UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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https://doi.org/10.25923/2ktd-t741

Refer to NMFS No: WCRO-2020-02799
WCRO-2020-02714

December 17, 2020

Michelle Walker
Chief, Regulatory Branch
Army Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project, and the Nelson Dam Removal Project, Yakima County, Washington

Dear Ms. Walker:

Thank you for your letter of August 5, 2020, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Yakima Naches River Water Treatment Plant Intake and River Stabilization Project, and for your letter of August 19, 2020, requesting initiation of consultation for the Nelson Dam Removal Project. We have proceeded with a single consultation combining both of your requests. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016).

Thank you, also, for your requests 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 action.

In this opinion, NMFS concluded that the proposed actions are not likely to jeopardize the continued existence of ESA-listed Middle Columbia River steelhead (*Oncorhynchus mykiss*), or result in the destruction or adverse modification of their critical habitat. As required by section 7 of the ESA, NMFS provided an incidental take statement (ITS) with the biological opinion. The ITS describes reasonable and prudent measures (RPMs) NMFS considers necessary or appropriate to minimize incidental take associated with the proposed actions. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements that the federal agency and any person who performs the action must comply with to carry out the RPMs. Incidental take from actions that meet these terms and conditions will be exempt from the ESA take prohibition.

We concluded that the proposed actions would also have some adverse effects on EFH. We did not provide any EFH conservation recommendations because the measures included in the Biological Assessments appeared sufficient to protect EFH.

Please contact Sean Gross, Interior Columbia Basin Office, Ellensburg, (509) 962-8911 ext. 806, sean.gross@noaa.gov, if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

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

Enclosure (1)

cc: File
David Moore, U.S. Army Corps of Engineers, david.j.moore@usace.army.mil

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

City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project
And
Nelson Dam Removal Project

NMFS Consultation Number: WCRO-2020-02799
And WCRO-2020-02714

Action Agency: U.S. Army Corps of Engineers

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	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?
Middle Columbia River steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	Yes	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	No

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By: 

Assistant Regional Administrator

Date: December 17, 2020

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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

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, as amended.

We also completed an essential fish habitat (EFH) consultation on the proposed actions, 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). The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at the Interior Columbia Basin Office at Ellensburg, Washington.

1.2. Consultation History

This document describes consultation between the Army Corps of Engineers (Corps) and NMFS for two distinct projects that the City of Yakima (City) intends to undertake. Combining these consultations into a single opinion is appropriate as both projects are located on the Naches River and will affect the same population of steelhead.

1.2.1. City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project

NMFS has participated in discussions with the City since at least 2013 regarding the City's need to ensure that it can continue to divert water from the Naches River to supply municipal water to its ratepayers. In the intervening years, the City has investigated several alternatives to protecting their water supply while reducing environmental impacts.

On June 10, 2019, the Corps requested that NMFS initiate formal consultation for Middle Columbia River (MCR) steelhead and their critical habitat for the proposal to issue a permit to the City. The consultation request is identified as NMFS Tracking No. WCRO-2019-01286.

On November 25, 2019, NMFS met with the Corps, the City, and its consultants to discuss design changes proposed by the City and the need for additional information to initiate consultation.

On November 27, 2019, NMFS sent electronic mail to the Corps and the City restating the need for additional information to initiate consultation.

On March 16, 2020, NMFS met with the City and its consultants via conference call to discuss information needed to initiate consultation.

On May 8, 2020, NMFS sent a letter to the Corps closing out the consultation request for WCRO-2019-01286 due to insufficient information regarding in-water work. NMFS requested that the Corps provide a new request for consultation when sufficient information could be provided.

On August 5, 2020, the Corps submitted a revised Biological Assessment (BA) dated August 3, 2020, a letter requesting initiation of formal ESA consultation and EFH consultation, and additional documents prepared by the City. The consultation request is identified as NMFS Tracking No. WCRO-2020-02799 and was initiated on August 5, 2020.

On October 6, 2020, NMFS notified the Corps and the City, via electronic mail, that it would issue a single consultation document to evaluate both the Nelson Dam Removal Project and the City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project.

On October 9, 2020, NMFS requested, via electronic mail, additional information from the Corps regarding the Corps' intent to permit activities described in the City's draft Adaptive Management Plan (AMP).

On October 13, 2020, the Corps responded, via electronic mail, that activities in the City's draft AMP would not be permitted at this time, and as such only those activities in the draft plan that would fit the Corps' maintenance exemption are likely to occur.

1.2.2 Nelson Dam Removal Project

NMFS has participated in discussions with the City since 2012 regarding its intent to consolidate several irrigation diversions at Nelson Dam and since approximately the same time to replace or reconfigure the dam due to structural risks. NMFS has participated in numerous discussions in the intervening years as the City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project has proceeded through various stages of feasibility and design review.

On October 18, 2019, NMFS attended a meeting with the City, its consultants, and others to discuss permitting for the proposed project. At this meeting, NMFS volunteered to coordinate among several stakeholders with fisheries interests which in-water work windows would be mutually acceptable.

On October 23, 2019, NMFS sent an email to the City's consultant identifying work windows and specific in-water work that appeared to be acceptable to multiple agencies. This information is reflected in the BA prepared by the City's consultants.

On March 11, 2020, the Corps requested that NMFS initiate formal consultation for MCR steelhead and their critical habitat for the proposal to issue a permit to the City. The consultation request is identified as NMFS Tracking No. WCRO-2020-00552. The BA included with the consultation request indicated that NMFS would receive the applicant's Design Document

Report (DDR) to allow evaluation of the proposed water intake and fish passage facilities, and that the DDR would be provided in April of 2020.

In several conversations in March and April 2020, NMFS indicated to the City and its consultants that the DDR would need to be furnished for NMFS to initiate formal consultation.

On May 8, 2020, NMFS sent a letter to the Corps closing out the consultation request for WCRO-2020-00552 due to insufficient information regarding the design and function of the fish screen and water diversion. NMFS requested the Corps provide a new request for consultation when sufficient information, namely the DDR, could be provided.

On August 19, 2020, the Corps submitted the DDR dated August 14, 2020, and a letter requesting initiation of formal ESA consultation and EFH consultation. The consultation request is identified as NMFS Tracking No. WCRO-2020-02714 and was initiated on August 19, 2020.

On October 6, 2020, NMFS notified the Corps and the City, via electronic mail, that it would issue a single consultation document to evaluate both the Nelson Dam Removal Project and the City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project.

1.3. Proposed Federal Actions

Under the ESA, "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). Under MSA, Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910).

1.3.1. City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project

The Corps proposes to issue a permit to the City, under Section 404 of the Clean Water Act (CWA), to construct river training features in the Naches River to ensure that the City can continue to divert water from the river for treatment and use by over 70,000 people. The City's intake is located on the left bank of the river alongside U.S. Highway 12. The river has been periodically unstable vertically and laterally for decades, as it has responded to various anthropogenic insults including construction of the highway and floodplain simplification and confinement. The City's approach is to construct several large structures in the river and floodplain to ensure that the river does not further downcut or migrate away from the water intake structure.

The Naches River previously intersected the upstream end of the City's intake structure and has since started migrating away from the intake structure, resulting in lower than optimal flows entering the intake. The shift in channel position, both laterally and vertically, has isolated the intake gates from the active channel flows at times and thereby limits the effectiveness of the intake in its current configuration. As the channel has migrated away from the intake gates, it has circumvented the existing grade control structure and eroded away the former right bank riprap revetment that has created a makeshift grade control structure of its own. This has led the active river channel to develop a wide and shallow geometry with little channel complexity or hydraulic diversity. A secondary channel, within the right floodplain, has been stranded vertically above

the main channel and river flows only reoccupy the secondary channel during larger flow events. The City believes that with continued channel migration and degradation, the intake operation may be permanently impacted.

The City intends to construct three types of structures to stabilize the river: (1) keyway structures, which are riprap structures buried into the bank to limit the lateral migration and channel avulsion; (2) river grade control (RGC) structures, which are full channel spanning buried riprap structures to limit channel incision; and (3) engineered log jam (ELJ) structures, which reposition the thalweg to redirect flows toward the intake gates. The City intends to rebuild two dilapidated RGC structures, install two ELJ structures, and install two buried keyway structures.

The keyway structures are designed to limit lateral channel migration by establishing a passive rock structure that would restrict bank erosion and thereby minimize lateral migration. The RGC structures are designed to maintain the water surface at sufficient elevation for water intake operation. The ELJ structures are designed to limit channel meandering and lateral migration and redirect flow towards the water intake gates. These structures would be built like bendway weirs with a low elevation profile that projects approximately 4 feet up from the bed of the existing channel. Native material excavated for the project will be incorporated as ballast or bar material.

Approximately 152,500 square feet of upland areas will be used for access, staging, and some construction, resulting in the removal of approximately 23,000 square feet of riparian vegetation composed primarily of herbs and shrubs. All in-water construction will occur in the July 15 to October 15 period and intensive in-water work will be timed to avoid dam releases that increase river flows during September. Limited in-water work will occur without dewatering, but intensive in-water work will occur in isolation from active flow either before or after the high water period. Dewatering and fish salvage will follow Washington State Department of Transportation (WSDOT) protocols (2016); dewatering is expected to last for at least one workday.

The City of Yakima (2020a) has proposed numerous best management practices and minimization measures that are typical of construction projects of this type. These measures are intended to minimize direct interaction with steelhead and to minimize potential impacts including erosion, chemical contamination, and vegetation disturbance.

Construction will be phased over approximately 5 months as follows:

Phase I (Work Prior to July 15)

Step 1: Installation of upland erosion and sediment control measures.

Step 2: Development of access roads and laydown areas.

Step 3: Installation of structures landward of the water on the right bank (west side). These include keyway structures and riprap portions of the ELJs and RGCs.

Step 4: Installation of the northeastern most ELJ associated with ELJ-2 (work completed out of the river). This work would require a temporary crossing to the left bank channel of the Naches River. To maintain a safe crossing (~ 40- to 50-foot span) either timber mats, riprap rock backfill, or a temporary bridge may be needed depending on water levels.

Phase II (July 15 to September 1)

The City will undertake this phase before scheduled high flows that occur in September as part of planned water releases from upstream storage dams.

Step 5: Installation of channel diversion structures incorporating fish removal. This would isolate and dewater approximately 280,000 square feet of riverbed for In-water Isolation Stage 1. Installation of side channel settling ponds for pumped water; both upstream (RGC-1) and downstream (RGC-2) locations on right bank.

Step 6: Complete installation in-water of ELJ-1, ELJ-2, and RGC-1. Install RGC-2 on the right bank.

Step 7: Place final segment of RGC-1 riprap (without excavation) in the wet and to the left bank canal wall (east side) river channel using long arm excavator from the end of the installed RGC-1 as constructed from the right bank.

Step 8: Remove all equipment and channel diversion structures.

Phase III

Step 9: Begin restoring existing contours and revegetating site. Total area of revegetation will be 140,000 square feet.

Step 10: Remove all erosion control measures and demobilize from right bank.

Phase IV (late September to October 15)

The City will undertake this phase after irrigation flows have decreased and before summer Chinook salmon spawning begins.

Step 11: Implement traffic control plan and install temporary riprap access ramp from U.S. Highway 12 down to river channel.

Step 12: Install channel diversion structures and salvage fish. This would isolate and dewater approximately 30,000 square feet of riverbed for In-water Isolation Stage 2.

Step 13: Complete installation of RGC-2 on left bank.

Step 14: Remove diversion structures, revegetate and demobilize from left bank.

Phase V (Adaptive Management and Long-term Monitoring)

The City included a draft AMP as an appendix to the BA. The plan describes a wide range of activities the City may undertake in the years after construction, including enlarging or installing new structures (ELJs, RGCs, and keyways). However, based on correspondence with the Corps in October 2020, it is NMFS understanding that the Corps does not intend to permit these future activities at this time. Therefore, for the purposes of this consultation, it is only expected that the City will perform adaptive management activities that would be allowed under the Section 404(f) maintenance exemption of the CWA, wherein the City could discharge fill that matches the character, scope, or size of the original fill design. In other words, the City would take actions to replace materials that were displaced and clear debris as needed.

The draft AMP indicates that any maintenance work would be completed between July 16 and September 1, and worksite isolation and dewatering would precede the work if in-water work is expected to take longer than 1 day, if turbidity is unmanageable, or if working without isolation is unsafe. If worksite isolation is needed, the City would follow WSDOT (2016) protocols to remove fish from the isolation area. For the purposes of this consultation, NMFS will assume

that in-water maintenance work will occur every 2 years and require 0.25 acres of worksite isolation, dewatering, and excavation and/or fill.

Other Activities

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not. Specifically, we considered whether the action would cause any activities to occur with respect to water distribution or water use by the City's ratepayers. We considered if, in the absence of the proposed action, the City would lose access to water, causing a change in water use by City ratepayers. We concluded that it was not reasonably certain that the proposed action would change water use activities for two reasons. First, we believe that the City would probably continue to access Naches River water in the absence of the proposed action. The river in this reach is somewhat unpredictable and may continue to be accessible from the intake. Further, we believe that the City would continue to conduct minor sediment removal and other actions to guide water toward the intake as they have done in the past, although at some cost to the City. Second, even if the City were unable to divert Naches River surface flows because the flows would be inaccessible in the absence of the proposed action, there is some likelihood that the City could change its source to groundwater and continue to provide water to its ratepayers. This seems possible because some of the City's water system is already served by groundwater and because the conversion of other water rights in the Yakima Basin from surface to groundwater is somewhat routine. Groundwater pumping would likely deplete river flows to the same extent as diverting surface water.

1.3.2. Nelson Dam Removal Project

The Corps proposes to issue a permit to the City, under Section 404 of the CWA, to remove Nelson Dam and replace it with a new water diversion structure in the Naches River, and to construct a water pipeline across Cowiche Creek. NMFS assumes that the U.S. Bureau of Reclamation (Reclamation) will authorize and/or fund at least part of the Project because Reclamation owns and maintains some facilities on the dam. The Bonneville Power Association (BPA) may also authorize and/or fund some of the project because it provides funding for maintenance of some facilities at the dam. However, at this time, neither Reclamation nor BPA have clearly identified the extent of their action, if any.

Nelson Dam is an 8-foot-high, 180-foot-wide, irrigation diversion dam originally built in the early 1920s to divert water from the Naches River. The current dam and north-bank fish ladder were constructed in 1985, as a joint project with the City, the North Cowiche Canal Association, and Reclamation. Nelson Dam is a partial barrier to upstream and downstream fish passage and is structurally compromised due to erosion. The dam is the site of the Naches–Cowiche and Yakima General System withdrawals. Two additional diversions, the Fruitvale and Old Union diversions, are located approximately 1 mile downstream near the confluence of Cowiche Creek with the Naches River. Maintaining these diversions creates partial fish passage barriers in side channels of the Naches River and in lower Cowiche Creek.

The proposed action includes authorization to remove Nelson Dam and some associated infrastructure and replacing the dam with a new diversion structure. The action also includes authorization for floodplain contouring near the dam and constructing a water pipeline that will allow consolidation of all four diversions to the dam site. The goals of the project include

improving fish passage, providing reliable water delivery, and normalizing floodplain dynamics across 6 miles of the Naches River.

Construction will occur in two phases. Phase 1 includes all work in the Naches River. Phase 2 includes construction of water pipelines. Both phases incorporate standard erosion control and spill control measures.

Exhaustive detail is included in the BA, its appendices, and the DDR. The following is a summary of the substantial elements of the project.

Phase 1 Construction

Construction would span approximately 18 to 24 months and may extend to the following planting season for site restoration activities. Mobilization and staging would occur in upland areas. Some trees and shrubs will be cleared to construct the pilot channels in the Naches River floodplain upstream of the dam. In water work will occur during two separate July 16–February 28 work windows. The following elements are proposed waterward of the ordinary high water mark:

1. Installation and removal of a series of cofferdams to divert the river around the in-water construction area. In-water work for the isolation cofferdams includes:
    a. Installation and removal of a sequence of cofferdams during two consecutive in-water work windows
        i. Work Window 1:
            - Diversion of the river into the main, north-bank temporary bypass.
            - A smaller south bank bypass would also be available until the end of the irrigation season (October 15).
        ii. Work Window 2:
            - Diversion back into the main river channel and roughened channel fishway constructed in Work Window 1. Isolation would be limited to a small area along north bank at and downstream of existing fish ladder.
    b. Incremental dewatering and fish salvage for both phases of in-water work. In total, approximately 79,000 square feet of the Naches River would be dewatered.
    c. Routing of nuisance water (i.e., water that enters the work area from ground or hyporheic flow) to settling areas.
2. Removal of:
    a. Nelson Dam
    b. North bank abutments for former Powerhouse Road
    c. North bank fish ladder
    d. Ecology-block juvenile bypass outfall structure under Powerhouse Road
    e. Existing south bank intake and screening structures
3. Construction of:
    a. New surface water intake structure and sluiceway within similar footprint of existing intake facilities on south bank
    b. Roughened channel and rock-matrix crest
    c. Two pilot channels

Upstream and downstream volitional fish passage will be provided for the duration of construction. To reduce disturbance potential, cofferdams will be installed during the low-flow portions of the in-water work window.

The primary features to be constructed are referred to in the BA and designs as a roughened channel and water intake structure. The roughened rock channel would replace the Nelson Dam's function of raising the water level to allow gravity diversion. The roughened channel structure will be a large weir comprised of sheetpile, rock, and other materials with several inset channels allowing fish migration over the structure at various river flows (Figure 1).

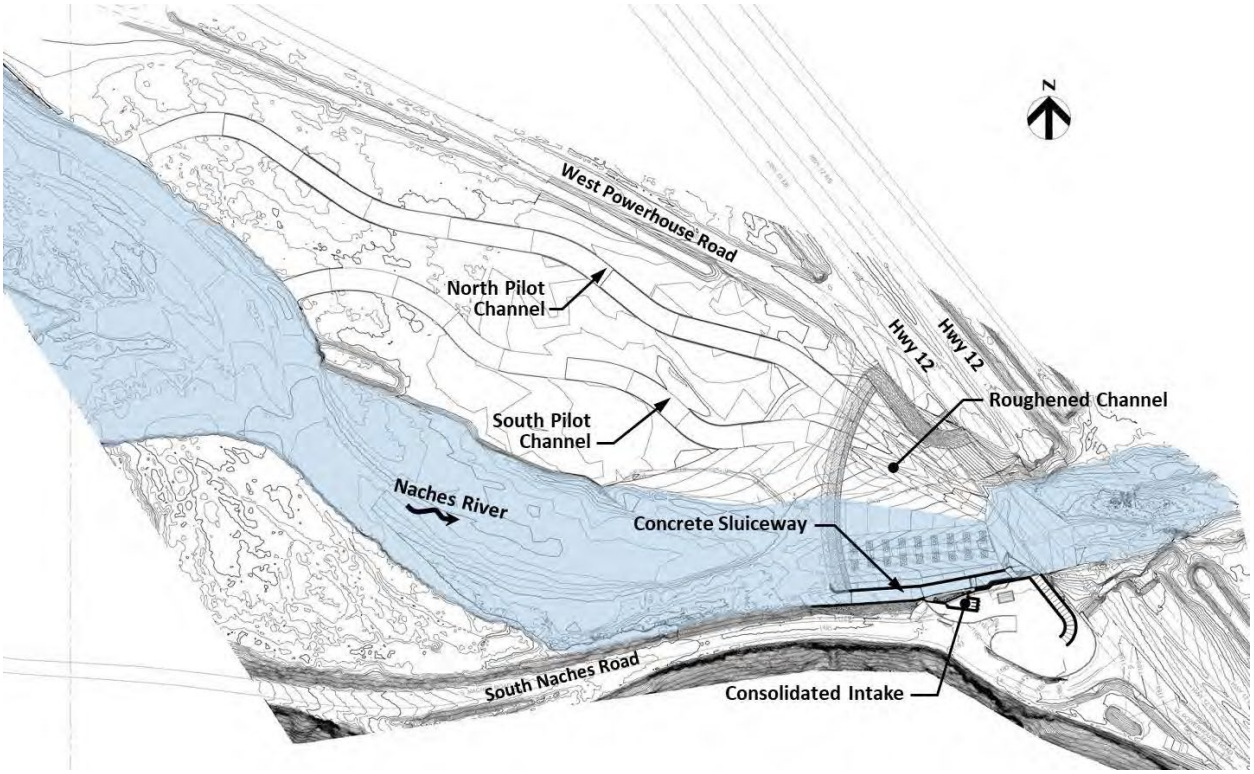

Figure 1. Overview of Phase 1 construction elements. From City of Yakima (2020b) (their Figure 2-1). The existing Nelson Dam is in the footprint of the proposed roughened channel.

The sluiceway and water intake occupy the right bank side of the roughened channel. The sluiceway is a 20-foot-wide concrete structure extending along the 390-foot length of the roughened channel. A water intake with fish screens will be located along the landward side of the sluiceway to divert water from the river, leaving fish in the sluiceway to continue their migration. The intake will serve the combined requirements of the City, Naches–Cowiche, Old Union, and Fruitvale diversions. The fish screen and all other elements of the project have been designed to meet or exceed NMFS criteria (2011a) for safe fish passage.

A key feature of the sluiceway is an overshot Obermeyer gate that will allow the City to change the surface water elevation upstream of the dam by raising or lowering the gate. Functionally,

this means that the height of the new facility is adjustable such that the City can manipulate water velocity, slope, and backwater to have some control over sediment deposition and erosion dynamics in the river.

Phase 1 also includes grading upstream of the dam on the left bank to create a more normal floodplain surface and improve fish passage over the roughened channel. The City will excavate parts of a large sediment deposit formed by the unnatural backwatering effect of Nelson Dam. Two pilot channels will be excavated to meet the high flow channels across the roughened channel structure. Parts of the floodplain would be planted with riparian and wetland vegetation. Trees removed for pilot channel construction will be left on site as floodplain habitat. Over the long term, the pilot channels are intended to deform as they facilitate erosion of sediment deposits formed by Nelson Dam and transport the sediment downstream of the dam to areas identified as sediment-starved.

Boulders will also be placed for scour protection to protect Powerhouse Road and South Naches Road as the sediment deposits upstream of the dam are purposely destabilized. Additional construction in the vicinity includes extension of an existing culvert in a roadside ditch and construction of a mechanical building.

Phase 2 Construction

The main purpose of Phase 2 is to reconfigure the water pipeline system to carry water from the new water intake at the sluiceway to the distribution systems for the Naches–Cowiche, Yakima General, Old Union, and Fruitvale systems. This work will allow decommissioning of the old diversion infrastructure and changing the point of diversion for the Old Union and Fruitvale water rights to the new consolidated water intake structure at the former Nelson Dam site.

Phase 2 is planned to last 8 months and commence in the year or two following completion of Phase 1. Construction of Phase 2 of the Proposed Action includes removal of portions of the City's existing surface water conveyance pipeline, installation of two new pipelines, and removal of the sedimentation basin adjacent to Cowiche Creek.

Most work in Phase 2 will occur in uplands and the majority of the pipeline corridor will be sited in the highly disturbed right-of-way of U.S. Highway 12. However, Phase 2 work will also include replacing an existing pipeline that crosses under Cowiche Creek with two new pipelines under the creek. This work will require temporary dewatering and trenching across Cowiche Creek.

Work in Cowiche Creek will occur over 4 weeks between July 16 and August 31. Up to 225 linear feet of the creek will be dewatered and bypassed around the work site in twin 30-inch pipes housed within cofferdams. Fish will be salvaged from the dewatering area following WSDOT's Fish Exclusion Protocols (2016) and the effort will be led by an experienced fish biologist. The stream bypass will allow downstream, but not upstream, volitional passage for fish in Cowiche Creek during construction.

The existing pipeline and part of an existing sedimentation basin will be removed. A trench as wide as 20 feet would be excavated and pipes installed such that their tops are at least 4 feet deeper than the depth to which the bed of Cowiche Creek is predicted to scour. Pipes would be capped with rock and gravels to restore the streambed profile. Removal of bypass pipes and cofferdams will be followed by reseeding of disturbed areas.

Operations

The surface water intake would divert water during the April 1 to October 15 irrigation season, per existing water rights. Sluicing operations (operating the gate to allow sediment to pass from upstream to downstream of the dam through the sluiceway) would occur in the spring during the descending limb of the hydrograph, or in January or February, if required. The City identifies four operating conditions for the project:

1. Non-operation
2. Normal operation during the diversion season
3. High-flow conditions during the diversion season
4. Periodic sluicing

NMFS notes that the end date of the City's identified diversion season (October 15) and beginning date of the non-operation season (November 1) leave a 16-day gap (October 16–31) unaccounted for. However, based on the timing of migratory steelhead behaviors, whether the facility is in a diversion or non-operation condition at this time is unlikely to change the effects of the project on MCR steelhead or their critical habitat.

1. Non-operation. This period (November 1 to March 31 of each year), occurs outside of the typical diversion season and represents a period when Naches River flows are conveyed primarily over the roughened channel. The primary intent of non-operational period is to maintain adequate conditions in the roughened channel to facilitate fish passage throughout a specified range of flows while also taking advantage of high-flow events to sluice bedload downstream of the project using the concrete sluiceway. The goal of allowing bedload to move downstream past the facility is to restore more normal sediment dynamics to 6 miles of the Naches River upstream and downstream of the facility, and to ensure that fish screens and water intake are not clogged with sediment. During the non-operational period, the fish screens would be raised to their full maintenance position above the water surface, the isolation gates behind the screens would be fully closed, and the Obermeyer weir gate would be in a fully up position. When flows are generally low, between 300 and approximately 5,000 cubic feet per second (cfs), all flow is expected to be conveyed over the roughened channel and portions of the left bank floodplain.

2. Normal operation during the diversion season. Normal operating conditions for the diversion facility occur between April 1 and October 15 of each year. During normal operating conditions, the screen isolation gates are in their fully open condition and the fish screens are in the down position, meaning they are in the water. Water passes through the fish screens into the afterbay of the intake and then to the conveyance pipes.

During this period, the Obermeyer and an over/under gate would manage river flows to meet fish passage objectives and irrigation demands. During typical operations, the over/under gate would be operated as an "over gate" in the down position to protect fish. When sediments build up, the gate would be lifted and operate as an "under gate" to sluice sediments.

The Obermeyer will be operated automatically to maintain a minimum operating water surface elevation in the sluiceway necessary to achieve adequate depth, sweeping velocity, and static head requirements for the fish screens and diversion.

At an extreme low-flow condition (270 cfs), a minimum of 176 cfs will be conveyed down the primary low-flow portion of the roughened channel, 10 cfs will be used for minimum bypass flow across the screens, and a maximum irrigation demand of 84 cfs will be diverted through the screens and into the surface water intake structure. In this condition, the 10 cfs is passed through the over/under gate at the downstream end of the fish screens and is reserved for the juvenile bypass; no flow will travel through the sluiceway past the Obermeyer.

As river flows increase from 270 cfs to approximately 500 cfs, the Obermeyer will be operated to prioritize an increase of flow conveyed down the roughened channel and secondarily to improve sweeping conditions across the screens. As river flows continue to increase from 500 cfs to approximately 5,000 cfs, the Obermeyer will be operated to increase sluiceway flows up to a user-specified sluiceway flow of 200 cfs and juvenile bypass flows up to 50 to 80 cfs.

3. High-flow conditions during the diversion season. Periods of high flow, turbidity, sediment, and debris movement are anticipated to occur within the diversion period. Conditions that may diminish the effectiveness of the surface water diversion may occur once out of every 5 to 10 years when large-magnitude river flow events mobilize large amounts of debris. The proposed design incorporates several measures to mitigate these conditions, but the actual performance and resilience of the intake facility during these periods will be unproven until several years after operation of the facility begins.

   The screen and intake are designed to protect the fish screens during high debris and bedload movement and raising or lowering the screens during storm events is not anticipated. The trash rack is intended to exclude large debris from entering the screen bay while the bypass is intended to maintain sweeping velocities across the screen to convey debris downstream. Fine sediments would be dislodged with a water-jet sediment removal system and the over/under gate. Sediment accumulation behind the screens will be addressed with a sluicing system that would be configured on the back side of the screen isolation gates.

4. Periodic sluicing. Sluicing through the concrete sluiceway would occur periodically, taking advantage of the descending limb of the hydrograph to flush out bedload and debris from upstream of the roughened channel and any accumulations in front of the intake. The purpose of this sluicing operation would be to maintain an unimpeded

hydraulic pathway from the Naches River to the intake screens and down the sluiceway and fish bypass. Evacuating bedload through the sluiceway will also reduce excessive bedload deposition upstream of the dam site. During sluicing, the over/under gate would be lifted to allow sediment to move down the juvenile bypass to the return to the river. Sluicing would likely occur several times per year and last an estimated 4 to 8 hours during daylight.

Maintenance

The City assumes that the maintenance activities described below would not need a future permit from the Corps pursuant to Section 404 of the CWA because they would be considered exempt from a permit requirement since they are for the purpose of maintaining a permitted structure. Any in-water maintenance activities will occur between July 16 and August 31.

Maintenance of the roughened channel structure will be needed if the ability of the structure to safely pass fish or to provide a reliable water supply is compromised. The exact scale and frequency of necessary maintenance are somewhat difficult to predict because they will be related to flooding patterns and attendant erosion and deposition. Therefore the City assumes that it will need to use an excavator staged in the dry to remove debris from atop the roughened channel from 0–7 days in any year. Further, the City assumes that it will need to undertake more significant maintenance every 2 years, which would involve repositioning or replacing rocks across 0.25 acres of the surface of the roughened channel over a period not exceeding 10 days. If needed, this work would be accompanied by excluding the work area with cofferdamming, and salvaging fish following the protocols described for Phase 1 construction.

Operating the sluiceway to clear debris is a maintenance action, but was described above, under Operations. Additional maintenance of the sluiceway, screens, juvenile bypass and water intake could include removing debris, such as logs, that may lodge in the sluiceway or on one of the gates. The City assumes that such maintenance will occur annually and would typically involve removing debris using an excavator operating with its tracks in the dry and minimal use of the bucket in-water.

Other Activities

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would cause a change in the exercise of water rights for water currently withdrawn at the Old Union and Fruitvale diversions. The BA identifies relocating the points of diversion to the new consolidated intake at the dam site as part of the Proposed Action, but it is unclear if the specific Federal actions under consultation (issuance of a Corps permit and potential funding and/or authorization by Reclamation and/or BPA) actually include this change. If not expressly a part of the proposed action, then this change in diversion location and use of the new pipelines by all affected water users is a consequence of the proposed action.

However, removal of the water management infrastructure at the current points of diversion for Fruitvale and Old Union is not a consequence of the action. It is not reasonably certain at present if that infrastructure will ever be removed. The physical removal of the existing diversion

infrastructure would be part of the Yakima County-led Cowiche Creek restoration project and will be subject to future consultation with the Corps and/or BPA.

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 conclusion of consultation, NMFS provide 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 "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably 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 designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (50 CFR 424.12) replaced 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:

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their habitat using an exposure-response approach.
- Evaluate cumulative effects.
- 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 the 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.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

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' "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 function of the PBFs that are essential for the conservation of the species.

2.2.1. Status of the Species

For Pacific salmon, steelhead, and other relevant species, NMFS commonly uses four parameters to assess the viability of the populations that, together, constitute the species: spatial structure, diversity, abundance, and productivity (McElhany et al. 2000). These "viable salmonid population" criteria therefore 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. These attributes are influenced by survival, behavior, and experiences throughout a species' entire life cycle, and these characteristics, in turn, are influenced by habitat and other environmental conditions.

"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 fundamentally 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 at 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, NMFS assesses 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 the ESA-listed species and their designated critical habitats that 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 (FR) (Table 1) and in the most recent 5-year status review (NMFS 2016), as well as applicable recovery plans and 5-year status reports. These additional documents are incorporated by reference.

Table 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 consultation. Listing status: 'T' means listed as threatened; 'E' means listed as endangered.

Species	Listing Status	Critical Habitat	Protective Regulations
Steelhead (*O. mykiss*)			
Middle Columbia River	T 1/05/06; 71 FR 834	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

Middle Columbia River Steelhead

The MCR steelhead Distinct Population Segment (DPS) was listed as threatened on March 25, 1999 (64 FR 14517), and its threatened status was reaffirmed on June 28, 2005 (70 FR 37160). The threatened status once again affirmed during 5-year status reviews on August 15, 2011 (76 FR 50448), and again on May 26, 2016 (81 FR 33468). The DPS is comprised of 17 independent populations within four Major Population Groups (MPGs) in Washington and Oregon. This DPS includes all naturally-spawned populations of steelhead (and their progeny) in streams from above the Wind River, Washington, and the Hood River, Oregon (exclusive), upstream to, and

including, the Yakima River, Washington, excluding steelhead from the Snake River Basin. Seven artificial propagation programs are considered part of the DPS: the Touchet River Endemic, Yakima River Kelt Reconditioning Program (in Satus Creek, Toppenish Creek, Naches River, and Upper Yakima River), Umatilla River, and the Deschutes River steelhead hatchery programs.

The life history characteristics for MCR steelhead are similar to those of other inland steelhead DPSs. Most fish smolt at 2 years and spend 1 to 2 years in salt water before re-entering freshwater, where they may remain up to a year before spawning (Howell et al. 1985). All steelhead upstream of The Dalles Dam are summer-run (Reisenbichler et al. 1992) fish that enter the Columbia River from June to August. Adult steelhead ascend mainstem rivers and their tributaries throughout the winter, spawning in the late winter and early spring. Fry emergence typically occurs between May and the end of June.

The area affected by the proposed action is inhabited by steelhead from the Naches population of the Yakima MPG. For the rest of the species status section we will focus on the Yakima MPG.

Abundance. Abundance estimates have been recently made for 16 of the 17 extant MCR steelhead populations. Seven of the 16 populations are currently above the average abundance thresholds that the Interior Columbia Basin Technical Recovery Team (ICTRT) identifies as a minimum for low risk. The remaining nine populations are at moderate or high risk of extinction due to low abundance.

The latest Northwest Fisheries Science Center (NWFSC) status review (NWFSC 2015) characterized two MCR steelhead populations as being at high risk of extinction in terms of abundance. The Naches River and Upper Yakima River populations were rated at moderate risk for integrated abundance and productivity. The remaining populations in the Yakima MPG are at low risk. Due to relatively high returns for most years since 2001, abundance of Satus Creek and Toppenish Creek populations are greater than the minimum abundance targets for viability (Table 2). Upper Yakima and Naches River returns had improved leading up to the 2015 review, but were still well below the targets (NWFSC 2015). However, since 2015, abundance has declined markedly. NMFS is currently conducting a status review for publication in 2021.

Productivity. Based on 20 full brood-year returns of MCR steelhead, most populations have replaced themselves, and a few have not, when only natural production is considered. Relative population status varies widely across the DPS. Based on a 2007 analysis, productivity is insufficient to meet recovery needs (ICTRT 2007a) for most populations. Estimates of required productivity increases required to reach a low risk of extinction depend on assumptions regarding future hydropower operations and ocean conditions.

Table 2. Summary of the Middle Columbia River steelhead Yakima River Group status and Interior Columbia Basin Technical Recovery Team viability criteria.

Population	Abundance and Productivity Metrics				Spatial Structure and Diversity Metrics			Rating
	Minimum Abundance Target	Natural Spawning Abundance 2005–2014	Productivity (returns-per-spawner) 2005–2014	Integrated Abundance/ Productivity Risk	Natural Process Risk	Diversity Risk	Integrated Spatial Structure/ Diversity Risk	Overall Viability Rating
Naches	1,500	1,244	1.83	Moderate	Low	Moderate	Moderate	Moderate
Satus	1,000	1,127	1.93	Low	Low	Moderate	Moderate	Viable
Toppenish	500	516	2.52	Low	Low	Moderate	Moderate	Viable
Upper Yakima	1,500	246	1.87	Moderate	Moderate	High	High	High Risk

The Upper Yakima population has a very high abundance/productivity gap, and the Naches has a high gap (NWFSC 2015), indicating that these populations are among the poorest performing in the DPS.

Spatial structure. The NWFSC (2015) uses the term "natural processes risk" instead of "spatial structure" and characterizes the risk to MCR steelhead populations as "very low" to "moderate" for all populations. The Naches population is rated low risk because seven of the eight historical major spawning areas are occupied. The only unoccupied major spawning area is the upper Tieton River which is currently blocked by Rimrock Dam (ICTRT 2005). The distribution across spawning areas of the Upper Yakima population continues to be substantially reduced from historical levels with only 11 of the 14 major spawning areas occupied and the population is at moderate risk. Impassable storage dams block significant portions of the Cle Elum and Kachess rivers, the uppermost reach of the Yakima River, and tributaries to these areas.

Diversity. The ICTRT (ICTRT 2007b) identified 20 existing populations in four MPGs as described previously. The Yakima River MPG consists of the Satus Creek, Toppenish, Naches, and Upper Yakima populations.

The NWFSC (2015) characterized most populations in the DPS and MPG as moderate risk. Risks due to the loss of life history and phenotypic diversity are inferred from habitat degradation, including passage impacts within the Yakima Basin.

Flow regulation by Reclamation has created a reduced out-migration window and a shift in the adult in-migration timing, both due to elevated temperatures in the lower river and flow modifications in the early migration season (ICTRT 2005). Risk to the Upper Yakima population is further elevated by flow management that affects rearing conditions in the mainstem Yakima River and passage issues at and below Roza Dam, in addition to historic stocking of out of basin rainbow trout in the Upper Yakima.

Limiting factors. The most significant factors limiting productivity of the MCR steelhead DPS include: (1) mainstem Columbia River hydropower adverse effects (i.e., modified hydrograph, increase in lentic conditions/decrease in riverine conditions—passage barriers, stream temperature, dissolved oxygen problems, and invasive species); (2) riparian degradation and large wood recruitment; (3) altered floodplain connectivity and function; (4) reduced streamflow;

(5) water quality; and (6) predation and competition (NMFS 2011b). Within the Yakima Basin, Reclamation's operation of the Yakima Project and subsequent diversion of irrigation water is the single largest limiting factor.

Recovery plan. In 2009, NMFS adopted a recovery plan for MCR steelhead that was developed by multiple organizations in both Washington and Oregon. Most important for this consultation is the Yakima Steelhead Recovery Plan that is part of the larger recovery plan. This plan outlined specific recovery actions that are intended to reduce threats associated with land and water management activities in the Yakima Basin.

Summary. The MCR steelhead DPS is not currently meeting the viability criteria described in the Mid-Columbia Steelhead Recovery Plan (NMFS 2009). To achieve viable status for the Yakima MPG, two populations should be rated as viable, including at least one of the two classified as large—the Naches River or the Upper Yakima River—neither of which currently meets viable status. The other two populations out of the four in the Yakima should be rated as maintained.

2.2.2. Status of Critical Habitat

This section examines the status of designated critical habitat affected by the proposed action by examining the condition and trends of PBFs throughout the designated areas. These features are essential to the conservation of the 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).

For salmon and steelhead, NMFS 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 the listed species they support. The conservation rankings are high, medium, or low. To determine the conservation value of each watershed to species viability, NMFS' critical habitat analytical review teams evaluated:

- The quantity and quality of habitat features (e.g., spawning gravels, wood and water condition, side channels).
- The relationship of the area compared to other areas within the species' range.
- The significance of the population occupying that area to the species' viability criteria.

Thus, even a location that has poor quality habitat could be ranked as a high conservation value, if it were essential due to factors such as limited availability (e.g., one of a very few spawning areas), a unique contribution of the population it served (e.g., a population at the extreme end of geographic distribution), or the fact that it serves another important role (e.g., obligate area for migration to upstream spawning areas).

Table 3 describes the PBFs of the habitat types within the full range of habitat designated as critical for the listed salmonid species. Range-wide, all habitat types are impaired to some degree, even though many of the watersheds comprising the fully designated area are ranked as providing high conservation value. The proposed action, however, affects only freshwater habitats.

Table 3. Physical and biological features of critical habitats designated for ESA-listed salmon and steelhead species considered in this opinion.

Physical and Biological Features		Species Life History Event
Site Type	**Site Attribute**	
Freshwater spawning	Substrate Water quality Water quantity	Adult spawning Embryo incubation Alevin growth and development
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry emergence from gravel Fry/parr/smolt growth and development
Freshwater migration	Free of artificial obstruction Natural cover Water quality Water quantity	Adult sexual maturation Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Estuarine areas	Forage Free of artificial obstruction Natural cover Salinity Water quality Water quantity	Adult sexual maturation and "reverse smoltification" Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Nearshore marine areas	Forage Free of artificial obstruction Natural cover Water quantity Water quality	Adult growth and sexual maturation Adult spawning migration Nearshore juvenile rearing
Offshore marine areas	Forage Water quality	Adult growth and sexual maturation Adult spawning migration Subadult rearing

The PBFs of freshwater spawning and incubation sites include water flow, quality and temperature conditions and suitable substrate for spawning and incubation, as well as migratory access for adults and juveniles. These features are essential to conservation because without them the species cannot successfully spawn and produce offspring.

The PBFs of freshwater migration corridors associated with spawning and incubation sites include water flow, quality and temperature conditions supporting larval and adult mobility, abundant prey items supporting larval feeding after yolk sac depletion, and free passage (no obstructions) for adults and juveniles. These features are essential to conservation because they allow adult fish to swim upstream to reach spawning areas and they allow larval fish to proceed downstream and reach the ocean.

Interior Columbia Recovery Domain

Habitat quality in tributary streams in the Interior Columbia Recovery Domain range from excellent in wilderness and roadless areas to poor in areas subject to heavy agricultural and urban development (NMFS 2009; Wissmar et al. 1994). Critical habitat throughout much of the Interior Columbia Recovery Domain has been degraded by intense agriculture, alteration of stream morphology (i.e., channel modifications and diking), riparian vegetation disturbance, wetland

draining and conversion, livestock grazing, dredging, road construction and maintenance, logging, mining, and urbanization. Reduced summer stream flows, impaired water quality, and reduction of habitat complexity are common problems for critical habitat in developed areas.

Many stream reaches designated as critical habitat in the Interior Columbia Recovery Domain are over-allocated, with more allocated water rights than existing streamflow conditions can support. Withdrawal of water, particularly during low-flow periods that commonly overlap with agricultural withdrawals, often increase summer stream temperatures, block fish migration, strand fish, and alter sediment transport (Spence et al. 1996). Reduced tributary stream flow has been identified as a major limiting factor for MCR steelhead in this area (NMFS 2007; NMFS 2011c).

Despite these degraded habitat conditions, the HUCs that have been identified as critical habitat for this species are largely ranked as having high conservation value. Conservation value reflects several factors, including: (1) how important the area is for various life history stages, (2) how necessary the area is to access other vital areas of habitat, and (3) the relative importance of the populations the area supports relative to the overall viability of the DPS.

2.2.3. Climate Change

Climate change has negative implications for salmon, steelhead, and their designated critical habitat in the Pacific Northwest (ISAB 2007; NWFSC 2015; Scheuerell and Williams 2005; Zabel et al. 2006). Average annual Northwest air temperatures have increased by approximately 1ºC since 1900, or about 50% more than the global average over the same period (ISAB 2007). The latest climate models project a warming of 0.1ºC to 0.6ºC per decade over the next century.

Climate change affects salmon, steelhead, and their habitat throughout the Interior Columbia Basin. Several studies have demonstrated that climate change has the potential to affect ecosystems in nearly all tributaries throughout the region (Battin et al. 2007; ISAB 2007). While the intensity of effects will vary by region (ISAB 2007), climate change is generally expected to alter aquatic habitat (water yield, peak flows, and stream temperature). As climate change alters the structure and distribution of rainfall, snowpack, and glaciations, each factor will in turn alter riverine hydrographs. Given the increasing certainty that climate change is occurring and is accelerating (Battin et al. 2007), NMFS anticipates salmonid habitats will be affected. Climate and hydrology models project significant reductions in both total snow pack and low-elevation snow pack in the Pacific Northwest over the next 50 years (Mote and Salathé 2009), changes that will shrink the extent of the snowmelt-dominated habitat available to salmon. Such changes may restrict our ability to conserve diverse salmon life histories.

The Independent Scientific Advisory Board (ISAB) identified a number of effects climate change would have on Columbia Basin salmon. A few of these include: (1) water temperature increases, and depletion of cold water habitat that could reduce the amount of suitable salmon habitat by about 22% by the year 2090 in Washington State; (2) variations in precipitation that may alter the seasonal hydrograph and modify shallow mainstem rearing habitat; and (3) earlier snowmelt and higher spring flows with warmer temperatures that may cause spring Chinook salmon and steelhead yearlings to smolt and emigrate to the ocean earlier in the spring (Crozier

et al. 2010; ISAB 2007; O'Neal 2002). In addition, climate impacts in one life stage generally affect body size of timing in the next life stage and can be negative across multiple life stages (Healey 2011; Wade et al. 2013; Wainwright and Weitkamp 2013).

In summary, climate change is expected to make recovery of these steelhead populations more difficult to achieve. However, habitat restoration actions can ameliorate at least some adverse impacts of climate change on steelhead. Examples include restoring connections to historical floodplains, and freshwater and estuarine habitats to provide fish refugia and areas to store excess floodwaters; protecting and restoring riparian vegetation to maintain cool stream temperatures; retiring irrigation water diversions; and purchasing or applying easements to lands that provide important cold water or refuge habitat (Battin et al. 2007; ISAB 2007).

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 for the two proposed actions combined includes the Naches River from River Mile (RM) 10.2 downstream to its mouth and includes Cowiche Creek from 100 feet upstream of the proposed pipeline crossing to its mouth. The action area in the Naches is the extent upstream and downstream over which the river's bed, banks, and floodplain are likely to be affected by erosion or deposition caused by the City's construction, operation, and maintenance of the river engineering structures near the water intake and the roughened channel, sluiceway, and pilot channels at the Nelson Dam site. The upstream extent of the action area is approximately 0.5 miles upstream of the water intake site, or approximately one river meander length upstream of the intake; at this location, the Naches River's thalweg runs along the U.S. Highway 12 embankment and is very stable such that geomorphic effects of work near the intake are not expected to manifest upstream of this location. The downstream extent of the action area is the mouth of the Naches, which is predicted to be the extent of deposition of sediment that is mobilized from upstream of Nelson Dam as the river and floodplain adjust to the removal of the dam and operation of the sluiceway over a period of years.

The action area in Cowiche Creek extends from just upstream of the worksite, where minor changes in hydraulics may occur when the temporary cofferdam is installed, downstream to the mouth, where turbidity may be temporarily increased during some construction activities.

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 consultations, 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).

The Yakima Basin Fish & Wildlife Recovery Board (YBFWRB) (2009) and Reclamation (2015) provided an overview of impacts within the Yakima basin that materially affect MCR steelhead and their critical habitat in the Yakima basin. For the following analysis, NMFS will draw from these earlier reviews, as well as more recent information, to focus on conditions and impacts specifically within the action area.

Altered Flows

Since the 1850s, water supply and delivery systems have been developed in the Yakima basin to serve irrigated agriculture mainly, and hydropower, domestic, and industrial users to a lesser degree (YBFWRB 2009). In the first half of the 20th century, the federal government authorized the Yakima Project, after which many private water rights were brought under the jurisdiction of Reclamation and new water rights were issued (YBFWRB 2009). The storage reservoirs and an extensive network of distribution facilities were constructed.

At present, the project is comprised of six major diversion dams, 420 miles of canals, 1,697 miles of lateral ditches, 30 pumping plants, 144 miles of drains, and 2 power plants (Reclamation 2015). The project also supplies water to water users in the basin that own and operate their water distribution infrastructure. In total, almost all water that is stored, released, and diverted in the Yakima Basin is managed as part of the Yakima Project; it is primarily the operation of the Yakima Project, in conjunction with precipitation and runoff patterns, that determines river flows in the action area.

Two Yakima Project reservoirs (Rimrock and Bumping) are upstream of the action area and operated to store water in the winter and spring and release it in spring through fall. Much of that water is then diverted at several diversion dams upstream of and within the action area. In total, the storage and diversion operations decrease the quantity of water in the action area for most of the year. However, during Reclamation's "flip-flop" operation, flows are increased dramatically from approximately September 1 to October 15 in order to convey water through the action area so that it can be diverted at dams farther downstream to water crops.

Based on our analysis of daily average flows for the Naches River in the action area for the 1987–2007 water years (Reclamation Hydromet data), the Yakima Project reduces river flows by approximately half of historical flows on average in winter, and by about one-quarter to one-third in spring through summer. Then the flip-flop operation causes flows that are approximately triple the historical flows during September. However, specific flow impacts may be more or less severe in different hydrological conditions. For example, flow reductions in spring and early summer in drought years are likely more severe than in average years.

Adequate flows are necessary for all life stages of steelhead to successfully contribute to maintaining the population and DPS. In a natural flow regime, flows in the action area would be dominated by snowmelt-driven discharge peaks in May that decline to base flows in August and

September. Late autumn rainfall and minor snowmelt would augment summer base flow, with Chinook winds causing occasional winter high water events.

Ongoing operations of the Yakima Project dramatically affect flow patterns in the action area, reducing the productivity and life history diversity of steelhead (NMFS 2016). Project operations alter flows such that reduced spring flows cause high smolt mortality, and altered winter and summer flows reduce rearing success; improving survival and productivity of these life stages in the action area by improving the flow regime is essential to recovery (NMFS 2016).

Managed flow now provides discharge out of phase with the natural hydrograph, reducing the ability of the action area to support critical habitat functions and productivity of MCR steelhead (as reviewed by the YBFWRB 2009). The most significant changes in flow patterns are the creation of (1) unnaturally low flows, (2) unnaturally high flows, (3) rapidly changing flow levels, (4) return flows, and (5) altered sediment and wood transport (YBFWRB 2009).

Reduced Flows. Reduced summer flows affect several life stages of steelhead. Low summer flows provide less habitat area and have been shown to reduce growth of rearing salmon (Davidson et al. 2010). Low flows often also cause water temperature to increase. Less habitat area and warmer water in summer occurs in the lower Naches River (YBFWRB 2009). These reduced flows degrade the productivity of rearing habitat.

Winter flows are reduced significantly in the Naches River, with the average November flow reduced by 54% due to operation of the Yakima Project (NMFS analysis of Reclamation Hydromet data, 1987–2007). Studies from other basins indicate that in winter, the ability of fish to swim, feed, avoid predators, and conduct other basic behaviors declines (Brown et al. 2011). The ability for salmonids to occupy good rearing habitat in winter is critical and the energetic cost of forced swimming is high enough that it depletes lipids and may result in mortality (Brown et al. 2011). Research in the Snake River basin indicates that dam operations that reduce winter flows reduce the number of juvenile *O. mykiss* that persist until the following spring (Mitro et al. 2003). Physical habitat modeling for the Yakima Basin indicates that winter habitat for subyearlings is particularly limited in parts of the Upper Yakima and Naches Rivers (Bovee et al. 2008). NMFS interprets the collective literature on winter flows and salmonids to conclude that winter rearing success is correlated to winter flows generally, that stable winter low flows and winter median flows are most important to providing stable winter habitat, and that high flow events in winter can be harmful to steelhead juveniles by forcing them from their established habitat, forcing them to expend energy that in some cases reduces their growth and/or survival.

On balance, NMFS expects that the severely reduced winter base flows reduce rearing success significantly, and the reduction in winter peak flows is of some benefit to rearing survival in some years, but insufficient to fully offset the extensive negative effects from reduced base flows. Reclamation has increased its minimum winter flow releases from Rimrock reservoir in recent years, which has reduced the Yakima Project's impact on winter flows by about 5–10% in the action area. Although these modifications have reduced the impact of Yakima Project operations on rearing on Naches steelhead to some degree, current operations remain severely

out of phase with the hydrological patterns that steelhead are adapted to and rely on to carry out essential life functions, which results in poor rearing success and low productivity.

Spring flows are reduced by project operations throughout the action area. As with winter flows, reduced spring flows can reduce the success of rearing steelhead, though reducing the highest of peak flows can offer some degree of protection to the same fish. On balance, reducing spring flows limits rearing success.

The impact of reduced spring flows on outmigrating steelhead smolts in the Yakima basin is significant. Reduced flows during the spring outmigration, lasting from approximately March 15 to June 15, significantly reduce steelhead smolt survival. There is a clear relationship between flow and survival at and just downstream of Reclamation's Roza Diversion Dam in the Upper Yakima River (Courter et al. 2015). Operations of the storage dams and Roza diversion dam result in significant steelhead smolt mortality. It is likely that there is a generally similar effect in the action area.

Increased Flows. Yakima Project operations increase flows far above natural levels in the action area from approximately September 1 to October 15. Increased flows are hypothesized to be harmful to specific life stages for various reasons, as summarized by the YBFWRB (2009). Habitat modelling has indicated that high flows in the Upper Yakima River significantly reduce the area of the river that is usable by rearing fish by increasing water velocity so much that only the river margins can be effectively used. We expect that this phenomenon also occurs within the Naches River in the action area, particularly in locations with degraded floodplains and levees that prevent higher flows from spreading out among multiple natural channels or creating shallow habitat at main channel margins. Young-of-the-year steelhead are expected to be most severely affected, with older juveniles affected as well.

Rapid Changes in Flow. Yakima Project operations cause rapidly declining flows at the end of the "flip-flop" operation in October. Rapidly declining flows do occur in a natural flow regime, but rarely occur in late summer, when very young steelhead would be exposed. There have been numerous observations of juvenile fish being stranded and dying in pools that are isolated by rapidly declining flows (YBFWRB 2009) in the Upper Yakima River, and we expect a similar phenomenon occurs in the Naches River in the action area. Rapid drops in flow in the Yakima basin also appears to prevent riparian cottonwood forests from successfully regenerating (Jamieson and Braatne 2001), which appears to affect the Naches River, among other reaches.

In the last 20 years, Reclamation has modified "flip-flop" operations to more gradually reduce flows in the Upper Yakima River and increase flows in the Tieton and Naches Rivers. This modification has probably slightly reduced stranding of rearing juveniles in side channels, and possibly contributed to reducing the impact of flow management on macroinvertebrates. However, negative effects of "flip-flop" remain widespread and NMFS is not aware of any efforts to re-establish a flow regime that will aid regeneration of cottonwoods that steelhead rely on to form the base of the riparian forest community through much of the action area.

Fish Passage

Steelhead movement within the action area is partially obstructed at Nelson Dam and at the Cowiche Creek fish ladder. Fish passage facilities at Nelson Dam do not function as intended. Proper operation of the fish ladder for upstream migration is frequently impaired due to sediment accumulation in the forebay of the dam and within the fish ladder itself. Local biologists believe that adult steelhead can simply jump the dam itself during high spring flows, although it appears that the dam may sometimes delay migration. Probably more important for MCR steelhead is the regular accumulation of cobble and gravel at the outlet of the fish screen bypass pipe. This accumulation creates very shallow water, and sometimes completely buries the outlet, such that smolts protected from entrainment into the canal inlets are then discharged at high velocity into gravel and cobble, resulting in injury or death. Over a number of years, Reclamation has made attempts to remove gravels and cobbles to improve function of the ladder and screen bypass outlet, but the problems are very difficult to resolve due to a combination of facility design and local sediment dynamics.

At the Fruitvale water diversion near the mouth of Cowiche Creek, a seasonal fish ladder is operated during the irrigation season to allow adult fish access to Cowiche Creek while the irrigation diversion is operating. Some adult steelhead may need to traverse the ladder, and can likely do so to access spawning grounds upstream. However, the combination of the diversion and ladder creates a migration barrier for juvenile steelhead when in operation, reducing their ability to find the optimal habitat as flows and temperatures change through the irrigation season.

Floodplain Development

Floodplain development has significantly reduced the capacity of the action area to support incubating and rearing steelhead, reducing growth, and ultimately survival. Historically, most reaches of the Naches were complex networks of channels covered by dense riparian forest (YBFWRB 2009) and characterized by floodplain-river interactions upon which the maintenance of productive aquatic habitat relies (Spence et al. 1996). The Naches River and its floodplain in the action area have been impacted by development of infrastructure, particularly U.S. Highway 12, Nelson Dam, and a series of levees. The floodplain throughout most of the area is composed of patchy riparian vegetation, agricultural areas, and residential development.

The upper 2 miles in the action area appear to still be adjusting to the construction of U.S. Highway 12 and the construction and rebuilding of numerous river training structures. The river has undergone periods of incision in the vicinity of the City water intake (RM 9.7), and more rapid incision has been temporarily arrested by frequent interventions including grade control structures and barbs (City of Yakima 2020a). In the last decade, channel incision in the main channel near the intake has disconnected a side channel of the river at most flows, concentrating the river along poor habitat at the margin of U.S. Highway 12.

The reach from approximately RM 8 downstream to Nelson Dam (RM 3.8) is characterized by aggradation, and significant instability and braiding (Yakima County 2006). Construction of Nelson Dam and levees reduced the river's slope in this reach and led to significant aggradation of coarse sediment that has caused lateral channel instability and increased flood risk

substantially. Nelson Dam acts as a grade control, impeding sediment movement (City of Yakima 2020b). The river has shifted toward a more active braided form, which has likely impacted steelhead by increasing the risk that their redds will be destroyed as the channel bed cuts and fills during high spring flows.

The river is highly constricted and degraded from Nelson Dam downstream to the Naches confluence. The river in this reach is pinched between steep uplands and U.S. Highway 12 such that it is straight and narrow. Additionally, Nelson Dam and the levee system significantly reduce sediment recruitment to the reach, causing further degradation. The Yakima Basin Recovery Plan for MCR steelhead (YBFWRB 2009) identifies "Improvement of sediment transport in the lower Naches River" as Recovery Action #6 for the Naches steelhead population, and indicates that modifying Nelson Dam and levees is the mechanism to achieve the prescribed restoration outcome.

Effects of floodplain development in the action area include: (1) an extensive restriction of the channel migration zone, reducing or eliminating large wood and sediment recruitment and other processes which help create aquatic habitat; (2) blocked access to the floodplain, impairing or preventing many ecological processes (e.g., fish access to off-channel habitats, nutrient exchange, hyporheic zone function); (3) an extensive reduction in riparian zone vegetation and function, including the food, shade, and overhead cover it provides for fish; (4) reducing the quantity of in-stream habitat and simplifying the habitat such that it provides less cover for rearing steelhead (YBFWRB 2009); and (5) decreased water quality due to pollutants delivered from developed floodplain areas.

Over the past 2 decades or so, numerous actions have improved floodplain and channel conditions in the action area. Many of these actions have been led by Yakima County through implementation of their Upper Yakima River and Naches River Comprehensive Flood Hazard Management Plans (CHFMPs). In accordance with the CHFMPs, Yakima County and other state and local governments have acquired several hundred acres of floodplain properties, set back numerous levees from the river, and constructed and restored several miles of channels (Yakima County 2018). These actions have generally occurred in the lower 17.5 miles of the Naches River, upstream of and within the action area. The extensive floodplain restoration program has not and will not fully restore all of the habitat quantity and function that MCR steelhead experienced historically, but it has and will continue to significantly improve the capacity of the action area to support spawning, rearing, and migration of steelhead.

The floodplain of Cowiche Creek in the action area is highly modified. The creek is confined to a narrow alignment as it passes under U.S. Highway 12, and is then confined by two levees to its confluence. A narrow band of riparian vegetation provides minimal function. Most of the formerly connected floodplain is dominated by impervious surface or orchard. The County intends to restore the Cowiche floodplain downstream of U.S. Highway 12 after relocating the point of diversion (POD) to the Nelson Dam site.

Water Quality Impairment

Unnaturally high summer water temperatures are common throughout the action area (see DOE 2008, and DOE 2018). High water temperatures are caused by a combination of (1) warm inputs from tributary streams due to land management practices, (2) unnaturally low flows caused by storage and diversion of water by Reclamation's Yakima Project, and (3) levees and highways adjacent to the Naches River. Levees reduce the frequency that water spreads over the floodplain and infiltrates, then seeps back into the river, and levees in the action area are generally constructed and maintained in a tree-free state that reduces shading to the river. Limiting shade adjacent to the river results in rapid heating.

High water temperatures in the action area exceed optimal conditions for salmonids (DOE 2008, and DOE 2018). Temperatures in in the action area are generally not high enough to lead to direct mortality of fish, but are high enough to reduce growth, contributing to reduced smolt size. Smaller smolts are less likely to survive to adulthood. Thus, reducing growth of juveniles ultimately reduces population size.

Kelt Reconditioning Program

The Yakama Nation has operated a BPA-funded steelhead kelt reconditioning program since 2001 to increase the rate of repeat spawning by adult steelhead. Approximately 36% of reconditioned kelts survive to spawn a second time (NMFS 2016), which appears higher than the survival rate of non-reconditioned kelts. Therefore, it is likely that the program has increased steelhead abundance in the Yakima MPG and will continue to do so in the future. The program is operated downstream of the action area, but affects spawning rates in the action area.

Environmental Baseline Summary

Middle Columbia River steelhead from the Naches population inhabit the action area and depend on it to support critical life functions. The Yakima Project has caused significant changes in river flows that impact steelhead and their habitat, particularly in its ability to support rearing and migration. Floodplain development throughout the action area has generally simplified the river system and bank habitats. Nelson Dam is the main driver of sediment aggradation upstream and sediment starvation downstream. Water quality in the action area is suboptimal. The Naches steelhead population inhabits the action area and is buoyed to a degree by the Yakama Nation's kelt reconditioning program. Overall, human development has severely degraded the action area such that current conditions appear insufficient to support recovery of MCR steelhead.

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, including the consequences of other activities 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 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17(a) and (b).

Effects on ESA-Listed Species

Short-term Effects. The following effects will occur during construction of the Yakima Naches River Water Treatment Plant Intake and River Stabilization Project and/or construction of the Nelson Dam Removal Project.

Fish Salvage and Dewatering

For each project, a large in-river work area will be isolated with cofferdams and dewatered to facilitate construction. The BA for each project references procedures for dewatering and salvaging fish for subsequent release. Fish salvage efforts will generally proceed from dipnetting and seining to electrofishing, as feasible. Fish salvage will occur when juveniles are the only lifestage of steelhead expected to be present in the action area.

Many factors influence the success of fish salvage efforts, including water depth, habitat complexity, temperature, salvage methods, crew experience, and care of fish after capture. At best, all fish are captured without injury and successfully released. However, in many cases some fish are difficult to capture, sustain injuries, and experience high stress after capture before they are released. Large salvage areas generally pose problems related to handling, measuring, holding, and relocating large numbers of stressed fish. For Stage 1 of the construction at the water intake in particular, it is unclear if the City will have a large enough crew available to efficiently capture, process, and release fish with minimum holding times.

NMFS used available data from the Upper Yakima River and Cowiche Creek to estimate the density of juvenile fish in the action area during dewatering and salvage operations. For Cowiche Creek, NMFS reviewed the results of five fish surveys and one fish salvage event from 2009 to 2017 in and just upstream of the area to be dewatered (WDFW, unpublished data). On average, those efforts yielded 0.4 juvenile *O. mykiss* per linear foot of stream length. Therefore, we estimate that 90 juveniles will be present in the 225-foot length of Cowiche Creek to be dewatered in Phase 2 of the Nelson Dam project (225 linear feet * 0.5 juveniles per linear foot = 90 juveniles).

We used information from the Upper Yakima River (WDFW, unpublished data) to estimate juvenile density in the Naches River, because adequate data for the Naches River were unavailable. Upper Yakima River boat electrofishing survey data were converted via procedures described by NMFS (2020) to yield an estimate of 0.0013 juveniles per square foot of riverbed. The intake project is proposed to dewater 310,000 square feet of riverbed (280,000 square feet in Stage 1 and 30,000 square feet in Stage 2). Therefore, we estimate that 403 juveniles will be present in the dewatered area (310,000 square feet * .00013 juveniles per square foot = 403 juveniles). For the 79,000 square feet that will be dewatered as part of phase 1 of the Nelson Dam project, we estimate that 103 juveniles will be exposed to salvage or stranding (79,000 square feet * .00013 juveniles per square foot = 103 juveniles).

NMFS conservatively estimates that 80% of juveniles in the area will be captured and released without ill effects during fish salvage[1]. However, we expect that the remaining 20% will be injured or killed because they are unable to be captured during fish salvage and succumb to dewatering, or they will be captured and experience external or internal injury including injurious levels of stress during holding and handling. Those fish that are injured or experience injurious levels of stress would be even less likely to survive the challenges of outmigration and so would ultimately die as a result of their injuries.

Therefore, for the Nelson Dam project, where 90 juveniles will be affected in Cowiche Creek and 103 will be affected in the Naches River, we estimate that a total of 154 juvenile steelhead will be captured and released safely, and that 39 juveniles will be injured or killed. For the water intake project, of the 403 juveniles in the dewatering area, we expect 322 juveniles to be captured and released safely, and 81 juveniles to be injured or killed. In total, the two proposed actions are expected to result in the injury and death of 120 juveniles (39 for Nelson Dam and 81 for the water intake project).

Mechanical Injury and Death

Juvenile steelhead may be crushed during fill and excavation in areas containing fish that will not be subject to prior worksite isolation and dewatering. For both projects, extensive cofferdams will be installed by heavy equipment that may injure or kill fish. Additionally, for the intake project, heavy equipment crossing and partial installation of the RGC-1 structure will occur in the river without worksite isolation. Based on project plans (City of Yakima 2020b, Appendix A), NMFS estimates the total in-water footprint of cofferdams in the Naches River for the Nelson Dam project to be 9,000 square feet. For the water intake project, approximately 29,000 square feet of in-water work will occur outside of isolation for the aggregate of cofferdams, a river crossing, and finishing the RGC-1 structure.

Most fish in these areas are likely to avoid being injured or killed via crushing by equipment or coffer dam materials by fleeing the immediate area during disturbance. However, some fish are likely to be crushed because they do not flee or because they seek refuge in river substrates that will then be impacted by fill or excavation. In total, NMFS expects that 10% of the fish in the footprint of this work in the Naches River will be injured or killed[2].

Using the estimate of 0.0013 juveniles per square foot in the Naches River that was described above, we estimate that 12 juvenile steelhead would be expected in the footprint for Nelson Dam cofferdams (9,000 square feet * .00013 juveniles per square foot = 12 juveniles), and that 2 of those juveniles would be injured or killed (10% of 12, rounding up). For the water intake project, we estimate that 38 juveniles would be in the footprint of un-isolated in-water work (29,000

[1] This is a conservative estimate based on the professional opinion of NMFS biologists' field experience and takes into account expected fish size, capture methods, and site conditions including anticipated depth, cover, substrate, turbidity, and flow.

[2] This is a conservative estimate based on the professional opinion of NMFS biologists' field experience and takes into account expected fish size, escape behavior, construction techniques, and available cover habitat including substrate size.

square feet * .00013 juveniles per square foot = 38 juveniles), and that 4 of those juveniles will be injured or killed (10% of 38, rounding up).

In Cowiche Creek, NMFS does not expect any fish to be crushed due to the very small scale of the cofferdams needed to isolate the work area.

Fish Passage

The City will ensure adequate fish passage around the dewatered areas in the Naches River for both projects, such that there will not be a meaningful effect to fish passage. However, worksite isolation in Cowiche Creek will prevent upstream migration during Phase 2 of the Nelson Dam project. Routing Cowiche Creek around the worksite in two pipes will allow fish to move downstream past the worksite, but will not allow upstream migration over a period of 4 weeks during the July–August construction window. Generally, no adult steelhead are present in the action area in the summer and upstream and downstream movement of juveniles is likely localized and limited to a minority of juveniles that occupy the area. Juveniles undertake local summer movements to support growth by finding additional food and better habitats as flows drop in the summer. We expect that a few individuals will be prevented from moving upstream in Cowiche Creek and as a result, they may be exposed to conditions that cause reduced growth.

Water Quality

Extensive in-water work for both projects will resuspend some of the fine sediments in the river bed into the water column, increasing turbidity and causing a plume of turbid water downstream from the construction areas. The BA for each project includes a list of practices to reduce the frequency, extent, and severity of turbidity plumes.

Increased suspended sediment can be detrimental to juvenile salmon and steelhead in several ways including avoidance of the area, abandonment of cover, stress, and reduced growth rates (Newcombe and Jensen 1996). Increased suspended sediment can also positively affect juveniles by making it more difficult for their predators to see them. NMFS expects that the turbidity levels generated by this action will be sufficient in the action area to cause temporary behavioral changes to steelhead that include changes in feeding and movement of fish within turbidity plumes (Berg and Northcote 1985), but not so long-lasting or severe as to cause any fish to be harmed or killed.

Additional impairment of water quality may result from accidental releases of fuel, oil, and other contaminants that can in some cases injure or kill aquatic organisms. Such releases, while rare, are reasonably likely to occur from the use of heavy equipment. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain polycyclic aromatic hydrocarbons (PAH), which can kill salmon at high levels of exposure, and can cause sublethal, adverse effects at lower concentrations (Meador et al. 2006). NMFS anticipates PAH releases of only very small quantities (ounces) are likely with each accidental release or spill, and therefore effects among fish are likely to be minimal. Spills or releases larger than a few ounces are not reasonably certain to occur. Dewatering and worksite isolation, as well as concrete curing standards

proposed for the Nelson Dam project, will ensure that uncured concrete in contact with the river will not meaningfully impact pH.

Long-term effects. The following effects will occur over years or decades following construction.

Fish Passage

The Nelson Dam project will significantly improve the ability of steelhead to safely pass the dam. The new facility will allow multiple passage routes upstream and downstream for adult and juvenile steelhead such that at least one route will be passable at anticipated flows. The project will eliminate the juvenile bypass pipe that has routed many juveniles into a buried outlet facility or dangerously shallow location for many years. Eliminating the bypass pipe and effectively replacing it with the multiple naturalistic roughened channels and the sluiceway route will increase survival of smolts as they migrate downstream. The Nelson Dam bypass discharge is the biggest known source of smolt mortality in the action area, and is likely the biggest in the Naches basin, and the proposed action will eliminate it.

The roughened channels will also allow upstream movement of juvenile steelhead, which will allow localized movements to seek out more favorable rearing habitat. In addition, the roughened channels will provide adult steelhead several routes to pass the dam en route to spawning. Although existing conditions at Nelson Dam, including a periodically blocked fishway, are not known to harm large numbers of migrating adult steelhead, it is likely that existing conditions cause some migration delay and expenditure of extra energy for migrating adults. Once the new facility is operating, upstream passage for adults should be relatively easy across a broad range of flows.

The long-term passage benefits of improved passage are significant at the population scale, because nearly all steelhead from the Naches population need to pass the dam to complete their life cycle.

Channel Form and Sediment Movement

The proposed actions will have different effects throughout the action area with respect to the form and function of the channel and floodplain. In the vicinity of the City's water intake, the RGCs, ELJs, and keyway structures will immediately increase aquatic habitat complexity, providing a wider variety and generally higher quality of rearing habitats. Within the construction footprint, these structures are likely to increase growth and survival of rearing fish.

At the reach scale, the structures at the City's water intake will stabilize the thalweg laterally and vertically and reconnect the right bank side channel at some flows. These changes may have positive and negative results for steelhead and their critical habitat over a period of several decades. Positive effects include reducing the threat of continued incision, which could disconnect more floodplain, and ensuring connectivity of the right bank side channel, which will support rearing steelhead. A negative effect is laterally stabilizing the thalweg, ensuring that the main channel remains adjacent to U.S. Highway 12, which offers poor habitat. It is uncertain

exactly how the channel would evolve in the absence of the proposed action, such that the relative weight of positive and negative effects is difficult to ascertain. Based on recent trends in channel evolution in the reach, NMFS expects that on balance the reach-level effects will be neutral or slightly positive with respect to steelhead rearing, and the site-level effects of increased complexity on reach-scale productivity will be positive.

The action at Nelson Dam is a significant part of Recovery Action #6 [Improvement of sediment transport in the lower Naches River (YBFWRB 2009)] for the Naches steelhead population and is expected to improve habitat over 6 miles upstream and downstream of the dam. The new roughened channel structure and operation of the sluice gate will effectively reduce the height of the dam, which will change the slope of the river's surface and bed over time. This change in slope will result in more natural sediment movement through the river, reversing some of the effects caused by the artificial obstruction that is Nelson Dam. The extensive aggradation and increased lateral instability that has been well documented upstream of the dam will be reversed to some degree as sediment is transported to and over the new structure. As the channel bed incises to a more natural elevation, flooding will also be reduced. NMFS expects that a multi-threaded channel will still exist upstream of the dam, but that less lateral erosion will improve the longevity of riparian trees in the reach and reduce the threat of steelhead redd scour. Improving the longevity of riparian forest will contribute to improved rearing habitat quality and improved rearing productivity. Reducing redd scour will improve steelhead productivity in the egg and embryo lifestage.

From Nelson Dam downstream to the Naches–Yakima confluence, the proposed action at Nelson Dam will cause an increase in sediment supply. As described above, changes at the dam will allow sediment to move more naturally down the river corridor, which will reduce the degree to which the lowest river reach is starved of sediment. Increased sediment flow over the roughened channels or through the sluicegate will begin to replenish the coarse sediment supply in the lowest reach, and begin to reverse historic incision of the channel and disconnection from the floodplain, improving the quality, and perhaps quantity, of rearing habitat and increase productivity for steelhead during rearing.

Operation of Water Diversion

The new facilities were designed to meet or exceed NMFS's fish passage criteria, and therefore generally present low risk to harm fish. However, it is likely that a small number of juveniles will be impinged or otherwise injured on the screens. Although the risk to each individual fish is very low, large numbers of fish will interact with the screens as they divert up to 84 cfs during the April 1 to October 15 irrigation season. The risk of injury will be highest at low water temperatures, for the smallest fish, and when debris creates temporary "hot spots" with higher than normal water velocities. Operation of the new consolidated water diversion and screens will supplant operation of the existing diversions and screens at Nelson Dam and the Fruitvale and Old Union diversions. The new intake and screen will meet modern screening criteria for safe fish passage (NMFS 2011a), and will therefore likely reduce the number of juvenile steelhead entrained, impinged, or otherwise harmed as compared to the existing screens.

NMFS expects no more than a few individual steelhead juveniles to be injured on the screens per year.

Maintenance Actions at Nelson Dam and the City's Water Intake

As described in the Proposed Action, some maintenance activities will be needed at each site, although the specifics are difficult to predict. NMFS expects that minor actions, such as removing logs from the Nelson sluiceway, will not harm any steelhead, although in-water excavation or fill would have a much higher potential for harm. It is assumed that in-water maintenance fill or excavation activities will be required approximately every 2 years over 0.25 acres at the water intake site and at Nelson Dam. The maintenance activity may include cofferdamming and dewatering, depending on circumstances.

Again using the estimate of .0013 juvenile steelhead per square foot of Naches River, NMFS estimates that 14 juvenile steelhead will be in the maintenance footprint (0.25 acres *43,560 square feet per acre * .0013 juvenile steelhead per square foot). Assuming that work will proceed similar to that for project construction, NMFS assumes that 20% of the fish in the maintenance footprint will be injured or killed. Therefore, NMFS assumes that 3 juveniles will be injured or killed per maintenance event (14 juveniles * 20%, rounding up), and the remaining 11 fish may be captured and released safely. These events will occur on average every other year for each proposed action, or a combined total averaging once per year.

Point of Diversion Changes

The proposed action will result in the PODs for the Old Union and Fruitvale water rights being moved upstream approximately 1 mile from their current PODs to the new consolidated water intake structure at the Nelson Dam site. Moving the PODs will reduce flows in the river between the existing and new PODs during the April 1–October 15 irrigation season. The diversions to be moved can withdraw a maximum of 43 cfs. However, nearly all irrigation diversions fluctuate over the irrigation season such that there will not be a constant 43 cfs reduction in the Naches River for the mile-long affected reach.

Mean flows in the affected reach during the spring are typically about 2,000 cfs, and drop to 365 cfs in August, before increasing steeply in September. As described in the Environmental Baseline, natural flows in spring and summer have been reduced by the Yakima Project and reduce rearing and outmigration success. The flow reduction will be approximately 1–2% of the river flow during spring migration and approximately 11% during August. The POD changes are expected to incrementally degrade outmigration productivity in spring and rearing success in summer over the mile-long affected reach.

The change to spring outmigration productivity is expected to be very small, given the combination of a small reduction in flow relative to baseline flows and the relatively small spatial extent of the effect. The effect on rearing success is mixed. Reduced flows in July and August are expected to reduce productivity incrementally, while reduced flows in September would incrementally increase productivity by reversing a portion of the unnaturally high flows that occur at that time due to operation of the Yakima Project.

Vegetation Disturbance

Each of the proposed actions will result in the clearing of riparian vegetation. Most of the clearing will be in areas with herbaceous, shrub, or immature trees. Trees that are cleared will be left in the vicinity to improve in-stream and floodplain habitat. The proposed actions also include planting native vegetation in areas far exceeding the footprint of clearing areas.

Riparian vegetation contributes to many aspects of productive salmonid habitat, including shade, food production, physical complexity, etc. (Spence et al. 1996). Removal of vegetation generally has the potential to reduce instream habitat quality. For the proposed actions, potential impacts will be mitigated by primarily clearing immature forest, herbaceous vegetation, and shrubs, by leaving cut trees on site, and by planting back much larger areas than those that are cleared. At Nelson Dam, much of the cleared area will become in-stream habitat as the pilot channels are graded, creating instantly usable rearing areas. In total, there will not be a significant positive or negative effect on rearing productivity or individual steelhead.

2.5.2. Effects on Critical Habitat

The effects of the proposed actions on the PBFs of critical habitat are summarized in Table 4.

Table 4. Impact of effect pathways on the conservation value of the three physical and biological features (PBFs) of critical habitat in the action area.

Effect Pathway	Duration	Freshwater Spawning PBF	Freshwater Rearing PBF	Freshwater Migration PBF
Fish Passage	4 weeks	-	↓	-
Water Quality	During Construction	-	-	-
Fish Passage	Long-term		↑	↑↑↑
Channel Form and Sediment Movement	Long-term	↑↑	↑↑↑	-
Operation of Water Diversion	Long-term	-	-	↑
Point of Diversion Changes	Long-term	-	↑ September ↓ July–Aug	↓
Vegetation Disturbance	Long-term	-	-	-

↑ slight improvement, ↑↑ large improvement, ↑↑↑ very large improvement, ↓ slight decline, - neutral

Short-term Effects. The following effects to critical habitat will occur during construction of the Yakima Naches River Water Treatment Plant Intake and River Stabilization Project and/or construction of the Nelson Dam Removal Project.

Fish Passage

The City will ensure adequate fish passage around the dewatered areas in the Naches River for both projects, such that there will not be a meaningful effect to the fish movement in the Naches River. However, worksite isolation in Cowiche Creek will prevent upstream movement during Phase 2 of the Nelson Dam project. Routing Cowiche Creek around the worksite in two pipes will allow fish to move downstream past the worksite, but will not allow upstream movement

over a period of 4 weeks during the July–August construction window. Generally, steelhead do not undertake significant upstream or downstream migrations in Cowiche Creek during this time, but rearing juveniles may undertake local summer movements to support growth by finding additional food and better habitats as flows drop in the summer. Blocking upstream passage for up to 4 weeks would very slightly reduce the ability of any fish present to productively rear and therefore is a minor and temporary reduction in the conservation value of critical habitat with respect to the freshwater rearing PBF.

Water Quality

Extensive in-water work for both projects will resuspend some of the fine sediments in the river bed into the water column, increasing turbidity and causing a plume of turbid water downstream from the construction areas. The BA for each project includes a list of practices to reduce the frequency, extent, and severity of turbidity plumes.

Increased suspended sediment can be detrimental to juvenile salmon and steelhead in several ways including avoidance of the area, abandonment of cover, stress, and reduced growth rates (Newcombe and Jensen 1996). Increased suspended sediment can also positively affect juveniles by making it more difficult for their predators to see them. NMFS expects that the turbidity levels generated by this action will be sufficient in the action area to cause temporary behavioral changes to steelhead that include changes in feeding and movement of fish within turbidity plumes (Berg and Northcote 1985), but not so long-lasting or severe as to cause any fish to be harmed or killed.

Additional impairment of water quality may result from accidental releases of fuel, oil, and other contaminants that can in some cases injure or kill aquatic organisms. Such releases, while rare, are reasonably likely to occur from the use of heavy equipment. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain PAH, which can kill salmon at high levels of exposure, and can cause sublethal, adverse effects at lower concentrations (Meador et al. 2006). NMFS anticipates PAH releases of only very small quantities (ounces) are likely with each accidental release or spill, and therefore effects among fish are likely to be minimal. Spills or releases larger than a few ounces are not reasonably certain to occur. Dewatering and worksite isolation, as well as concrete curing standards proposed for the Nelson Dam project, will ensure that uncured concrete in contact with the river will not meaningfully impact pH. No meaningful change is expected in the function of any PBF.

Long-term effects. The following effects will occur over years or decades following construction.

Fish Passage

The Nelson Dam project will significantly improve the ability of steelhead to safely pass the dam. The new facility will allow multiple passage routes upstream and downstream for adult and juvenile steelhead such that at least one route will be passable at anticipated flows. The project will eliminate the juvenile bypass pipe that has routed many juveniles into a buried outlet facility or dangerously shallow location for many years. Eliminating the bypass pipe and effectively

replacing it with the multiple naturalistic roughened channels and the sluiceway route will increase survival of smolts as they migrate downstream. The Nelson Dam bypass discharge is the biggest known source of smolt mortality in the action area, and is likely the biggest in the Naches basin. Removing the bypass pipe will substantially improve the function of the freshwater migration PBF by substantially improving downstream migration conditions.

In addition, the roughened channels will provide adult steelhead several routes to pass the dam en route to spawning. Although existing conditions at Nelson Dam, including a periodically blocked fishway, are not known to harm large numbers of migrating adult steelhead, it is likely that existing conditions cause some migration delay and expenditure of extra energy for migrating adults, and therefore the dam reduces the ability of the action area to support the freshwater migration PBF for adults. Once the new facility is operating, upstream passage for adults should be relatively easy across a broad range of flows such that the proposed action will cause improved function in the freshwater migration PBF by improving upstream migration conditions.

The roughened channels will also allow upstream movement of juvenile steelhead, which will allow localized movements to seek out more favorable rearing habitat, improving the function of the freshwater rearing PBF. It is unknown to what degree Nelson Dam's prevention of upstream juvenile migration impedes recovery; therefore the improvement to the freshwater rearing PBF is assumed to be slight.

Channel Form and Sediment Movement

The proposed actions will have different effects throughout the action area with respect to the form and function of the channel and floodplain. In the vicinity of the City's water intake, the RGCs, ELJs, and keyway structures will immediately increase aquatic habitat complexity, providing a wider variety and generally higher quality of rearing habitats. Within the construction footprint, these structures will increase the function of the freshwater rearing PBF.

At the reach scale, the structures at the City intake will stabilize the thalweg laterally and vertically and reconnect the right bank side channel at some flows. These changes may have positive and negative results for habitat function over a period of several decades. Positive effects include reducing the threat of continued incision, which could disconnect more floodplain, and ensuring connectivity of the right bank side channel, which will support rearing. A negative effect is laterally stabilizing the thalweg, ensuring that the main channel remains adjacent to U.S. Highway 12, which offers poor habitat. It is uncertain exactly how the channel would evolve in the absence of the proposed action, such that the relative weight of positive and negative effects is difficult to ascertain. Based on recent trends in channel evolution in the reach, NMFS expects that on balance the reach-level effects will be neutral or slightly positive with respect to the freshwater rearing PBF, and the site-level effects will be positive.

The proposed action at Nelson Dam will affect the Naches River and floodplain upstream of the dam for several miles and the effects will last as long as the new structure does. The new structure and operation of the sluice gate will effectively reduce the height of the dam, which will change the slope of the river's surface and bed over time. This change in slope will result in

more natural sediment movement through the river, reversing some of the effects caused by the artificial obstruction that is Nelson Dam. The extensive aggradation and increased lateral instability that has been well documented upstream of the dam will be reversed to some degree as sediment is transported to and over the new structure. As the channel bed incises to a more natural elevation, flooding will also be reduced. NMFS expects that a multi-threaded channel will still exist upstream of the dam, but that less lateral erosion will improve the longevity of riparian trees in the reach and reduce the threat of steelhead redd scour. These changes are expected to increase the conservation value of the reach above Nelson Dam with respect to the freshwater spawning PBF and freshwater rearing PBF. Excavation of the pilot channels near the dam will accelerate changes in sediment mobility such that benefits start accruing immediately.

From Nelson Dam downstream to the Naches–Yakima confluence, the proposed action at Nelson Dam will cause an increase in sediment supply. As described above, changes at the dam will allow sediment to move more naturally down the river corridor, which will reduce the degree to which the lowest river reach is starved of sediment. Increased sediment flow over the roughened channels or through the sluicegate will begin to replenish the coarse sediment supply in the lowest reach, and begin to reverse historic incision of the channel and disconnection from the floodplain. These changes will support improved channel and floodplain complexity and improve the function of the freshwater rearing PBF.

The action at Nelson Dam is a significant part of Recovery Action #6 [Improvement of sediment transport in the lower Naches River (YBFWRB 2009)] because it is expected to improve the conservation value of critical habitat with respect to the freshwater rearing PBF by improving sediment transport over approximately 6 miles of the Naches River.

Operation of Water Diversion

The new facilities were designed to meet or exceed NMFS' current fish passage criteria, and therefore generally present low risk to harm fish. However, it is likely that a small number of juveniles will be impinged or otherwise injured on the screens. Although the risk to each individual fish is very low, large numbers of fish will interact with the screens as they divert up to 84 cfs during the April 1 to October 15 irrigation season. The risk of injury will be highest at low water temperatures for the smallest fish, and when debris creates temporary 'hot spots' with higher than normal water velocities.

Operation of the new consolidated water diversion and screens will supplant operation of the existing diversions with older screens at Nelson Dam and the Fruitvale and Old Union diversions. The new intake and screen will meet modern screening criteria for safe fish passage (NMFS 2011a), and will therefore meet more rigorous fish safety standards than the older generation screens at the existing diversions. Therefore, operating the new water diversion instead of the existing diversions will cause at least a slight increase in the conservation value of critical habitat with respect to the freshwater migration PBF.

Point of Diversion Changes

The proposed action will result in the PODs for the Old Union and Fruitvale water rights being moved upstream approximately 1 mile from their current PODs to the new consolidated water intake structure at the Nelson Dam site. Moving the PODs will reduce flows in the river between the existing and new PODs during the April 1–October 15 irrigation season. The diversions to be moved can withdraw a maximum of 43 cfs. However, nearly all irrigation diversions fluctuate over the irrigation season such that there will not be a constant 43 cfs reduction in the Naches River for the mile-long affected reach.

Mean flows in the affected reach during the spring are typically about 2,000 cfs, and drop to 365 cfs in August, before increasing steeply in September. As described in the Environmental Baseline, natural flows in spring and summer have been reduced by the Yakima Project and reduce rearing and outmigration success. The flow reduction will be approximately 1-2% of the river flow during spring migration and approximately 11% during August.

The change to the freshwater migration PBF is expected to be slight, given the combination of a small reduction in flow relative to baseline flows and the relatively small spatial extent of the effect. The effect on the rearing PBF is mixed. Reduced flows in July and August are expected to reduce the function of the rearing PBF incrementally, while reduced flows in September would incrementally increase function of the rearing PBF by reversing a portion of the unnaturally high flows that occur at that time due to operation of the Yakima Project.

Vegetation Disturbance

Each of the proposed actions will result in the clearing of riparian vegetation. Most of the clearing will be in areas with herbaceous, shrub, or immature trees. Trees that are cleared will be left in the vicinity to improve in-stream and floodplain habitat. The proposed actions also include planting native vegetation in areas far exceeding the footprint of clearing areas.

Riparian vegetation contributes to many aspects of productive salmonid habitat, including shade, food production, physical complexity, etc. (Spence et al. 1996). Removal of vegetation generally has the potential to reduce instream habitat quality. For the proposed actions, potential impacts will be mitigated by primarily clearing immature forest, herbaceous vegetation, and shrubs, by leaving cut trees on site, and by planting back much larger areas than those that are cleared. At Nelson Dam, much of the cleared area will become in-stream habitat as the pilot channels are graded, creating instantly usable rearing areas. In total, there will not be a significant positive or negative effect on the function of any PBF from vegetation disturbance.

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 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 environmental baseline (Section 2.4).

In the Yakima Steelhead Recovery Plan, the YBFWRB (2009) reports that rapid human population growth and development is occurring in Yakima County. In many areas, forest and agricultural lands are being converted to residential, commercial, and industrial uses. This development is often located adjacent to streambanks, which can result in the reduction or elimination of riparian zones and increased flood hazards. The probability of conflict between new land uses and floodplain and stream channel functions (which sustain fish habitat and conveyance of water and sediment) is high (YBFWRB 2009). Development of the floodplain in the action area is expected to continue, though impacts will be ameliorated to some degree through more modern floodplain and environmental protection regulations.

Various habitat restoration projects have been implemented annually throughout the Yakima basin, and NMFS assumes that they will continue. Some of these projects do not require Federal authorization or funding, and therefore they will contribute to cumulative effects. Approximately one of these projects every 2–3 years is constructed in the regulated reaches of the Naches River that comprise the action area. These actions typically provide localized habitat benefits and, to some degree, counteract the negative effects of continued development of floodplain areas and maintaining floodworks.

In total, cumulative effects will generally perpetuate the existing conditions in the action area that were described in the Environmental Baseline.

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 as a whole for the conservation of the species.

Middle Columbia River steelhead from the Naches population inhabit the action area and depend on it to support critical life functions. The Yakima Project has caused significant changes in river flows that impact steelhead and their habitat, particularly in its ability to support rearing and migration. Floodplain development throughout the action area has generally simplified the river system and bank habitats. Nelson Dam is the main driver of sediment aggradation upstream and sediment starvation downstream and consequent impacts to steelhead habitat and productivity. Water quality in the action area is suboptimal. The Naches steelhead population inhabits the action area and is buoyed to a degree by the Yakama Nation's kelt reconditioning program.

Overall, human development has severely degraded the action area such that current conditions appear insufficient to support recovery of MCR steelhead.

2.7.1. Middle Columbia River Steelhead

The MCR steelhead DPS is not currently meeting the viability criteria described in the Mid-Columbia Steelhead Recovery Plan (NMFS 2009). The Naches population of MCR steelhead will be affected by the proposed action. Naches steelhead are far short of abundance and productivity needed to sustain a viable population. Ongoing climate change will generally impose additional barriers to survival and recovery.

Short-term effects of the proposed actions include the capture and safe release of 154 juvenile steelhead for the Nelson Dam project and 322 juvenile steelhead for the water intake project, which will not affect population viability. A total of 126 juvenile steelhead are estimated to be injured or killed during construction. This total includes the following: 39 fish for the Nelson Dam project due to fish salvage and dewatering, 81 fish at the city water intake due to fish salvage and dewatering, two fish at Nelson Dam due to in-water work without isolation, and four fish at the water intake due to in-water work without isolation. An additional short-term impact is an expected reduction in growth of no more than a few individual juveniles in Cowiche Creek associated with impeding upstream fish passage for juveniles during summer construction. The likelihood that juvenile steelhead rearing in the action area would survive to the following spring and then outmigrate to the ocean and return to the Naches basin as adults is estimated to be less than 1%. Therefore, the injury and death of 126 juveniles plus reduced growth of several more in Cowiche Creek, is likely to cause a one-time reduction in adult returns to the Naches basin of no more than two adult steelhead, which is less than 0.1% of the mean adult return size to the population (see Table 2). This reduction would not meaningfully affect the long-term abundance or productivity of the population, and therefore would not affect steelhead at larger scales such as the MPG or DPS.

The major long-term effects of the proposed actions are beneficial and include significantly improved passage at Nelson Dam, which is expected to increase the number of smolts that successfully outmigrate from the Naches population, and somewhat restored sediment transport dynamics caused by reducing the impact of Nelson Dam across 6 miles of habitat above and below the dam. These benefits are expected to increase the success of MCR steelhead in spawning upstream of the dam, rearing upstream and downstream of the dam, and in migrating past the dam. An improvement in habitat complexity near the water intake site will also improve the quality of rearing habitat at that location. All of these effect will increase the productivity of the Naches population, which should improve abundance over time.

There are several long-term negative effects of the proposed actions, including a very slight reduction in productivity via the estimated injury or death of three juvenile steelhead per year caused by maintenance activities (assumed to occur at each site once every 2 years), and the injury or death of a few smolts caused by operation of the new consolidated water diversion and fish screens at the Nelson Dam site. Additionally, there may be a very slight reduction in smolt survival, and therefore productivity, by the reduction in flows through the mile-long reach downstream of Nelson Dam resulting from the POD change.

Although the long-term benefits of the proposed actions are not easily quantifiable, they are significant enough to be singled out as a priority recovery action in the Yakima Basin Steelhead Recovery Plan (YBFWRB 2009). The proposed actions will cause an overall increase in productivity of the Naches population, despite some particular elements of the actions having detrimental effects of smaller magnitude than the beneficial effects.

The actions will support recovery of the population consistent with the Recovery Plan. Although this project alone will not improve the extinction risk category for the population, it will improve productivity and abundance in the long-term, which will reduce risk to the population and the MPG. Therefore, the proposed actions will not adversely affect MCR steelhead to the degree that the likelihood of survival and recovery in the wild is appreciably reduced.

2.7.2. Critical Habitat

Critical Habitat designated for MCR steelhead is, in general, not functioning well enough to support recovery of the DPS. Water storage and diversion projects have drastically altered the critical habitat in the Columbia River and some of its tributaries, including the Yakima River. Floodplain development and land management have had significant impacts in some tributaries. Critical habitat in the Columbia River estuary has been degraded by conversion of a formerly complex ecosystem to industrial, transportation, recreational, agricultural, and urban uses. The freshwater migration corridors and estuarine areas PBFs have been severely degraded. Freshwater rearing sites have generally been degraded in areas with heavy agricultural and urban development. Climate change will have a range of effects on critical habitat; some effects are uncertain, though in general, climate change is likely to negatively affect critical habitat. Ongoing climate change will generally continue to reduce the ability of critical habitat to support recovery.

The proposed actions will cause short- and long-term effects to critical habitat. During construction in Cowiche Creek, the freshwater rearing PBF will be somewhat diminished by preventing upstream migration through the work area. However, this would occur at a time when few steelhead migrate upstream, and as such this temporary diminishment does not substantially reduce the conservation of critical habitat to support recovery.

In the long term, the proposed actions will largely improve the conservation value of critical habitat at the scale of the action area. The freshwater migration PBF will benefit substantially by improving upstream and especially downstream passage at Nelson Dam, although there will be some decline in the PBF's function in the mile-long reach downstream of the dam due to the POD change. The freshwater rearing PBF will better support the conservation value of critical habitat due to increased habitat complexity at the water intake site and a more natural sediment regime expressed over approximately 6 miles of the action area; this improvement in the sediment regime is why the Nelson Dam Removal Project is singled out in the Yakima Basin Steelhead Recovery Plan. The spawning PBF will be improved over several miles upstream of Nelson Dam because normalizing the sediment regime will lead to increased riverbed stability in this reach, reducing the potential that steelhead redds will be scoured.

Overall, the proposed actions will improve the function of all PBFs in the action area and therefore the conservation value of critical habitat at the action area scale in the long term,

despite some individual elements of the actions causing smaller or shorter-term effects. Improving the conservation value of critical habitat will support recovery at the action area scale, though these actions alone cannot fully recover MCR steelhead. Improving the conservation value at the action area scale will also improve the conservation value at the designation scale. Thus, we do not expect the proposed action to appreciably diminish the conservation value of critical habitat for MCR steelhead at the designation scale.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed actions, the effects of other activities caused by the proposed actions, and cumulative effects, it is NMFS' opinion that the proposed actions are not likely to jeopardize the continued existence of Middle Columbia River steelhead or destroy or adversely modify its designated critical habitat.

2.8.1. 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 actually 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 is reasonably certain to occur as follows:

<u>City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project</u>

Fish Salvage and Dewatering
The City will dewater and salvage fish from 310,000 square feet of the Naches River, leading to the capture and safe release of 322 juvenile steelhead and the injury or death of 81 juvenile steelhead.

Mechanical Injury and Death
The City will conduct in-water work without prior dewatering over 29,000 square feet of the Naches River to construct cofferdams, cross the Naches River, and partially construct RGC-1, which will cause the injury or death of 4 juvenile steelhead.

Maintenance Actions
The City will perform maintenance actions consistent with the Corps' Section 404 exemptions for maintenance. Actions including in-water fill or excavation during the summer work window will occur no more than every 2 years, on average, and over no more than 0.25 acres of active channel. Dewatering, fish salvage, and in-water work will cause the capture and safe release of 11 juvenile steelhead and the injury or death of three juvenile steelhead per maintenance event.

Nelson Dam Removal Project

Fish Salvage and Dewatering
The City will dewater and salvage fish from 79,000 square feet of the Naches River and a 225-foot-length of Cowiche Creek, leading to the capture and safe release of 154 juvenile steelhead and the injury or death of 39 juvenile steelhead.

Mechanical Injury and Death
The City will conduct in-water work without prior dewatering over 9,000 square feet of the Naches River to construct cofferdams, which will cause the injury or death of 2 juvenile steelhead.

Fish Passage
The City will prevent upstream migration in Cowiche Creek at its worksite for a period of 4 weeks during the July–August construction window, causing reduced growth in affected juvenile steelhead (unquantifiable number).

Operation of Water Diversion
The City will operate the consolidated water diversion to remove up to 84 cfs from the Naches River during April 1 to October 15 every year after construction, causing impingement or other injury on the fish screens of a small, but unquantified number of juvenile steelhead.

Maintenance Actions
The City will perform maintenance actions consistent with the Corps' Section 404 exemptions for maintenance. Actions including in-water fill or excavation during the summer work window will occur no more than every 2 years, on average, and over no more than 0.25 acres of active channel. Dewatering, fish salvage, and in-water work will cause the capture and safe release of 11 juvenile steelhead and the injury or death of three juvenile steelhead per maintenance event.

Point of Diversion Changes
Relocation of the PODs for the Old Union and Fruitvale water rights from the existing locations to the new consolidated water intake structure at the Nelson Dam site will cause up to 43 cfs of Naches River water to be removed further upstream during the April 1–October 15 irrigation season every year after the POD change. This will degrade the quality of rearing and migrating habitat in a mile-long reach of the Naches River, causing harm to an unknown number of juvenile steelhead.

The amount and extent of take will be exceeded if any of the following surrogates and/or direct measures of take are exceeded:

City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project

- Capture of juvenile *O. mykiss* up to 225 mm fork length[3] during fish exclusion exceeds 403 fish.
- Injured or killed (including captured and subsequently injured/killed) *O. mykiss* up to 225 mm in fork length exceeds 85 fish (from *Fish Salvage and Dewatering* and *Mechanical Injury and Death).*
- Dewatering for construction exceeds 310,000 square feet.
- In-water footprint of cofferdams, in-water crossing, and RGC-1 constructed without prior isolation exceeds 29,000 square feet.
- Fill, excavation, and dewatering for maintenance exceed 0.25 acres per event, of if maintenance events including fill or excavation occur more frequently than an average of every 2 years over a 10-year period.

Nelson Dam Removal Project

- Capture of juvenile *O. mykiss* up to 225 mm fork length during fish exclusion exceeds 193 fish for Phase 1 and Phase 2 work, combined.
- Injured or killed (including captured and subsequently injured/killed) *O. mykiss* up to 225 mm in fork length exceeds 41 fish (from *Fish Salvage and Dewatering* and *Mechanical Injury and Death)* for Phase 1 and Phase 2 work, combined.
- Dewatering for construction exceeds 29,000 square feet in the Naches River or 225 linear feet of Cowiche Creek.
- In-water footprint of cofferdams installed without prior isolation exceeds 9,000 square feet in the Naches River.
- Diversion exceeds 84 cfs at the new consolidated diversion during April 1 to October 15 for all water users combined.
- Diversion exceeds 43 cfs at the new consolidated diversion during April 1 to October 15 to serve the Fruitvale and Old Union water rights.
- Fill, excavation, and dewatering for maintenance exceed 0.25 acres per event, of if maintenance events including fill or excavation occur more frequently than an average of every 2 years over a 10-year period.

Although the surrogates are largely coextensive with the proposed action, they nevertheless function as effective reinitiation triggers because they are readily observable. If at any time the level or method of take exempted from take prohibitions and quantified in this opinion is exceeded, reinitiation of consultation will be required.

[3] Nearly all juvenile *O. mykiss* that will emigrate from the Yakima basin do so before growing larger than 225 mm in fork length (Yakama Nation, unpublished data). Therefore, juvenile *O. mykiss* greater than 225 mm in fork length are assumed to be resident fish and therefore not MCR steelhead.

2.9.2. Effect of the Take

In the opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed actions, is not likely to result in jeopardy to the species.

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).

The Corps shall:

1. Minimize incidental take resulting from dewatering and fish salvage.
2. Minimize incidental take by developing and implementing a monitoring and reporting program to confirm that the terms and conditions in this ITS are effective in avoiding and minimizing incidental take from proposed activities and that the amount and extent of take is not exceeded.

NMFS believes that full application of project minimization measures included as part of the proposed actions, together with use of the RPMs and terms and conditions described below, are necessary and appropriate to minimize the likelihood of incidental take of listed species due to completion of the proposed actions.

2.9.4. Terms and Conditions

The terms and conditions described below are non-discretionary, and the Corps or any applicant must comply with them in order to implement the RPMs (50 CFR 402.14). The Corps or any applicant 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.

City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project

1. The following terms and conditions implement RPM 1 for the City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project:
    a. At least 90 days before dewatering activities begin, the Corps or City shall:
        i. Identify a lead fish biologist for dewatering activities. The lead biologist will have experience in dewatering and fish salvage.
        ii. Identify all equipment and supplies needed for dewatering activities, including electrofishers, dipnets, seines, blocknets, buckets, aerators, batteries, etc. in sufficient sizes and numbers to support the dewatering effort.
        iii. Identify at least two qualified fish biologists to lead fish salvage crews during In-water Isolation Stage 1. Identify at least one qualified fish biologist to lead a fish salvage crew for In-water Isolation Stage 2. Qualified biologists will have experience in electrofishing and fish identification.

iv. Ensure that the construction schedule allows at least 2 days for dewatering and fish salvage activities.

b. At least 10 days before dewatering activities begin, the Corps or City shall inform NMFS of the anticipated dewatering and fish salvage schedule.

c. During dewatering and fish salvage activities, the Corps or City shall:

i. Ensure personnel are on-site for timely capture, handling and release of fish. At a minimum, two crews of four people each (including at least one qualified fish biologist per crew) will be available for fish salvage during In-water Isolation Stage 1. At a minimum, one crew of at least four people (including at least one qualified fish biologist) will be available for fish salvage during In-water Isolation Stage 2.

2. The following terms and conditions implement RPM 2 for the City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project:

a. Within 90 days after construction is completed, the Corps shall provide NMFS a post-project monitoring report including, at a minimum, the following information:

i. Project name and NMFS Tracking No: City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project, WCR-2020-02799.

ii. Number of *O. mykiss* up to 225 mm fork length that were captured and released without injury. Fork length can be estimated, instead of directly measured, to reduce handling stress for captured fish.

iii. Number of *O. mykiss* up to 225 mm fork length that were captured and observed injured or dead. Fork length can be estimated, instead of directly measured, to reduce handling stress for captured fish.

iv. Number of *O. mykiss* up to 225 mm fork length that were unable to be captured and observed to be killed by asphyxiation from dewatering or other means.

v. Total square footage of fill and excavation activities in the Naches River conducted without prior fish salvage and dewatering.

vi. Total area of dewatering and fish salvage.

b. The monitoring report should be delivered to NMFS' Interior Columbia Basin Office at 304 S. Water Street, Suite 201, Ellensburg, WA 98926.

<u>Nelson Dam Removal Project</u>

No terms and conditions are necessary to implement RPM 1 for the Nelson Dam Removal Project because proposed measures included in or referenced in the BA are sufficient to minimize incidental take resulting from dewatering and fish salvage.

3. The following terms and conditions implement RPM 2 for the Nelson Dam Removal Project:

a. Within 90 days after construction is completed, the Corps shall provide NMFS a post-project monitoring report including, at a minimum, the following information:

i. Project name and NMFS Tracking No: Nelson Dam Removal Project, WCR-2020-02714.
ii. Number of *O. mykiss* up to 225 mm fork length that were captured and released without injury. Fork length can be estimated, instead of directly measured, to reduce handling stress for captured fish.
iii. Number of *O. mykiss* up to 225 mm fork length that were captured and observed injured or dead. Fork length can be estimated, instead of directly measured, to reduce handling stress for captured fish.
iv. Number of *O. mykiss* up to 225 mm fork length that were unable to be captured and observed to be killed by asphyxiation from dewatering or other means.
v. Total square footage of cofferdams constructed in the Naches River without prior fish salvage and dewatering.
vi. Total area of dewatering and fish salvage in the Naches River.
vii. Total stream length of dewatering and fish salvage in Cowiche Creek.

b. The monitoring report should be delivered to NMFS' Interior Columbia Basin Office at 304 S. Water Street, Suite 201, Ellensburg, WA 98926.

2.9. Reinitiation of Consultation

This concludes formal consultation for two proposed actions:

- City of Yakima Naches River Water Treatment Plant Intake and River Stabilization Project
- Nelson Dam Removal Project

As 50 CFR 402.16 states, reinitiation of consultation is required and shall be requested by the Federal agency or by NMFS 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 identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the 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. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA , EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). 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) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH [CFR 600.905(b)].

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

3.1. Essential Fish Habitat Affected by the Project

The proposed actions and action area are described in the BAs and this opinion. The project area includes habitat that has been designated as EFH for various life stages of Chinook salmon (*O. tshawytscha*), and coho salmon (*O. kisutch*).

3.2. Adverse Effects on Essential Fish Habitat

See Section 2.5.1 of the opinion for a description of the effects of the proposed actions on steelhead habitat. The adverse effects to Pacific salmon habitat are similar.

NMFS concludes that the proposed actions will have adverse effects on EFH designated for Pacific Coast salmon in Cowiche Creek and the Naches River. Based on information provided by the action agency and the analysis of effects presented in the ESA portion of this document, we conclude that the proposed action will have the following adverse effects on EFH for Pacific Coast salmon.

The ability of EFH to support salmon migration would be temporarily interrupted by blocking passage in lower Cowiche Creek during construction, but removing and rebuilding of Nelson Dam will result in significant improvements in EFH with respect to migration. The quality of EFH to support salmon rearing will be enhanced through most of the action area due to a combination of increased complexity at the water intake site and the normalization of sediment transport processes through the lower 6 miles of the Naches River. The ability of EFH to support salmon spawning will be improved for several miles upstream of Nelson Dam by partially restoring the sediment transport regime, which should reduce the frequency of redd scour. The POD change associated with the proposed action would, by itself, cause a diminishment of the quality of EFH in the mile-long reach of river downstream of Nelson Dam, although the substantial and larger scale beneficial effects of the proposed actions more than offset the impacts of the POD change.

3.3. Essential Fish Habitat Conservation Recommendations

NMFS determined no conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH, because the measures contained in or referenced by the Biological Assessments were sufficient.

3.4. Supplemental Consultation

The Corps must reinitiate EFH consultation with NMFS if either of the proposed actions 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 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.

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 the Corps. Other interested users could include the City, their ratepayers, citizens of affected areas, and others interested in the conservation of the affected ESUs/DPS. Individual copies of this opinion were provided to the Corps. The document will be available within 2 weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. The format and naming adheres to conventional standards for style.

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

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