UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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Refer to NMFS No.: WCRO-2018-01265

May 27, 2020

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 on the Stanfield Irrigation District Conjunctive Use Project, Columbia River, Umatilla, Oregon

Dear Ms. Wiedmeier:

Thank you for your letter of December 11, 2018, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et. seq.) for the Stanfield Irrigation District conjunctive use project in the Columbia River. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA 950 CFR 402, 84 FR 45016).

Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson–Stevens Fishery Conservation and Management Act (16 U.S.C 1855(b)) for this consultation. However, after reviewing the proposed action, we concluded that there are no adverse effects on EFH. Therefore, we are hereby closing the EFH consultation.

In this biological opinion (opinion), NMFS concludes that the proposed action is not likely to jeopardize the continued existence of the Columbia River chum salmon or result in the destruction or adverse modification of their critical habitat. In addition, NMFS concurs that the subject action is not likely to adversely affect following ESA-listed species:

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

Snake River Basin steelhead
Snake River sockeye salmon
Middle Columbia River steelhead
Lower Columbia River Chinook salmon
Lower Columbia River coho salmon
Lower Columbia River steelhead
Upper Willamette River Chinook salmon
Upper Willamette River steelhead
Pacific eulachon
Southern green sturgeon
Southern Resident killer whale

As required by section 7 of the ESA, NMFS is providing an incidental take statement (ITS) with the opinion. The ITS describes reasonable and prudent measures (RPMs) NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this program. The ITS also sets forth nondiscretionary terms and conditions, including reporting requirements, that the Bureau of Reclamation must comply with to carry out the RPMs. Incidental take from actions that meet these terms and conditions will be exempt from the ESA's prohibition against the take of the listed species considered in this opinion.

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

cc: Carolyn Chad, Deputy Area Manager (Bureau of Reclamation)

Endangered Species Act Section 7(a)(2) Biological Opinion

Stanfield Irrigation District, Conjunctive Use Project
Columbia River

NMFS Consultation No.: WCRO-2018-01265

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 Adversely Affect Critical Habitat	Is Action Likely to Destroy or Adversely Modify Critical Habitat
Upper Columbia River spring Chinook salmon (*Oncorhynchus tshawytscha*)	Endangered	No	N/A	No	N/A
Upper Columbia River steelhead (*O. mykiss*)	Threatened	No	N/A	No	N/A
Snake River spring/summer Chinook salmon (*O. tshawytscha*)	Threatened	No	N/A	No	N/A
Snake River fall Chinook salmon (*O. tshawytscha*)	Threatened	No	N/A	No	N/A
Snake River sockeye salmon (*O. nerka*)	Endangered	No	N/A	No	N/A
Snake River steelhead (*O. mykiss*)	Threatened	No	N/A	No	N/A
Middle Columbia River steelhead (*O. mykiss*)	Threatened	No	N/A	No	N/A
Columbia River chum salmon (*O. keta*)	Threatened	Yes	No	Yes	No
Lower Columbia River steelhead (*O. mykiss*)	Threatened	No	N/A	No	N/A
Lower Columbia River Chinook salmon (*O. tshawytscha*)	Threatened	No	N/A	No	N/A
Lower Columbia River coho salmon (*O. kisutch*)	Threatened	No	N/A	No	N/A

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 Adversely Affect Critical Habitat	Is Action Likely to Destroy or Adversely Modify Critical Habitat
Upper Willamette River steelhead (*O. mykiss*)	Threatened	No	N/A	No	N/A
Upper Willamette River Chinook salmon (*O. tshawytscha*)	Threatened	No	N/A	No	N/A
Pacific eulachon (*Thaleichthys pacificus*)	Threatened	No	N/A	No	N/A
Green sturgeon (*Acipenser medirostris*)	Threatened	No	N/A	No	N/A
Southern resident killer whale (*Orcinus orca*)	Endangered	No	N/A	No	N/A

Consultation Conducted By: National Marine Fisheries Service
West Coast Region

Issued By:

Michael Tehan
Assistant Regional Administrator

Date: May 27, 2020

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GLOSSARY OF ACRONYMS

BPA	Bonneville Power Administration
cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers
CR	Columbia River
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
DPS	distinct population segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	evolutionarily significant unit
HID	Hermiston Irrigation District
HUC5	hydrologic unit code (fifth field)
ITS	Incidental Take Statement
kcfs	Kilo cubic feet per second
LCR	Lower Columbia River
MCR	Middle Columbia River
MPG	Major Population Group
MSA	Magnuson–Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
ODFW	Oregon Department of Fish and Wildlife
PBF	physical or biological feature
PCE	primary constituent element
Reclamation	U.S. Bureau of Reclamation
RM	river mile
RPM	reasonable and prudent measure
SID	Stanfield Irrigation District
SR	Snake River
TMT	Technical Management Team
UCR	Upper Columbia River
UWR	Upper Willamette River
VSP	Viable Salmonid Population

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 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). The document will be available within 2 weeks at the National Oceanic and Atmospheric Association's Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at the NMFS Columbia Basin Branch Office, Ellensburg, Washington.

1.2 Consultation History

On December 14, 2018, NMFS received a letter dated December 11, 2018, from the U.S. Bureau of Reclamation (Reclamation) requesting ESA consultation on the effects of the Stanfield conjunctive use project near Umatilla, Oregon. NMFS initiated consultation on December 14, 2018, but consultation was held in abeyance for 38 days due to a lapse in appropriations and resulting partial government shutdown. Consultation resumed on January 28, 2019. The consultation deadline was extended to September 13, 2019.

1.3 Proposed Federal Action

The Stanfield Irrigation District (SID) has applied for a new Oregon State water right to take up to 3,000 acre-feet using Reclamation's pumping plant located on the Columbia River at about river mile (RM) 300 near the City of Umatilla, Umatilla County, Oregon. The new right would be added to SID's existing water right of 34,700 acre-feet. Additionally, Reclamation proposes to authorize access to exchange water by SID during the non-exchange season (March through June) should one of SID's canals or siphons fail during the irrigation season (Reclamation 2018).

Conjunctive Use

The purpose of the new water right is to saturate irrigated lands both before and after the irrigation season when precipitation and soil moisture content are exceptionally low or certain triggers are met. For the pre-irrigation season, the trigger is defined as a precipitation amount of 1.18 inches or less per month from November through January. SID would pump up to 60 cubic feet per second (cfs) from the Columbia River between February 15 and February 28, or about 1,550 acre-feet. Reclamation estimates that this would occur roughly once every 5 years.

For the post-irrigation season or after September 30, SID would pump up to 60 cfs for 12 days for a volume of about 1,400 acre-feet. This would occur after SID has exhausted its water right of 34,700 acre-feet following a dry winter/spring season combined with a hot and dry summer. This is further defined where the sum of precipitation for November through April is less than 4 inches (Reclamation 2018).

1.3.2 Emergency Use

Reclamation (2018) also proposes to allow SID to meet irrigation demand by pumping from the Columbia River at a time when they would normally draw from the Umatilla River. This would only occur if one of SID's conduit systems fail, thus preventing diversion from the Umatilla River. SID has not experienced an emergency of this nature, so its frequency is unknown and is expected to be rare. Reclamation estimates that repairs could take up to 8 weeks, depending on the size and location of the failure.

We considered whether the proposed action would cause any other activities and determined that it would not.

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.

Reclamation determined the proposed action is not likely to adversely affect twelve salmon and steelhead species, southern distinct population segment (DPS) of eulachon, southern DPS of green sturgeon and Southern Resident killer whales or their critical habitat. Our concurrence is documented in the "Not Likely to Adversely Affect" Determinations section (Section 2.11).

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 as a whole for the conservation of a listed species" (50 CFR 402.02).

The designations of critical habitat use the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (50 CFR 402.02) replace this term with physical or biological features (PBFs). 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.

The 2019 regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the regulations (84 FR 44977), that definition does not change the scope of our analysis and in this opinion, we use the terms "effects" and "consequences" interchangeably.

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. Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
2. Evaluate the environmental baseline of the species and critical habitat.
3. Evaluate the effects of the proposed action on both species and their habitat using an exposure-response approach.
4. Evaluate cumulative effects.
5. In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species; or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
6. 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 snowpack, increases winter flows, and advances the timing of spring melt (Mote et al. 2014, 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. 2009). 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 $3.7^{\circ}C$ 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, Chinook salmon, and eulachon 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, steelhead and eulachon 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), including green sturgeon and Southern Resident killer whale (Glick 2007). Although no formal predictions of impacts on the southern residents have yet been made, it seems likely that any changes in weather and oceanographic conditions resulting in effects on salmon populations will have consequences for the whales.

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 evolutionarily significant units (ESU) and distinct population segments (DPS) (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 summary that follows describes the status of Columbia River (CR) chum salmon, and its designated critical habitat. Columbia River chum salmon is the one ESA-listed species that occurs within the geographic area of this proposed action, is likely to be adversely affected by the proposed action, and thus is considered in this opinion. More detailed information on the status and trends of this listed resource, and its biology and ecology, are in the listing regulations and critical habitat designations published in the Federal Register (Table 1). These documents are available on the NMFS West Coast Region website (http://www.westcoast.fisheries.noaa.gov/).

Table 1. Listing status, status of critical habitat designation and protective regulations, and relevant Federal Register (FR) decision notices for ESA-listed Columbia River chum salmon considered in this opinion.

Species	Listing Status	Critical Habitat	Protective Regulations
Columbia River chum salmon	Threatened 6/28/2005; 70 FR 37160 Updated 4/14/2014; 71 FR 20802	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

Status of CR Chum Salmon

The CR chum salmon ESU includes all naturally spawned populations in the Columbia River and its tributaries in Oregon and Washington (Figure 1). This ESU also includes two artificial propagation programs: the Grays River Program and the Washougal River Hatchery/Duncan Creek Program. The ESU spans three distinct ecological regions (Coast, Cascade, and Gorge); each of these three ecological regions is considered a major population group (MPG). On March 25, 1999, NMFS listed the CR chum salmon ESU as a threatened species (64 FR 14508). The threatened status was reaffirmed on April 14, 2014. Critical habitat was designated on September 2, 2005 (70 FR 52746).

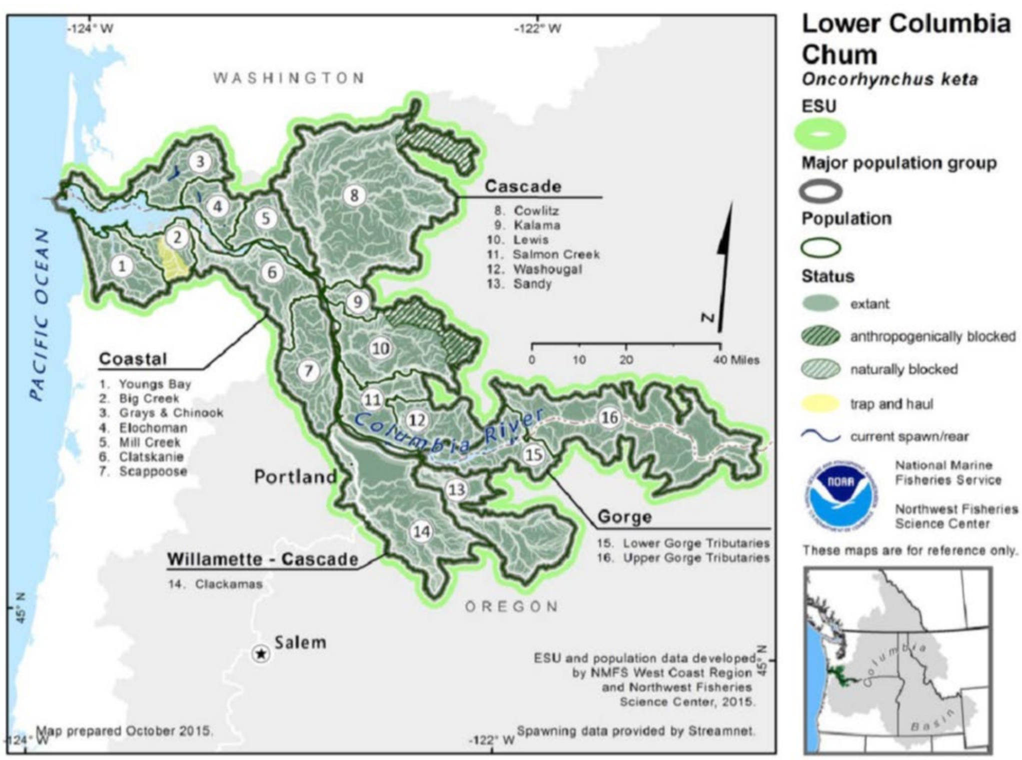

Figure 1. Map of the Columbia River chum salmon ESU's spawning and rearing areas, illustrating populations and major population groups.

Columbia River chum salmon numbers began to decline by the early 1950s (Johnson et al. 2012) due to habitat degradation and harvest rates. Historically, this ESU consisted of 17 independent populations (Table 2); 16 were fall-run and one was summer-run which returned to the Cowlitz River. Fifteen (six in Oregon and nine in Washington) of the 17 populations that historically made up this ESU are so depleted that either their baseline probability of persistence is very low, or it is nearly extirpated.

Table 2. Historical Columbia River chum salmon populations.

MPG	Historical Populations	Core or Genetic Legacy Populations
Coast	Youngs Bay (OR)	Core
	Grays/Chinook (WA)	Core, genetic legacy
	Big Creek (OR)	Core
	Elochoman/Skamakowa (WA)	Core
	Clatskanie (OR)	
	Mill/Abernathy/Germany (WA)	
	Scappoose (OR)	
Cascade	Cowlitz–fall (WA)	Core
	Cowlitz–summer (WA)	Core
	Kalama (WA)	
	Lewis (WA)	Core
	Salmon Creek (WA)	
	Clackamas (OR)	Core
	Sandy (OR)	
	Washougal	
Gorge	Lower Gorge (WA & OR)	Core, genetic legacy
	Upper Gorge (WA & OR)	

Source: NMFS 2013a.

All populations are affected by habitat loss and degradation of spawning and rearing habitat, hydropower impacts on upstream migration and downstream habitats, and the legacy effects of historical harvest. Land development, especially in the low gradient reaches that chum salmon prefer, will continue to be a threat to most chum salmon populations due to projected increases in the population of the greater Vancouver/Portland area and the lower Columbia River overall. The pervasive loss of critical spawning, incubation, and rearing habitat is a primary limiting factor for chum salmon throughout the lower Columbia. Chum salmon typically spawn in upwelling areas of clean gravel beds in mainstem and side channel portions of low-gradient reaches above tidewater (NMFS 2013a).

For CR chum salmon, recovery requires improving all three MPGs to a high probability of persistence or to a probability of persistence consistent with their historical condition. Most populations in this ESU remain at high to very high risk with low abundances; some are extirpated or nearly so. Most will require very large improvements to reach their recovery goals (NWFSC 2015).

The most recent status review concluded that only three of 17 populations are at or near their recovery viability goals. One population, Grays River, is at low risk, with spawner abundances in the thousands and demonstrating a recent positive trend. The Washougal River and Lower Gorge populations maintain moderate numbers of spawners and appear to be relatively stable. The life history of chum salmon is such that ocean conditions have a strong influence on the survival of emigrating juveniles. The potential prospect of poor ocean conditions for the near future may put further pressure on these chum salmon populations. Even with the improvements observed during the last 5 years, the majority of natural populations in this ESU remain at a high or very high risk category, and considerable progress remains to be made to achieve the recovery goals (NMFS 2013a).

For CR chum salmon, the pervasive loss of spawning, incubation and rearing habitat is a primary limiting factor. Chum spawning habitats (upwelling areas of clean gravel beds in mainstem and side-channel portions of low-gradient reach above tidewater) have been practically eliminated in most systems as a result of past and current land uses. Similarly, access to the estuary habitats in which juvenile chum salmon spend considerable time rearing has been impaired by agricultural and residential land use, particularly modification via dikes, levees, bank stabilization, and tide gates but also by flow alterations caused by mainstem dams. These alterations impair sediment routing, influence habitat-forming processes, reduce access to peripheral habitats, and change the dynamics of the Columbia River estuarine food web.

NMFS will evaluate the implications for extinction risk of more recent returns in the upcoming 5-year status review, expected in 2021. The status review will consider new information on population abundance, productivity, diversity, and spatial structure.

2.2.2 Status of the CR Chum Salmon Critical Habitat

NMFS designated critical habitat for CR chum salmon to include all estuarine areas and river reaches from the mouth of the Columbia River upstream to the confluence with the White Salmon River.

Critical habitat encompasses six subbasins in Oregon and Washington containing 19 occupied watersheds, as well as the lower Columbia River rearing and migration corridor. Most fifth-field hydrologic unit code (HUC5) watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). Most of these watersheds have some or a high potential for improvement.

The pervasive loss of critical spawning, incubation, and rearing habitat is a primary limiting factor for chum salmon throughout the ESU. Chum salmon typically spawn in upwelling areas of clean gravel beds in mainstem and side-channel portions of low-gradient reaches above tidewater. These habitats have been practically eliminated in many systems through a combination of channel alteration and sedimentation that is attributable largely to past and current land uses; these include historical and current forest management, agriculture, rural residential uses, urban development, and gravel extraction. Low-elevation stream reaches have been directly affected by extensive channelization, diking, wetland conversion, stream clearing, and gravel extraction. Impaired watershed processes continue to limit chum salmon habitat through effects on floodplain and wetland habitat conditions and connectivity, riparian conditions and function, and channel structure (NMFS 2013a).

In the Coast and Cascade MPG, habitats are largely limited by road networks that contribute excess sediment and crossings that impede passage. Lower reaches are mostly in agricultural and rural residential use and have been extensively modified by bank stabilization, levees, and tide gates. Land uses that have limited the productivity of tributary habitat include forest management and timber harvest, agriculture, rural residential and urban development, and gravel extraction (NMFS 2013a).

In the Gorge MPG, habitat-related limiting factors result from past and current land uses; these include a mix of private, state, and federal forest land in the upper mainstem and headwater reaches of the Gorge subbasins, plus transportation and rural residential land uses, with some urban development, in lower mainstem and tributary reaches. Highway and transportation corridors run parallel to the Columbia River shoreline, traversing all creek drainages in ways that restrict access and disconnect upland and lowland habitat processes. The associated habitat degradation is considered a primary limiting factor for the Upper and Lower Gorge chum salmon populations. The Upper Gorge population also is significantly affected by habitat loss caused by inundation from Bonneville Reservoir; it is likely that significant amounts of historical spawning and rearing habitat for this population have been inundated (NMFS 2013a).

The PBFs essential for conservation of CR chum salmon include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, estuarine areas, and nearshore marine areas. The combined effect of past and present practices in watersheds with critical habitat is that critical habitat is not able to fully serve its conservation role in many of the designated watersheds. Factors limiting the function of the PBFs are discussed in more detail in the Environmental Baseline section below.

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 Columbia River from Reclamation's pumping plant at about RM 300 to the mouth at the Pacific Ocean.

2.4 Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. 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. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

2.4.1 Exchange Operations

The historical operations of SID and other irrigation districts in the Umatilla Basin have been altered to help meet Umatilla River instream flow targets identified in Reclamation's (1988) Project Environmental Impact Statement. This is largely accomplished through the Phase I and II water exchange arrangements that allows live flow and stored water released from McKay

Reservoir to remain instream in the Umatilla River for fish while water pumped from the Columbia River is used for irrigation. 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 and the Umatilla Basin irrigation districts.

The exchanges are triggered when Umatilla River flow drops to the target flows identified in Table 3. When an exchange is in place, some federal irrigation diversions from the Umatilla River are reduced or eliminated (Reclamation 2016) such that Umatilla River flows do not drop below the targets.

Table 3. 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 II water exchange facilities were constructed to serve SID and the Hermiston Irrigation District (HID). 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 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).

2.4.2 SID Operations

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 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.

2.4.3. Columbia River

The environmental baseline in the action area for this opinion has been well described and fully analyzed in previous ESA consultations (NMFS 2010, 2014 and 2019) and is not repeated here. However, it is important to recognize that for the last 20 years, a considerable volume of coordination has occurred to protect CR chum salmon spawning and incubation at the Ives Island complex roughly 2 miles downstream of Bonneville Dam. The BPA, U.S. Army Corps of Engineers (Corps) and Reclamation coordinate through the inter-agency Technical Management Team (TMT) to provide a tailwater elevation at Bonneville Dam each year that supports chum spawning in November and December; and in December set a flow level to protect incubation through fry emergence which is normally completed by early April. The TMT works to achieve a balance between providing adequate flow protection for chum salmon and refill at storage projects with spring flows that benefit multiple ESUs and DPS' that have priority over maintaining water elevations for chum salmon (BPA 2018 and NMFS 2019).

To examine the upstream extent of CR chum salmon exposure to the effects of the proposed action, we reviewed analyzed CR chum salmon passage data from 2013 to 2018 at Bonneville Dam and The Dalles Dam. An average of 119 adults were observed at Bonneville Dam each year during this period, ranging from 21 fish in 2017 to 180 fish in 2018. During the 6 years where data were available, either zero or four fish overshot The Dalles Dam. Therefore, the area where CR chum salmon experience the effects of the proposed action is the Columbia River from the tailrace of John Day Dam to the Columbia River plume.

On the mainstem Columbia River, hydropower projects, water storage projects and the withdrawal of water for irrigation and urban uses have significantly degraded salmon and steelhead habitats (NMFS 2013a). The volume of water discharged by the Columbia River varies seasonally according to runoff, snowmelt, and hydrosystem demands. Mean annual discharge is estimated to be 265 kilo cubic feet per second (kcfs), but may range from lows of 71 to 106 kcfs to highs of 539 kcfs. Naturally occurring maximum flows on the Columbia River occur in May, June, and July as a result of snowmelt in headwater regions. Minimum flows occur from September to March, with periodic peaks due to winter rains. Interannual variability in stream flow is strongly correlated with two recurrent climate phenomena, the El Nino/Southern Oscillation and the Pacific Decadal Oscillation.

Columbia River chum salmon spawn in the mainstem at the Ives/Pierce Island complex in the Bonneville tailrace. For this large spawning aggregation, with is part of the Lower Gorge MPG, access to spawning and incubation habitat at high elevations around the islands and the Washington shoreline can be limited by hydrosystem operations. These operations include flow management at upper basin reservoirs and load following for electricity production at Bonneville Dam. The Columbia River System Action Agencies provide a tailwater elevation at Bonneville Dam each year that supports chum spawning during late fall and winter, and then supports incubation and emergence in the Ives Island complex into spring. In almost all years since chum flows have been implemented, the Action Agencies have been able to fully support chum spawning, incubation and migration below Bonneville Dam; in 2 years out of 21 years, however, other objectives have impaired the ability to fully support chum spawning, incubation and migration.

2.5 Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17 (a) and (b).

While the CR chum salmon ESU includes three MPGs (Coast, Cascade and Gorge), we focus our analysis on the Lower Gorge population within the Gorge MPG. This is because this population contains individuals that spawn, incubate, and migrate only in the mainstem Columbia River around the Ives Island complex (roughly RM 144) below Bonneville Dam. Also, some individuals from this population spawn in Hardy and Hamilton Creeks on the Washington side and in some years require adequate flow below Bonneville Dam to access these creeks. Some adult fish from the Washougal population may also spawn in the mainstem Columbia River below Bonneville Dam, and, therefore, our analysis relates to this group as well. We do not include the Upper Gorge population in this analysis because they likely spawn in tributaries to the Bonneville pool and therefore not affected by very minor changes in Columbia River flow.

Adult CR chum salmon enter the Columbia River from mid-October through November and spawning occurs from early November through December (NMFS 2013a). Adults from the Lower Gorge population make their redds around the Ives Island complex in the mainstem Columbia River and in Hamilton and Hardy Creeks, tributaries on the Washington side near Ives Island. Fry emerge from March through May and promptly migrate downstream to the Columbia River estuary.

Columbia River Chum Salmon Migration and Spawning

The proposed pumping of up to 60 cfs from the Columbia River during the post-irrigation season would take place for approximately 12 days in early to mid-October and is expected to occur on average about once every 5 years. The total volume of water, if fully used, would be approximately 1,428 acre-feet. We evaluated daily average discharge at Bonneville Dam (about 2 miles upstream from Ives Island) from 2001 through 2019, for the period October 1–15 when conjunctive use for the post irrigation season is proposed to occur. The lowest daily average during this period occurred in 2002 on October 12 and was 70,900 cfs. A withdrawal of 60 cfs would have reduced flow at the Ives Island complex by about 0.085 percent. Additionally, the 10-year (2010–2019) average discharge from Bonneville Dam for the first 15 days in October is about 98,388 cfs[1] and the conjunctive use withdrawal would reduce this average by roughly 0.061 percent.

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[1] Columbia Basin data access in real time (DART), Columbia Basin Research: http://www.cbr.washington.edu/dart/query/river_graph_text

Water depth and velocity in the Ives Island complex are influenced by changes in tide which can vary more than a foot[2] at this location. NMFS completed consultation with Reclamation on a similar action that involved a water withdraw of up to 2,700 cfs from the Columbia River upstream of the action area (NMFS 2013b). It was estimated that the change in stage near Portland, Oregon, would be roughly 0.25 inches. NMFS (2013b) did not estimate how the change in stage near Portland translated to a change in stage in the Ives Island spawning area. We assume that the change in depth around the shallower spawning areas of the Ives Island complex from the 2013 action is slightly more than 0.25 inches. The volume of water being withdrawn in the proposed action is 2.2 percent of that analyzed in the 2013 action. This roughly amounts to a 0.005-inch change in stage near Portland, Oregon, and is likely undetectable in the Ives Island area. The change in tide around the Ives Island complex has significantly more influence on water elevation in this area than the small decrease in stage that would occur in early to mid-October from conjunctive use 156 miles upstream. However, there is a small chance that in some rare years with a combination of extended low flow and tides, the proposed action could exclude higher elevation spawning areas located in the Ives Island complex below Bonneville Dam.

Adult chum salmon enter the Columbia River concurrent with post-irrigation conjunctive use. However, given the small volume of water removed from the Columbia River we do not anticipate any change in migration behavior. The tidal changes alone would overwhelm any effect from the proposed action. Furthermore, we expect little to no effect on the flow levels set by the TMT to protect spawning habitat below Bonneville Dam. Some adults in some years may initiate spawning in late October but most spawning does not occur until November, well after the post-irrigation conjunctive use has ceased. Effects on adult migration and spawning would be negligible in the years that conjunctive use occurs.

Columbia River Chum Salmon Incubation

Reclamation also proposes to permit SID to water lands in the pre-irrigation season, which again would occur about one in every 5 years on average and is proposed to occur during the last 2 weeks of February. Columbia River chum salmon eggs would be incubating in the gravel at that time.

We again analyzed daily average flows from 2001–2019 in the Columbia River below Bonneville Dam for the pre-irrigation conjunctive use period of February 15–28. The lowest daily average for this period occurred on February 28, 2010 and was 110,167 cfs. A 60 cfs withdrawal on that day would have reduced flow by about 0.05 percent. The most recent 10-year (2010–2019) average for this period was 193,097 cfs, and a 60 cfs withdrawal would have resulted in a 0.03 percent reduction in flow volume. Also, the 10-year lowest daily average occurs on February 28 and was 182,710 with the 60 cfs withdrawal, resulting in a 0.033 percent loss of flow volume around the Ives Island complex for that day.

The TMT normally sets an incubation flow level in December, and the Corps holds this level until early April when most, if not all, CR chum have emerged from the gravel and started their seaward migration (NMFS 2019). Based on the most recent 10-year average, flow volumes

[2] 2019 NOAA tide tables, Beacon Rock State Park.

below Bonneville Dam during pre-irrigation conjunctive use (February 15–28) are 96 percent higher than flows during the post-irrigation conjunctive use period. When conjunctive use occurs, the change in stage below Bonneville Dam in the last 2 weeks of February is likely insignificant and probably cannot be measured; even when the Corps cannot maintain flow elevations set by the TMT. Therefore, we expect that conjunctive use, when it occurs, will have negligible, if any, effects (e.g., dewatering) on chum salmon egg incubation. However, conjunctive use in late February, combined with low winter flows, may serve to dewater some redds and suffocate chum fry still in the gravel. We expect this to be a rare event.

Emergency Use

The SID diverts live flow from the Umatilla River until it drops to target flows set by the CTUIR and ODFW. The SID then ceases its Umatilla diversion and begins pumping from the Columbia River in exchange for leaving flow in the Umatilla River (Phase II exchange). This exchange normally occurs in mid to late spring and is part of the baseline condition. Emergency use of Columbia River water would occur when one of SID's water supply conduits from the Umatilla River fails and SID would pump from the Columbia River at a time when it normally diverts from the Umatilla River. The pumping rate would be a maximum of 60 cfs until repairs are completed. SID has not experienced a conduit failure during an irrigation season but estimates that repairs could take up to 8 weeks. The frequency of such an event is expected to be rare. The consequence of this portion of the action is that for a period of up to 8 weeks, in the event of a canal failure, SID would be enabled to access water that would have otherwise stayed in the Umatilla and the Columbia Rivers.

The irrigation season runs from April 1 to October 1, and a conduit failure that would force early pumping from the Columbia River could only occur in the spring before SID stops diverting live flow from the Umatilla River. This would likely happen in April or May. Most CR chum salmon fry have migrated or are migrating to the Columbia River estuary by April, but some fry may still be in the gravel when an emergency occurs. The most recent 10-year (2010–2019) monthly average flow in the tailrace of Bonneville Dam in April is 265,691 cfs. A 60 cfs withdrawal would reduce flow at the Ives Island complex by about 0.02 percent. This reduction in flow during April would not be detectable and would have no adverse effect on the few, if any, chum fry still in the gravel. Adult CR chum salmon are not in the Columbia River during the spring months.

2.5.1 Columbia River Chum Salmon Critical Habitat

This CR chum salmon ESU has about 167 miles of occupied riverine and estuarine designated critical habitat in the action area. The conservation value of the migratory corridor habitat is not likely to be negatively affected because the proposed flow depletions are very small, estimated to be only about 0.061 percent of the average monthly flow at Bonneville Dam in the first 2 weeks of October and about 0.03 percent during the last 2 weeks of February.

The magnitude of any effects from flow alterations on this ESU's PBFs of critical habitat would be negligible. The proposed action's likely effects on chum salmon spawning habitat in October would be extremely small, and short in duration. The proposed action would not have any long-term impact on the spawning habitat, which is usually not available in October. The last week in

October is the very beginning of chum spawning in the mainstem CR and only in infrequent years. The normal spawning operation begins in November.

Thus, NMFS expects little short-term and no long-term effects to migratory and spawning PBFs in the action area.

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 and 402.17(a)). 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 types of human activities that contribute to cumulative effects are expected to have adverse impacts on salmonid populations and their habitat because similar activities have occurred in the recent past and have had adverse effects. These can be considered reasonably certain to occur in the future because they occurred frequently in the recent past, especially if authorizations or permits have not yet expired.

Within the action area, future, non-federal actions are likely to include human population growth, additional water withdrawals, and changing land use practices. In coastal waters within the action area, state, tribal, and local government actions are likely to be in the form of legislation, administrative rules, or policy initiatives, and fishing permits. Private activities are likely to be continuing commercial and sport fisheries and resource extraction, all of which can contaminate local or larger areas of the coastal ocean with hydrocarbon-based materials. Although these factors are ongoing to some extent and likely to continue in the future, past occurrence is not a guarantee of a continuing level of activity. That will depend on whether there are economic, administrative, and legal impediments (or in the case of contaminants, safeguards). Therefore, although NMFS finds it likely that the cumulative effects of these activities will have adverse effects commensurate to those of similar past activities, it is not possible to quantify these effects.

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 diminish the value of designated or proposed critical habitat for the conservation of the species.

2.7.1 Species

NMFS' most recent status review affirmed CR chum salmon as threatened but identified some positive trends in CR chum salmon status (NWFSC 2015). One population, Grays River, is at low risk, with spawner abundances in the thousands and demonstrating a recent positive trend. The Washougal River and Lower Gorge populations maintain moderate numbers of spawners and appear to be relatively stable. However, most populations in this ESU are at high to very high risk, with very low abundances (NWFSC 2015). The life history of chum salmon is such that ocean conditions have a strong influence on the survival of emigrating juveniles. The potential prospect of poor ocean conditions for the near future may put further pressure on these populations (NWFSC 2015).

The proposed pumping of 60 cfs from the Columbia River for conjunctive use would not be an annual event and is estimated to occur about once every 5 years. Conjunctive use in the pre-irrigation and post-irrigation season and potentially during the spring months due to a conduit failure, would result, in all cases, in a decrease in flow volume below Bonneville Dam of just hundredths of a percent. The resultant change in stage around the Ives Island complex is likely undetectable and not measurable given the daily stage change from tides. Furthermore, the post irrigation use in early October would be completed before CR chum begin to spawn, and the pre-season use in the last half of February would occur when average flow below Bonneville Dam is 96 percent higher than during the October use period. Emergency use would occur in the spring months (April through early June) when average flow volume increases below Bonneville Dam by another 37 percent over the February average flows. Redds with fry remaining would have adequate water. An emergency of this nature has yet to happen and is expected to be rare.

Thus, effects to migrating CR chum salmon are expected to be negligible, and while effects to spawning and incubating chum salmon are more likely to occur. Two populations, in the Gorge MPG (Lower Gorge and Upper Gorge[3] populations) and the Washougal population (in the Cascade MPG) are the only populations exposed to the effects of the action during spawning. Exposure would rarely happen, at most, once every 5 years. Effects to the Washougal population are further minimized because only some individuals in the population spawn in the mainstem Columbia River. If exposure occurs for the Gorge populations, very few fish will be exposed and very few eggs or fish will be affected, and we expect this to rarely occur. Thus, we do not expect effects to be measurable for these populations, and thus we expect no change in the VSP parameters for the Gorge MPG and the Cascade MPG.

2.7.2 Critical Habitat

Effects to CR chum critical habitat would be negligible in October and unmeasurable in late February and spring. We expect no change in the conservation value of the spawning and migratory PBFs at the scale of the reach, and thus expect no change in the PBFs' conservation value at the designation scale.

[3] Spawning above Bonneville Dam is thought to be very limited due to the loss of historical spawning areas now under Bonneville Pool; however, for the first time chum fry were observed at the Bonneville Dam monitoring facility in 2010 suggested spawning in the mainstem above Bonneville Dam (NWFSC 2014).

2.8 Conclusion

After reviewing the current status of the CR chum salmon 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 CR chum salmon, nor destroy or adversely modify CH designated for CR chum 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 and Extent of Take

In this opinion, NMFS determined that take of CR chum salmon would be negligible but could occur as follows:

1. Conjunctive use in the first half of October, combined with extended low flows in Columbia River, could exclude higher elevation spawning areas located in the Ives Island complex below Bonneville Dam.
2. Conjunctive use in late February, combined with low winter flows, may serve to dewater some redds and suffocate chum fry still in the gravel.

The removal of 60 cfs from the Columbia River in conjunction with dry fall weather may slightly reduce the margins of higher elevation spawning areas around the Ives Island complex and serve to excluding some spawning sites for early arriving CR chum salmon. Similarly, pre-irrigation conjunctive use in late February could strand fry lingering in the gravel from late season spawners when combined with low winter flows. NMFS expects that the occurrence of reduced spawning habitat and loss of individual chum fry from conjunctive use would rarely occur.

The extent of take shall be limited to no more than five redd strandings, as established by any survey, each year conjunctive use is initiated.

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 reducing spawning habitat below Bonneville Dam.
2. Avoid or minimize incidental take from stranding chum fry below Bonneville Dam.
3. Avoid or minimize incidental take by limiting conjunctive use frequency.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and Reclamation must comply with them 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, Reclamation shall:
    a. Not permit conjunctive use after October 16.
    b. Notify NMFS' Ellensburg, Washington office if conjunctive use is proposed to occur after October 16.
    c. Conjunctive use after October 16 shall be approved by NMFS.
2. To implement RPM No. 2, Reclamation shall:
    a. Not permit conjunctive use before February 15, unless approved by NMFS.
    b. Notify NMFS' Ellensburg, Washington office if conjunctive use is proposed to occur before February 15.
3. To implement RPM No. 3, Reclamation shall:
    a. Limit frequency of pre-irrigation use to no more than twice in any 5-year period beginning in 2021.
    b. Limit frequency of post-irrigation use to no more than twice in any 5-year period beginning in 2020.
    c. Proposals to exceed the frequency limit shall be approved by NMFS.

2.10 Reinitiation of Consultation

This concludes formal consultation for the Stanfield conjunctive use 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, (4) a new species is listed or critical habitat designated that may be affected by the action, or (5) emergency pumping from the Columbia River due to infrastructure failure happens a second time.

2.11 Not Likely to Adversely Affect Determinations

NMFS received Reclamation's request for written concurrence that the Stanfield Irrigation District Conjunctive Use Project is not likely to adversely affect 12 salmon and steelhead species, southern DPS of Pacific eulachon, southern DPS of North American green sturgeon and Southern Resident killer whale, and their designated critical habitat. NMFS prepared this response to Reclamation's request pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR 402, and agency guidance for the preparation of letters of concurrence.

2.11.1 Middle and Upper Columbia River and Snake River Salmon and Steelhead

The ESUs and DPS' from the Upper Columbia River (UCR), Snake River (SR), and Middle Columbia River (MCR) use the Columbia River in the action area as migratory habitat. Spawning occurs in Columbia River tributaries for these species thus spawning and incubation is not exposed to the effects of the action.

We analyzed long term passage records from McNary Dam to determine presence/absence in the Columbia River at the upstream portion of the action area (Table 4). The table depicts when adults from the UCR, SR, and MCR DPS' are migrating upstream through the action area.

Table 4. Timing and proportion of adult salmon and steelhead passage at McNary Dam.

SPECIES	YEARS AVG	ADULT PASSAGE DATES					
		FIRST	5%	50%	90%	95%	LAST
Upper Columbia River Chinook	2002–2019	4/16	4/30	5/19	6/25	7/08	8/17
Snake River spring/summer Chinook	2002–2019	4/12	5/05	6/08	7/10	7/18	9/23
Snake River fall Chinook	2002–2019	6/11	8/28	9/17	10/03	10/08	11/15
Upper Columbia River steelhead	2002–2019	4/04	7/07	8/21	9/19	9/28	11/10
Snake River steelhead	2002–2019	1/19	6/02	9/16	10/15	10/25	12/23
Middle Columbia River steelhead	2002–2019	2/22	6/10	9/17	10/28	11/07	12/09
Snake River sockeye	2003–2019	6/25	6/28	7/05	7/10	7/13	7/24

Source: Columbia Basin Research, Columbia River Data Access in Real Time, http://www.cbr.washington.edu/dart.

Pre-Irrigation Use (February 15–28)

Pre-irrigation conjunctive use would occur when a few individuals of SR and MCR adult steelhead pass McNary Dam. The 10-year average (2010–2019) flow for this period is 163,685 cfs with a 10-year average daily minimum of 151,935 cfs. Conjunctive use, when it occurs, would reduce flow by 0.04 percent for a small number of individual MCR and SR steelhead but would cease well before the bulk of these runs arrive at the dam (Table 4). Thus, a few adult steelhead from the SR and MCR DPS' will be exposed to the change in flows; however, the change in flow is so small that the migrating adult fish will not respond to it. Therefore, the effects this part of the action on these steelhead DPS' is insignificant.

No adults from the Chinook ESUs, SR sockeye ESU, and UCR steelhead DPS would be exposed to the pre-irrigation conjunctive use depletion of flows in the Columbia River. Therefore, the effects of the pre-irrigation action are discountable.

Post Irrigation Use (October 1–15)

Based on available data, all SR spring/summer Chinook salmon, UCR spring-run Chinook salmon, and SR sockeye salmon will be finished with their upstream migration prior to the onset of post irrigation conjunctive use. Therefore, they will not be exposed to the effect of post irrigation conjunctive use (discountable). The majority of MCR steelhead, UCR steelhead, SR fall Chinook salmon, and SR steelhead will have migrated past the action area before the post irrigation use period. However, some overlap with the tail end of these runs would likely occur; about 5 to 10 percent of these DPS' will still be migrating through the action area during post irrigation use. The 10-year (2010–2019) average daily low flow at McNary Dam during the first half of October is 86,879 cfs and conjunctive use would reduce this by about 0.07 percent. The 10-year average daily flow for this same period would be reduced by 0.063 percent in those years when post irrigation use is applied. Therefore, NMFS does not expect adult migration to be measurably affected by these small and temporary reduction in flow events when they occur (insignificant).

Downstream juvenile migrants from these DPS' pass both McNary Dam and Bonneville Dam from early April through early August, well after pre-irrigation conjunctive use ends and before post irrigation use occurs. Thus, no exposure to the effects of the action will occur, and the effects to downstream migrating juveniles is discountable.

Emergency Use

As previously described above (Section 2.5), emergency use is expected to be rare and may never occur. SID has not employed emergency pumping from the Columbia River due to a conduit failure. Still, should a conduit failure occur, SID proposes to pump up to 60 cfs from the Columbia which would occur in the months of April and May when SID normally diverts water from the Umatilla River. Both adult and juvenile migrants of the species listed in Table 4 would be in the action area during this time. However, this withdrawal would reduce average flow at McNary Dam by about 0.02 percent. This reduction in flow is not expected to alter adult or juvenile migration behavior and is expected to be extremely rare and may never occur (insignificant).

Based on this analysis, NMFS concurs with Reclamation that the proposed action is not likely to adversely affect the species listed in Table 4 and designated critical habitats because all the effects of the proposed action are either discountable or insignificant.

2.11.2 Lower Columbia River Salmon and Steelhead

Lower Columbia River (LCR) Chinook salmon, CR coho salmon and LCR steelhead occur in the downstream portion of the action area. The upstream limit of these DPS' occurs at the Hood River in Oregon and the White Salmon River in Washington. Lower Columbia River Chinook salmon, LCR steelhead and CR coho salmon spawn in tributary streams and no spawning occurs in the mainstem Columbia River. A few populations of each DPS migrate upstream of Bonneville Dam, but most of the MPGs and populations remain in habitats downstream of Bonneville Dam. Thus, the action area is used as juvenile and adult migratory and juvenile rearing habitat.

The pre-irrigation period of February 15–28 results in an average decrease of flow volume at Bonneville Dam of roughly 0.03 percent. The post irrigation period (October 1–15) results in a flow reduction of about 0.061 percent at Bonneville Dam. Furthermore, if the springtime (April–May) emergency use were to occur, the average flow volume at Bonneville Dam would decrease by roughly 0.02 percent. Moving downstream from Bonneville Dam, the percent decrease in flow volume declines even more due to contributions of flow from lower river tributaries. The change in river stage below Bonneville Dam is nearly immeasurable. Consequently, NMFS does not expect normal migration or feeding behavior to be significantly altered for any individuals of LCR Chinook salmon, CR coho salmon, and LCR steelhead.

Based on this analysis, NMFS concurs with Reclamation that the proposed action is not likely to adversely affect LCR Chinook salmon, CR coho salmon, and LCR steelhead and designated critical habitats because all the effects of the action are insignificant.

2.11.3 Upper Willamette River Salmon and Steelhead

These species only use the Columbia River as a migratory and feeding corridor and as described above, these behaviors are not expected to be altered by the exceedingly small decline in flow volume in those years it occurs. All the effects of the action are expected to be insignificant. Therefore, NMFS concurs that the proposed action is not likely to adversely affect Upper Willamette River (UWR) Chinook salmon or UWR steelhead or designated critical habitat.

2.11.4 Southern Distinct Population Segment Eulachon

Southern DPS eulachon enter the Columbia River from late fall through winter and spawn in lower Columbia River tributaries downstream of Bonneville Dam. The Columbia River serves as a migration corridor for this species. The pre-irrigation use could occur when this species is present in the lower Columbia River, but, as described above, the decrease in flow volume below Bonneville Dam is extremely small and the change in river stage nearly immeasurable.

Therefore, NMFS does not anticipate migration behavior to be modified in years when conjunctive use occurs; all effects of the proposed action are insignificant. NMFS concurs that the proposed action is not likely to adversely affect southern DPS eulachon or designated critical habitat.

2.11.5 Southern Distinct Population Segment of Green Sturgeon

The southern DPS of green sturgeon are broadly distributed in nearshore marine areas from Mexico to the Bering Sea. Green sturgeon are commonly observed in bays, estuaries, and sometimes the deep riverine mainstem in lower elevation reaches of non-natal rivers along the west coast of North America, including the lower Columbia River estuary (NMFS 2015). Green sturgeon spawn in the Sacramento River. Larvae and juveniles rear in the Sacramento and San Francisco Bay estuary before entering the Pacific Ocean. Subadults and adults may occur in the Columbia River estuary during the summer and fall months and then congregate off northern Vancouver Island, B.C., Canada during the winter and spring months (NMFS 2019).

The effect of conjunctive use during the first 2 weeks of October when green sturgeon may occur in the Columbia River estuary is discountable. The change in river stage is immeasurable and completely overwhelmed by the daily change in tides and therefore green sturgeon will not be exposed to the effects of the action (discountable). NMFS concurs that the proposed action is not likely to adversely affect southern DPS of green sturgeon or its designated critical habitat.

2.11.6 Southern Resident Killer Whale

Southern Resident killer whales consist of three pods (J, K, and L) which inhabit coastal waters off Washington, Oregon, and Vancouver Island and are known to travel as far south as central California and as far north as Southeast Alaska (NMFS 2008). From spring through fall, the whales spend a substantial amount of time in the inland waterways of the Strait of Georgia, Strait of Juan de Fuca, and Puget Sound. All three pods generally remain in the Georgia Basin through October and make frequent trips to the outer coasts of Washington and southern Vancouver Island (Ford et al 2000).

By late fall, all three pods are seen less frequently in inland waters. Several sightings and acoustic detections of Southern Residents have been obtained off the Washington and Oregon coasts in the winter and spring (NMFS 2018). Satellite-linked tag deployments have also provided more data on the Southern Resident killer whale movements in the winter, indicating that the K and L pods use the coastal waters along Washington, Oregon, and California during non-summer months.

Southern Resident killer whales consume a variety of fish species (22 species) but salmon are identified as their primary prey (Ford et al. 1998; Ford et al. 2000). Scale and tissue sampling from May to September indicate that their diet consists of a high percentage of Chinook salmon. Coho salmon and steelhead are also found in the diet in spring and fall months when Chinook salmon are less abundant. The occurrence of K and L pods off the Columbia River in March suggests the importance of Columbia River spring-run stocks of Chinook salmon in their diet (Hanson et al. 2013) at that time of year. Chinook salmon genetic stock identification from samples collected in winter and spring in coastal waters included twelve United States West

Coast stocks, and over half of the Chinook salmon consumed originated in the Columbia River for the K and L pods (primarily fall-run stocks). Based on genetic analysis of feces and scale samples, Chinook salmon from Fraser River stocks dominate the diet of Southern Residents in the summer (Hanson 2011).

Except for CR chum salmon, NMFS has determined that the proposed action would have insignificant and discountable effects on all other Columbia River salmon and steelhead populations. Subsequently, we do not anticipate any significant loss of prey species for southern resident killer whales. Therefore, NMFS concurs that the proposed action is not likely to adversely affect southern resident killer whales.

3. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (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.

3.1 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 the U.S. Bureau of Reclamation. Other users of this information could include SID and its patrons. Individual copies of this opinion were provided to Reclamation. The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adhere to conventional standards for style.

3.2 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.

3.3 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 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 implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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