, mostly below Pendleton, Oregon. Large-scale flow depletions regularly dewatered the entire lower Umatilla River, altering the hydrograph and reducing or eliminating fish migration flows and access to spawning and rearing habitat. Some of the water was (and still is) replaced with irrigation return flow occurring below SID, WID and HID. These return flows became the primary source of water for WID, the lowermost irrigation diversion, as well as the only source of cooler water for fish in a temperature-impaired section of the river. Furthermore, construction of McKay Dam and Reservoir in 1927 blocked access to approximately 108 miles of productive habitat in upper McKay Creek, and flow below the dam ceased during the winter and early spring storage period (Reclamation 2016).

Extensive vegetation removal and disturbance associated with urban development, cultivation, grazing, forestry, transportation corridors, and flood control has also blocked access to rearing, migration and spawning habitat and as well as degrading this habitat. In a study of landscape change in the Umatilla Basin, Kagan et al. (2000) notes that the most significant change is the conversion of native prairie to farmland and the disappearance of large forested riparian areas along the Umatilla River. The report estimated that bottomland hardwood and willow communities have been reduced by as much as 95 percent since 1850. The report also notes the current absence of water in many areas where the original General Land Office surveyors reported abundant springs and small creeks.

The current condition of the riparian vegetation varies considerably throughout the Umatilla basin. Much of the riparian vegetation in the upper tributaries is composed of narrow bands of hardwood and conifer species, while galleries of large mature cottonwoods exist in some areas of CTUIR land as well as in a few areas along the mainstem Umatilla River below Pendleton. Lower mainstem and tributary reaches have riparian vegetation types primarily composed of shrubs and grasses, with some scattered hardwood trees. In some cases where crop cultivation extends to the stream banks or where grazing pressure is high, woody or shade-producing riparian vegetation is sparse. NPCC (2004) estimates that approximately 70 percent of the Umatilla River has been levied or channeled, and trees are actively prevented from growing on the dikes.

For the Umatilla Basin in general, stream temperatures exceed state water quality standards in the summer and early fall months (June–September). Warmest stream temperatures correspond to prolonged solar radiation exposures due to lack of shade, warm air temperature, low flow conditions, and decreased ground water contributions. Daily variations in temperature are significant. A survey of habitat conditions for the stream systems throughout the Umatilla Basin ranked the general condition of streams as poor to fair using habitat features such as pool area, percent dry channel, width/depth ratios, percent substrate fines, canopy closure, and woody debris (NPPC 2004).

Many of the streams in the Umatilla Basin are on the Clean Water Act (CWA) 303(d) list for temperature, sediment and nutrients (ODEQ 2012). Maximum daily stream temperatures at the mouth of the Umatilla River in August can exceed 75°F. Even areas upstream of the Project facilities exceed 75°F and typically exceed the state water temperature criteria for rearing and migration of 64.4°F (ODEQ 2007).

Since passage of the Umatilla Basin Project legislation in 1988, and through the coordination efforts of the Umatilla River Technical Work Group[1], significant improvement to instream flows has occurred. The Umatilla Basin Project has reduced the length of time the lower Umatilla River is subject to diminished flow conditions from mid-July through early September. Still, sections of the lower 37 miles of the Umatilla River consist of low flows annually from about mid-July to mid- to late August in dry years. Some relief in the Umatilla River below Pendleton is provided by releases of cooler water from McKay Reservoir starting in mid-August. Under the current baseline, higher flows return to the system in mid- to late August, and as a result of McKay water releases, cooler temperatures in the mainstem Umatilla River prevail from mid- to late September through June (Reclamation 2016).

Additionally, since 2001, Reclamation has maintained a flow of 10 cfs or more in McKay Creek below the dam during the storage season to benefit salmonid rearing. In 1995, an adult barrier was placed at the mouth of McKay Creek to prevent the stranding of adults and dewatering of redds in this reach between the creek's mouth and McKay Dam.

Fish Passage Facilities

MCR steelhead pass through and are affected by several major facilities on the Umatilla River mainstem from RM 50 to the mouth, which are owned, operated or were constructed by private parties, Reclamation or others as shown in Table 2.10. The BPA contracts with the irrigation districts for the operation and maintenance of these facilities on an annual basis. All fish screens meet NMFS' juvenile fish screen criteria (NMFS 2011).

[1] The Umatilla River Technical Workgroup is comprised of irrigation districts, Reclamation, CTUIR and the Oregon Department of Fish and Wildlife.

Table 2.10. Ownership and operation and maintenance responsibility of fish passage facilities in the Umatilla River action area (Reclamation 2016).

Facility	Ownership			Operation & Maintenance Responsibility		
	Facility	Fish Ladder	Fish Screen	Facility	Fish Ladder	Fish Screen
Furnish Diversion Dam	SID	BPA		WID	WID	
Furnish Ditch	SID		BPA	WID		WID
Feed Diversion Dam	Reclamation	BPA		HID	WID	
Feed Canal	Reclamation		BPA	HID		WID
Westland Diversion Dam	WID	BPA		WID	WID	
Westland Canal	WID		BPA	WID		WID
Maxwell Diversion Dam	Reclamation	No Ladder*		HID		
Maxwell Canal	Reclamation		BPA	HID		WID
Three Mile Falls Diversion Dam	Reclamation	BPA		WEID	WID	
West Extension Main Canal	Reclamation		BPA	WEID		WID

*Maxwell Diversion Dam is passable without a ladder.

The CTUIR and ODFW staff oversee all passage efforts and conditions of these facilities and manage Westland and Three Mile Falls Dam trap and haul efforts during times when flows require fish to be trapped and hauled around dry sections of stream. These agencies also determine the type and timing of needed maintenance to keep these facilities operating as designed and according to NMFS and ODFW approved criteria. All drum screens at these federal facilities have been rescreened since their original installation dates in order to maintain fish passage criteria.

Supplementation

The Umatilla River Summer Steelhead Program is currently funded by BPA as part of a larger group of hatchery programs within the Umatilla Basin. Hatchery steelhead from several different sources have been released into the Umatilla River since at least 1967, with releases of fish originating only from the Umatilla hatchery program beginning in 1975. Then in 1991, the program switched to 100 percent natural origin return (NOR) adults for broodstock and this continued until the program was adjusted in 2014 (ODFW 2017).

The original goals for the Umatilla River Summer Steelhead Program were: (1) enhance production through supplementation of hatchery produced fish using 100 percent NOR broodstock; (2) provide sustainable tribal and non-tribal harvest opportunities; and (3) maintain the genetic influence of the natural population (>0.67) over hatchery produced fish (<0.33) in the natural spawning grounds above Three Mile Falls Dam. These were the goals of the program until brood year 2014 when, instead of using 100 percent NOR steelhead for broodstock, returning hatchery summer steelhead were incorporated into the broodstock. Currently, returning Umatilla River hatchery summer steelhead are incorporated into the broodstock at a rate of no more than 33 percent of the actual spawners and there are no hatchery x hatchery crosses (ODFW 2017).

ODFW (2017) notes that the most recent 5-year (2011 to 2015) mean abundance of natural-origin steelhead returns to the Umatilla River is 3,134. The minimum abundance threshold for the Umatilla River population is 1,500 natural-origin spawners (NMFS 2009) and, because the natural-origin returns for this population are well above this abundance target (between ~900 and ~3,400 fish over in recent years), abundance concerns are minimal to negligible in the current state of the population, and the removal of up to 110 adults for broodstock would not alter this status. Furthermore, the naturally-spawning hatchery summer steelhead would be expected to increase the overall A&P of the population even though the hatchery steelhead may not be as productive as the natural-origin summer steelhead. Thus, the removal of natural-origin summer steelhead to meet proposed hatchery broodstock needs is not considered to be negative on the abundance of this population (ODFW 2017).

2.4.2 Columbia River

Along with MCR steelhead, six other species occur near the Phase II pumping plant on the Columbia River, roughly 8.5 miles upstream of the mouth of the Umatilla River. These species are UCR spring-run Chinook salmon, UCR steelhead, SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, SR sockeye salmon, and SR steelhead. This portion of the action area is primarily a migratory corridor for both juveniles and adults, but some juvenile rearing likely occurs here. This reach of the Columbia River has been fully analyzed in previous ESA consultations (NMFS 2010 and 2014).

2.5 Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

2.5.1 Direct Effects on MCR Steelhead in the Umatilla Basin

The effects on MCR steelhead resulting from the future ongoing operation and maintenance of the Project are predominantly flow related. Reclamation evaluated these effects by modeling flows under the proposed action using the Riverware modeling tool. Flows were modeled using data from four Hydromet[2] gaging stations located on the Umatilla River (Table 2.11). Five distinct time periods were analyzed: April through June, July through August, September, October through November, and December through March. Specific modeled flow effects at each gaging station are discussed below by specific reach. Reclamation also modeled flows under the current environmental baseline with no Project operations, i.e., no storage on McKay Creek or Cold Springs Reservoir, no Phase I or II exchanges, no diversions at Feed or Maxwell canals, only pre-Project water rights for WEID, state water right diversions operating, and finally all irrigation deliveries based on available live flow.

[2] Hydromet is Reclamation's network of automated hydrologic and meteorologic monitoring stations.

Table 2.11. Hydromet gaging stations used for Umatilla River flow modeling scenarios.

Station Name	Approximate Location
MCKO	McKay Creek below McKay Dam
YOKO	Umatilla River at Yoakum, OR
UMDO	Umatilla River at I-84 near Stanfield, OR
UMAO	Umatilla River near Umatilla, OR

Table 2.12 shows that the proposed action when compared to no Project operations under the existing environmental baseline, results in less water in the Umatilla River during the winter and early spring and more water in the Umatilla River from late spring through fall. Less water during winter and early spring is the result of water being stored in McKay and Cold Springs Reservoirs, and more water in the late spring through fall is the result of water being released from McKay Reservoir for irrigation and fish target flows. The proposed action results in a decrease in winter flows associated with storage, which may decrease edge rearing habitat for MCR steelhead in the action area. Increased flows under the proposed action in the late spring aid juvenile steelhead in their outmigration and in the fall aid adult steelhead in their upstream migration. Both adults and juveniles at the extreme edge of their migration periods encounter low flows and elevated water temperatures in the Umatilla River, but habitat and flow conditions under the proposed action are enhanced over conditions under the environmental baseline with no Project.

Table 2.12. Median flows (cfs) for operations with and without the proposed action (PA).

Gaging Station	Dec–March		Apr–June		Jul–Aug		September		Oct–Nov	
	w/ PA	w/o PA	w/ PA	w/o PA	w/ PA	w/o PA	w/ PA	w/o PA	w/ PA	w/o PA
MCKO	10	122	132	86	177	1	150	1	64	6
YOKO	624	727	809	844	228	50	195	50	210	90
UMDO	384	589	434	288	9	5	27	5	198	46
UMAO	498	670	460	416	13	21	112	0	244	57

July and August flows under the proposed action normally fall short of ODFW-recommended levels (Table 1.1) for anadromous fish passage and rearing habitat. In the lower Umatilla River, low streamflow translates into reduced velocity, width and depth of flow, isolation of pool and riffle habitat, and increased warming. Additional competition for space among species and vulnerability to disease and predation are likely consequences of reduced flows. Cool water refugia resulting from irrigation return flows or springs become critical to sustaining rearing life stages. For the June through September period, flow requirements estimated by ODFW for passage ranged from a minimum of 250 cfs to 300 cfs (Reclamation 2016).

Few, if any, steelhead smolts migrate from the basin after mid-summer. Trap and haul operations are periodically carried out at Westland Dam in early July when exchange flows are terminated. This operation typically captures less than 1 percent of the overall salmonid smolt outmigration, most of which are outmigrating fall Chinook salmon; only a few juvenile steelhead are observed. This indicates that flows under the proposed action during the spring and early summer months are providing migration conditions that allow juvenile MCR steelhead to emigrate through the lower Umatilla River.

For adult steelhead returning to the Umatilla River, the proposed action includes releases from McKay Reservoir by ODFW and CTUIR to aid upstream migration through the action area. While a target release of 75 cfs, if available, occurs from July 1 through September 30, about 300 cfs is released from October 1 through November 15 and is a higher priority release to provide adequate flow for returning adult steelhead and other adult salmon species. These target flows are additive to flow already occurring in the river. The predominant period for steelhead entry to the Umatilla River is mid-September through April. From 1979 through 2016 (37 years), an average of four adult steelhead passed Three Mile Dam in August, 23 in May, and just two in June. The upward trend in natural steelhead production in the Umatilla Basin indicates that adults are able to pass through the action area successfully under the proposed action.

As discussed in section 1.3.3, above, the available storage for target releases from McKay Reservoir differs from year to year, and depends on the amount of annual precipitation. In most years, the minimum flow targets are met and provide adequate volume for migration and winter rearing but do not provide channel maintenance or habitat development.

Effects of Phase I and II Exchange Operations

Phase I and II allow target flows to be met in the lower Umatilla River. Phase I augments instream flows for the lower 3 miles of the Umatilla River when flows approach or fall below seasonal target flows at Three Mile Dam. WEID reduces the diversion of Umatilla River water in May and June and from August through October by up to 140 cfs at Three Mile Dam, allowing flow to remain in the channel down to its confluence with the Columbia River. The purpose of Phase II is to provide instream flows from McKay Creek to the Columbia River in the spring and fall. HID and SID forgo live flow diversions from the Umatilla River as flows approach target flows in the mid- to late spring. All of SID's McKay storage is exchanged with Columbia River water and CTUIR and ODFW control the release of McKay flows for fish. Providing additional water in the Umatilla River in May and June aids the outmigration of juvenile MCR steelhead, and additional water in the river starting in September allows adult MCR steelhead to migrate upstream.

The operation of the Phase II pumping plant stationary fish screens in the Columbia River includes cleaning with an air burst every 4 hours from May through October. This results in significant turbulence in the immediate screen area, which may injure migrating juveniles directly impacted by the burst. Injured or disoriented juveniles would be more vulnerable to predators in the immediate area. However, the airbursts remove any debris that has collected on the screens, allowing them to perform as designed, which in turn prevents injury and mortality to juvenile salmonids. The probability of juvenile migrants being injured or killed by clogged screens is much greater than that of an airburst once every 4 hours. Furthermore, due to the airbursts that occur in a small area of a large river, it is likely that few, if any, individuals would be present during any airburst event. As such, we anticipate that take would occur on only a few individual juvenile salmonids and most likely be in the form of harassment, not injury or mortality.

Effects of Cold Springs Dam Operations

Cold Springs Reservoir stores water from the Umatilla River and the Columbia River to meet irrigation needs. The key habitat components for MCR steelhead that are directly and indirectly affected by the operation of Cold Springs Reservoir are streamflow and fish passage in the lower Umatilla River mainstem.

The Umatilla River diversion point for filling Cold Springs Reservoir is conditioned by target flows (Table 1.1) during major fill periods and meets NMFS (2011) screen criteria. The diversion structure does not impact key habitat components. Additional water for Cold Springs storage is pumped from the Columbia River, whose screens and intake facilities meet NMFS criteria. The filling of Cold Springs from the Columbia is a bucket-for-bucket exchange with the Umatilla River, and pumping on the Columbia is restricted by flow targets established by NMFS (2008 and 2014), thus flow for both upstream and downstream migration is maintained.

Effects of McKay Reservoir Ongoing Operations

Of importance to listed species in the action area is the allocation of stored water in McKay Reservoir for fish. Because of the structure of the dam and the bottom release point, McKay Reservoir water is cold and provides much needed cooler temperatures as well as flow improvements in the lower 37 miles of the Umatilla River. While water from the reservoir is allocated under contracts and other agreements, the residual pool is considered discretionary water that can be allocated by Reclamation (Reclamation 2016). During the late summer, releases from McKay Reservoir reduce stream temperatures in the Umatilla River for several miles below McKay Creek, improving rearing conditions for juvenile steelhead. For at least 2.5 miles, these temperatures normally meet the Oregon water quality standard for rearing and migration of 64.4°F. The river progressively warms below this point.

The year-to-year fill procedures provide no carryover options for the residual pool for fish, nor any provisions to ensure that the fish pool is filled every year. The amount of water that is available for fish—the remaining residual pool—is that amount of water that is left after all the other uses have been satisfied. Given resource demands, in some years water is not available for Priority 3 releases (Table 1.4), which is a target flow of 50 to 75 cfs from July 1 to September 30. The Umatilla River in the action area can become too warm and lack adequate depth for juvenile summer rearing, particularly in July and August when peak stream temperatures occur. Mortality can result if fish cannot escape to areas upstream of this reach or cannot find areas of cool ground water infiltration. Most juvenile salmonids, including steelhead, leave the action area as densities drop significantly in this area during the summer months and most of these fish move upstream to cooler water and suitable habitat (Maudlin 2000).

The proposed operation of McKay Reservoir impacts key habitat components for MCR steelhead. Release of cool water during a portion of steelhead migration times from McKay improves flow conditions and aids migration, improves velocities and water temperatures, and increases the amount of rearing space and food production in the lower Umatilla River mainstem and McKay Creek by connecting pools and riffles and increasing the width and depth of flow. Rearing and migration conditions for steelhead in the lower Umatilla River are vastly improved

by McKay releases. With or without the proposed action, the lack of McKay releases for fish, coupled with on-going diversions during July and August, degrades habitat conditions and increases water temperatures below the Westland Diversion (RM 27), and delays steelhead entry into the Umatilla Basin. While irrigation return flows and ground water inflows enter the Umatilla River beginning near RM 25 and improve stream flows and temperatures for short sections of the river, they are not enough to fully mitigate for dewatering, high temperatures, and reduced rearing areas—conditions that are exacerbated by the lack of riparian vegetation. These conditions are often stressful to smolts and can impose passage barriers to adult and smolt migration, affect food production, and reduce juvenile rearing space. However, the release of water for irrigation from McKay Reservoir limits these poor flow-related habitat conditions to the lower 27 miles of the Umatilla River. Without these releases, these poor flow-related habitat conditions would extend up the Umatilla River to the mouth of McKay Creek and 6 miles up McKay Creek (Reclamation 2016). Maudlin (2000) observed that most juvenile salmonids, including steelhead, move upstream to reaches influenced by the cool water released from McKay Reservoir or to cool reaches and tributaries further upstream, thus avoiding lethal and sublethal effects from the warm water reaches within the action area.

The maintenance of 10 cfs in McKay Creek during the winter while the reservoir is filling is sufficient flow to keep juvenile salmonids alive but does not provide adequate depths in the existing channel to provide passage. If irrigation releases stop abruptly in the fall, juvenile steelhead may be stranded, but if releases are stopped gradually, the risk of stranding is significantly reduced. During the winter months, it is unlikely that juvenile steelhead would need increased flows for migration, since their movement is limited due to cold temperatures during the overwintering period.

Effects of McKay Creek Fish Barrier

The McKay Creek fish barrier prevents adult MCR steelhead from accessing 6 miles of holding and spawning habitat, from the mouth to the dam, preventing adult stranding and redd desiccation during the winter refill of McKay Reservoir. Juvenile steelhead can pass through the barrier and rear in McKay Creek, and are typically large individuals in good condition (CTUIR 2001). Shallow riffles, limited pool habitat, and cold temperatures during the minimum 10 cfs release from December to March constrains overwintering habitat but there is little movement of fish during this period. However, these fish take full advantage of rearing habitat in McKay Creek during the spring and summer months when higher volumes of cool water are released for irrigation and fish flows.

2.5.2 Effects of Ongoing Irrigation Diversion Operations

The five federal diversion structures on the lower Umatilla River divert live flows, Columbia River exchange water, and federal water from McKay Reservoir during migration periods for listed MCR steelhead and other salmonids. These diversions begin at approximately RM 37 and occur downstream to the mouth of the Umatilla River. Reclamation flow diversions reduce access to, and the quality of, rearing habitat in the lower Umatilla River. However, irrigation releases of cooler water from McKay Reservoir provides up to 20 miles of rearing habitat for MCR juvenile steelhead in the Umatilla River below McKay Creek (Reclamation 2016).

The severity and significance of these impacts varies according to the location of each diversion point, volumes of water diverted in relation to instream flow needs, the timing of diversion operations, and the salmonid life stage present. Accordingly, the analysis of the effects of irrigation diversion operations is discussed below by reach and by life stage present.

River Mouth to Three Mile Dam

This lower-most reach of the Umatilla River is approximately 3 miles in length. Adult steelhead and smolts use this reach as a migration corridor (NMFS 2009), so flow volume and temperature are important key habitat components. Streamflow in this reach of the Umatilla is a consequence of upstream federal and non-federal live flow diversions, water released from McKay Reservoir, and the flow target guidelines shown in Table 1.1. Peak stream temperatures in this reach can exceed 80^{o}F between late June and mid-August with some daily average temperatures exceeding 75^{o}F. Reclamation's modeled flows at UMAO (RM 2) under the proposed action estimate a median flow of 13 cfs. Based on UMAO gage data from 2009 through 2018[3], average daily flows do not get this low and rarely get under 50 cfs.

Factors affecting smolt and adult steelhead in this reach include lethal water temperatures and insufficient flow for migration during the summer months (ODEQ 2001). Although in small numbers, adult steelhead begin entering the Umatilla River in September. Adult entry picks up more in mid- to late September, depending on flow volume and temperature. Low flow and higher temperatures will delay entry, and fish will hold in the Columbia River or its tributaries until conditions in the Umatilla River are more suitable. Peak migration past Three Mile Dam normally occurs between December and March. Most steelhead smolts have migrated out of the Umatilla River by late June before water temperature and low flows prohibit migration (Reclamation 2016).

The Maxwell diversion at RM 15.5 and the WID mid-August diversion affect flow, water velocity, and water temperatures in the lower 3 miles of the Umatilla River (ODEQ 2001). In mid-September, WID stops diverting water released from McKay Reservoir and storage is released to supplement live flow in this reach until natural flow increases along with reduced diversions. Flow releases for fish migration during this period are protected to the mouth of the Umatilla River; resulting in roughly 100 to 200 cfs more flow than would occur under baseline conditions without the proposed action. These flows allow for returning adult steelhead to pass Three Mile Falls Dam.

Three Mile Dam to Furnish Diversion Dam

Under current streamflow and habitat conditions, adult steelhead use this reach primarily as a migration corridor with adult upstream migration beginning in September and smolt out-migration late April through June. Steelhead and other salmonid juveniles have been observed using this river reach for rearing. The key habitat components in this river reach affected by the proposed action include flow volume, water velocity, water temperature, cover/shelter, substrate,

[3] Reclamation's gage data from modeled flows at UMAO from 2009 through 2018 (https://www.usbr.gov/pn/hydromet/arcread.html)

space, food and passage. The effects of the proposed action on these essential features of critical habitat are to limit listed steelhead access to suitable migration flows and rearing habitat.

Flows in this reach are monitored at three main gages: the Umatilla River near Hermiston (UMMO at RM 15.5), the Dillon Diversion gage (UMDO at RM 24 and Interstate 84), and the Umatilla River near Echo (UMUO at RM 28). At the September entry time for adult MCR steelhead, target flows for this reach are in effect and keep this reach watered under the proposed action. Since 1997, increases in daily discharge during September reflect Phase II water exchange efforts to improve instream flow. Storage releases from McKay Reservoir also increase flow through this reach from mid-September until mid-November. Water exchange operations at the Feed Canal diversion help maintain satisfactory flow for adult migration (November to June) since diversions do not occur unless flows exceed the 250/300 cfs targets by at least 80 cfs (Reclamation 2016). These flows during this time frame (November to June) also provide for winter rearing and spring migration for juvenile steelhead.

The WID and Maxwell diversions in this reach do reduce flow and contribute to warming stream temperatures during the summer months. If natural flow or releases from McKay Reservoir cannot maintain 150 cfs or more at UMDO, then ODFW and CTUIR initiate trap and haul operations at the Westland Dam juvenile collection facility for transport downstream. On average, trap and haul operations begin by July 10 with few steelhead involved (Reclamation 2016). Established target flow levels assure that there are adequate passage conditions in this reach from mid-November through June.

Furnish Dam to McKay Creek

The YOKO gage at Yoakum (RM 38) monitors flow in this reach. All McKay Reservoir water releases pass through this reach during parts of the steelhead migration period. Daily average flow in this reach during adult steelhead migration (September to May) rarely drops below 200 cfs (Reclamation 2016). During late summer, releases from McKay Reservoir reduce stream temperatures at or slightly below 64°F in the Umatilla River for at least 2.5 miles below McKay Creek. This provides adequate steelhead rearing conditions. NMFS considers the flow volumes, velocities and stream temperatures in this reach enough for passage and minimally necessary to support access to rearing areas. The higher flows from July through August are due to the delivery of stored water for irrigation, and lower flows from December through March are due to storing water in McKay Reservoir.

McKay Creek Mouth to McKay Dam

The 6-mile reach of McKay Creek from the mouth to the dam is historical spawning and rearing habitat for steelhead. Past and present storage and release operations impair fish production in this reach by adversely modifying flow and habitat conditions. In order to prevent adult access and thus adult losses, Reclamation constructed a fish barrier in 1995. Flow conditions from November through March have been improved from 0 cfs to 10 cfs since the fish barrier was installed. McKay Dam blocks access to roughly 108 miles of steelhead spawning and rearing habitat.

Flow in this reach is measured by the MCKO gage near Pendleton and flow above McKay Reservoir is measured at the MYKO gage near Pilot Rock. Minimum flow from December through March is 10 cfs but median flows would be about 122 cfs without storage. The modeled median flows under the proposed action for the remainder of the year are considerably greater than they would without storage (Table 2.12). Flow below McKay Dam fluctuates greatly depending on flood water releases, irrigation releases and other operations from McKay Reservoir. Maintaining a minimum winter flow in McKay Creek of 10 cfs reduces the potential for stranding and mortality of individuals associated with the pre-2000 zero winter flows (Reclamation 2016). However, due to the high width/depth ratio of McKay Creek, the depths associated with shallow riffles when 10 cfs is being released from the dam are inadequate to provide passage for all MCR steelhead life stages, but juvenile steelhead movement is minimal during the cold overwintering period regardless of flow.

Fluctuation of flows related to Project operations (particularly within McKay Creek) is identified as a possible concern for juvenile steelhead and the food web they depend on. Significant fluctuations in the flows on a weekly, daily, or even hourly basis (particularly in McKay Creek) may cause cyclic dewatering and re-watering of near shore habitats, riffles, and pools, which reduces biotic productivity and strands salmonid fry (Reclamation 2016).

2.5.3 Fish Entrainment

The Project diversions are fully screened but the screens are located in the irrigation canals and not at the point of diversion; so entrained fish are those individuals that are diverted from the mainstem Umatilla River through headgates into Project canals and then later returned to the river through a fish bypass at the canal screens. Steelhead and other species recovered in the Project canals at the end of irrigation season are captured in the canal reach between the headgate and fish screen. To help Reclamation assess and monitor entrainment, the USFWS' Abernathy Fish Technology Center assisted with the installation and maintenance of both pass-over and pass-through PIT tag antenna arrays at Reclamation canals and fish bypass structures (Three Mile Falls, Feed Canal, Maxwell Canal and WEID Canal). Reclamation also contracted with the USFWS to collect PIT tag data, run analyses and report results.

The Feed Canal Diversion is used to transport a portion of Umatilla flow to Cold Springs Reservoir from the fall through early spring months and normally shuts off by the end of April and before the bulk of steelhead smolts begin outmigrating; although in some years operations may continue through late May. Data from 2006 through 2015 for juvenile steelhead show that entrainment ranged from 0.0 percent to 2.5 percent at the Feed Canal Diversion and from 0.1 percent to 31.2 percent at the Maxwell Diversion. The portion of entrained steelhead that were estimated to return to the Umatilla River via the fish bypasses ranged from 85.1 percent to 100 percent. Overall, about 97.3 percent of entrained steelhead at the Feed and Maxwell diversions return to the Umatilla River by way of the fish bypass channels. For the Project diversions combined, it is estimated that up to 25 percent of steelhead smolts may be entrained in any one year but most of these fish return to the Umatilla River. Salvage operations carried out by CTUIR in the Project canals from 2006 through 2015 resulted in a high of 22 steelhead recovered from Feed Canal in 2008. In all the other years of salvage, the number of juvenile steelhead recovered ranged from zero to five fish (Reclamation 2016).

Adult steelhead can be entrained also, particularly fallbacks or kelts that are moving downstream. After analyzing radio telemetry data on adult movement in the Umatilla River, the USFWS estimated that about 2.8 percent of adults are entrained at Project diversions, mainly the Maxwell and Feed diversions. Most (88 percent) of these fish were detected at the canal bypass facilities and at points further downstream indicating that a small number of adults are potentially lost due to entrainment (Simpson and Taylor 2013).

2.5.4 Effects on Critical Habitat

Designated critical habitat within the action area consists primarily of freshwater migration and rearing PBFs. None of the listed species addressed in this opinion spawn in the action area. The critical habitat PBFs most likely to be affected by the proposed action are water quality, water quantity, and passage. These features are essential to conservation because they allow adult fish to reach upstream spawning areas and they allow juvenile fish to rear in and near natal streams for at least 1 to 2 years before proceeding downstream to the ocean.

Water Quality

The mid- to late-summer water temperatures in the mainstem Umatilla River upstream from the mouth of McKay Creek can exceed 75°F, thus flow entering the action area during this time period can significantly exceed ODEQs standards for salmonid rearing (64°F) and migration (68°F). Additionally, the paucity of riparian cover allows for significant exposure to direct sunlight, combined with high air temperatures, results in greater amounts of heating as you move downstream through the action area. By August, maximum daily stream temperatures at the mouth of the Umatilla River can also exceed 75°F.

The high stream temperatures in the upstream portion of the action area are markedly reduced for about 2.5 miles below the mouth of McKay Creek due to cold water releases from McKay Reservoir in August. Water temperature in this reach stays near the criterion of 64°F for juvenile rearing. Beyond this point the mainstem Umatilla River warms progressively where rearing habitat is available only seasonally or is localized due to the presence of some springs or irrigation return flows (White et al. 2007).

Although upstream-migrating adult summer steelhead seek cool water refugia in the Columbia River or its lower river tributaries until water temperatures and flows are suitable for continued upstream migration into the Umatilla River, Umatilla River adult summer steelhead may still experience less than optimal migration conditions in September and October with the proposed action in poor water years. Juvenile steelhead have nearly completed their spring outmigration before flow decreases and water temperatures increase, although the very few juvenile steelhead that remain are collected at the smolt collection facility at the beginning of July and are hauled downstream for release (CTUIR 2014).

2.6 Cumulative Effects

“Cumulative effects” are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation (50 CFR 402.02). Future federal actions that are unrelated to the proposed action

are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline vs. cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the rangewide status of the species (Section 2.2).

In 2017, the population growth rate of Umatilla County was 0.53 percent and for Morrow County a slight decrease in population occurred by 0.37 percent. NMFS assumes that the population for these counties will remain relatively stable over the next 5 years. Future private and state actions will continue within the action area at approximately the same level at which they are occurring now since the population will likely not see much change. As the human population in the action area remains somewhat constant, demand for agricultural, commercial, or residential development, and recreation is likely to remain relatively constant as well.

2.7 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminishes the value of designated or proposed critical habitat for the conservation of the species.

2.7.1 Umatilla River

The threatened status of the MCR DPS is largely a result of low viability (abundance, productivity, spatial structure, and diversity) in four populations. Seven populations in the DPS exhibit moderate or maintained viability while six populations are rated as viable or highly viable. The Umatilla River MCR steelhead population is currently at a moderate risk for abundance, productivity, spatial structure, and diversity (NWFSC 2015). The proposed action would not affect existing spawning habitat since this occurs upstream of the action area, but the action will affect migration and rearing habitat due to continued water withdrawals and poor water quality during the mid- to late-summer months. Water withdrawals under the proposed action will continue but no additional withdrawals are proposed.

Successive water withdrawals combined with little riparian cover limit juvenile steelhead rearing in the action area of the Umatilla River, particularly during the July through mid-September period when stream temperatures normally exceed ODEQ's standard of 64°F. Rearing conditions are slightly improved due to cooler water released from McKay Reservoir starting in August. Juveniles steelhead rearing in this reach likely access cooler water from ground water inputs as well as the upper portion of the action area where cool water released from McKay Reservoir

maintains adequate rearing conditions for a few miles downstream from the mouth of McKay Creek and McKay Creek up to McKay Dam.

Nearly all steelhead smolts have outmigrated before the mainstem Umatilla River becomes prohibitively warm. Trap and haul operations are periodically carried out at Westland Dam in early July. This operation typically captures less than 1 percent of the overall salmonid smolt outmigration, most of which are outmigrating fall Chinook salmon; only a few juvenile steelhead are observed. All water withdrawals under the proposed action are screened to NMFS criteria and are maintained in good working order. Some juvenile steelhead are entrained behind the canal headgates each year. The CTUIR and ODFW conduct fish salvage operations annually before canals are dewatered.

Adult steelhead typically begin to enter the Umatilla River in September, primarily in mid-September. Releases from McKay Reservoir significantly improve flows by this time and temperature also greatly improves in the mainstem Umatilla River by October. If flows are insufficient to pass Three Mile Dam, CTUIR and ODFW conduct trap and haul operations and release fish in areas upstream. Some delay at diversion structures may occur but it is difficult to determine if adults are holding or truly delayed. Adult steelhead spawn in the late winter to early spring period so some individuals may choose to hold for a time before migrating to upstream spawning areas. Spawner abundance has increased over the last few years and the 15-year trend in natural origin spawners is positive.

2.7.2 Columbia River

The operation of the Phase II pumping plant stationary fish screens in the Columbia River includes cleaning with an air burst every 4 hours from May through October. This results in significant turbulence near the screen area, which may injure migrating juveniles that are directly impacted by the burst. Injured or disoriented juveniles would be more vulnerable to predators in the immediate area. However, the airbursts remove any debris that has collected on the screens, allowing them to perform as designed, which in turn prevents injury and mortality to juvenile salmonids. The probability of juvenile migrants being injured or killed by clogged screens is much greater than that of an airburst once every 4 hours. Furthermore, due to the bursts occurring in a relatively small area of a large river, it is likely that few, if any, individual juveniles or adults would be present during any airburst event and the probability that injury or mortality would occur due to an airburst is very low. NMFS does not anticipate any injury to adult salmon and steelhead that encounter the pumping plant during their upstream migration. The airburst events may result in harassment and temporarily alter normal migration behavior but these events would be very brief and adults would return to normal behavior.

The exchange of Columbia River water for Umatilla River water is designed to be a bucket-for-bucket exchange. In other words, the volume of water removed from the Columbia River is equal to the volume left in the Umatilla River or provided to the Umatilla River from storage. In practice, this is not always a real-time bucket-for-bucket exchange but does closely match each year. This results in a roughly 8.5-mile reach of the Columbia River where up to roughly 0.2 percent of the Columbia River flow is removed during the summer months when pumps are operating at maximum volume. This results in a minor change to juvenile migratory and rearing habitat and adult migration habitat in the Columbia River.

Anticipated cumulative effects from human population growth, development and continued agricultural practices over time in the action area are likely to continue to impair water quantity and quality, restrict floodplain connectivity, and reduce reestablishment of well-functioning riparian habitat or side channels.

2.8 Conclusion

After reviewing the current status of the listed species and its critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' opinion that the proposed action is not likely to jeopardize the continued existence of, nor destroy or adversely modify CH designated for, MCR steelhead, SR steelhead, SR fall-run Chinook salmon, SR spring/summer-run Chinook salmon, SR sockeye, UCR steelhead and UCR spring-run Chinook salmon.

2.9 Incidental Take Statement

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1 Amount or Extent of Take

In the opinion, NMFS determined that incidental take of MCR steelhead is reasonably certain to occur as follows:

39. Entrainment of both adult and juvenile MCR steelhead between canal headgates and fish screens.
40. Potential injury of juvenile MCR steelhead at the fish screens in the Project canals and the Columbia River pump station.
41. Possible stranding of juvenile and adult MCR steelhead in Project canals between headgates and fish screens after water deliveries cease.
42. Possible stranding of juvenile MCR steelhead in McKay Creek when releases for irrigation from McKay Reservoir are ended.

Entrainment of outmigrating juvenile steelhead at the Project headgates is unavoidable. It is estimated that roughly 25 percent of outmigrating steelhead smolts may be entrained in any one year (Reclamation 2016). The estimated average of naturally-produced steelhead smolts emigrating from the Umatilla Basin from 1999 through 2013 was 44,367 fish (range 24,601 to 82,005). The annual hatchery release goal is 150,000 fish (may be more or less depending on

brood year and other factors) (ODFW 2017). The estimated average number of smolts emigrating from the Umatilla Basin each year is 194,367 (hatchery and wild combined). NMFS estimates that the total number of MCR juvenile steelhead entrained shall not exceed 48,591 (194,367 x 0.25) fish each year. Up to 3 percent of all entrained fish may be lost to residualism, predation, or other forms of mortality. Since only a few fish are recovered in salvage operations each year, NMFS expects that most of the entrained steelhead return to the Umatilla River and continue their migration.

Returns of MCR steelhead adults to the Umatilla Basin from brood years 1990–1991 through 2015–2016 have averaged 3,151 fish (hatchery and wild combined). It is estimated that up to 2.8 percent of adult steelhead may be entrained annually. NMFS estimates that the total number of adult MCR steelhead entrained shall not exceed 88 (3,151 x 0.028) fish each year.

2.9.2 Effect of Take

In the opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

1. Avoid or minimize incidental take from dewatering McKay Creek from November through April by maintaining a minimum flow in McKay Creek.
2. Maintain gages and monitor water delivery at federal diversions.
3. Continue coordination with ODFW and CTUIR for the storage and release of water from McKay Reservoir for fish migration.
4. Maintain all PIT tag arrays and develop a comprehensive monitoring report every 5 years to ensure compliance with the measures and to report levels of incidental take.
5. Avoid or minimize incidental take from juvenile fish passage at Reclamation diversion structures by maintaining fish passage facilities in proper working order.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and Reclamation must comply with them in order to implement the RPMs (50 CFR 402.14). Reclamation has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

To be exempt from the prohibitions of section 9 of the ESA, Reclamation must fully comply with the following terms and conditions that implement the RPMs described above. Partial compliance with these terms and conditions may invalidate this take exemption.

1. To implement RPM No. 1 (McKay Creek minimum flows), Reclamation shall:
    a. Release a minimum of 10 cfs continuously from McKay Reservoir from November 1st through April 30th in order to maintain flows in McKay Creek enough to provide minimal habitat levels and prevent stranding of juvenile MCR steelhead.

2. To implement RPM No. 2 (water delivery), Reclamation shall:
    a. Maintain gages at federal diversions to track the delivery of specific quantities of Project water to ensure that take associated with the delivery of water in excess of contracted amounts is minimized.

3. To implement RPM No. 3 (coordination), Reclamation shall:
    a. Coordinate with ODFW and CTUIR on the storage and release of water from McKay Reservoir for the benefit of fish migration in the Umatilla River.

4. To implement RPM No. 3 (monitoring), Reclamation shall:
    a. Every 5 years produce a report on adult and juvenile passage performance at all Project fish passage facilities. The first 5-year reporting period shall start on January 1, 2020, and end on December 31, 2024. Each 5-year report shall be submitted to NMFS by March 1 of the following year (first 5-year report submitted by March 1, 2025). At a minimum, the report shall include:
        i. estimated number of adult and juvenile steelhead entrained;
        ii. estimated number of adult and juvenile steelhead that returned to the Umatilla River;
        iii. number of steelhead recovered by salvage operations;
        iv. problems encountered with passage facilities and PIT tag arrays or other monitoring equipment, and the necessary repairs needed to restore normal function; and
        v. any unusual flow events that impact fish passage (e.g., large floods or significant low flows and low storage due to drought).
    b. Conduct annual salvage operations in Project canals at the end of the irrigation season.

5. To implement RPM No. 4 (passage at diversions), Reclamation shall:
    a. Keep all fish screens, adult fishways, and PIT tag arrays in proper working order always during the fish passage season.
    b. Report any problems that hinder passage or result in injury or mortality within 5 business days of discovery to:

        National Marine Fisheries Service
        304 South Water, Ste. 201
        Ellensburg, Washington 98926

2.10 Conservation Recommendations

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding

discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

1. The NMFS recommends that during shutdown of water delivery from McKay Reservoir, Reclamation ramp flow down as slowly as practicable to prevent stranding of any steelhead present in McKay Creek downstream of the reservoir. We recommend that Reclamation consult with ODFW and CTUIR to determine the most reasonable ramping rate.

2.11 Reinitiation of Consultation

This concludes formal consultation for the operation and maintenance of the Umatilla Project and Umatilla Basin Project.

As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the Reclamation and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

The proposed action and action area are described in sections 1.3 and 2.3, respectively, to this document. The action area includes EFH for juvenile rearing and migration and adult migration of Chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon (*O. kisutch*).

3.2 Adverse Effects on Essential Fish Habitat

Based on information provided by Reclamation and the analysis of effects presented in section 2 of this document, NMFS concludes that the proposed action will have adverse effects on EFH for Chinook and coho salmon. These effects include a reduction in water quality and quantity due to irrigation water withdrawals.

3.3 Essential Fish Habitat Conservation Recommendations

We provide the following conservation recommendation:

> Application of term and conditions 1.a. through 3.a (section 2.9.4) will curtail effects on migration and rearing EFH for Chinook and coho salmon.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, Reclamation must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and Reclamation have agreed to use alternative time frames for the response. The response must include a description of measures proposed by Reclamation for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, Reclamation must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects [50 CFR 600.920(k)(1)].

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

Reclamation must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The DQA specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended user of this opinion is Reclamation. Other users of this information could include ODFW, CTUIR and Project irrigation districts and its patrons.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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