UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
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Portland, Oregon 97232-1274

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May 10, 2019

Laura Boerner, Chief
Planning, Environmental and Cultural Resources Branch
Seattle District
U.S. Army Corps of Engineers
Post Office Box 3755
Seattle, Washington 98124

Re: Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson–Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Elmway Levee and Okanogan River Levee Projects.

Dear Ms. Boerner:

Thank you for your letters dated February 15, 2019, and March 26, 2019, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (U.S.C 1531 et seq.) for the Elmway Levee Project and the Okanogan River Levee Projects (Project). In this biological opinion (opinion), NMFS concluded that the proposed action is not likely to jeopardize the continued existence of ESA-listed Upper 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 opinion. The ITS describes reasonable and prudent measures (RPMs) NMFS considers necessary or appropriate to minimize incidental take associated with these 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 also evaluated potential impacts of the action on essential fish habitat (EFH) 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 regulation at 50 CFR 600. We concluded that the proposed action would adversely affect Pacific Coast salmon EFH; therefore, the enclosed document also includes our conservation recommendations to address those adverse effects.

Please contact Justin Yeager of the Columbia Basin Branch at (509) 962-8911 ext. 805 or by electronic mail at justin.yeager@noaa.gov with any questions or comments concerning this section 7 consultation.

Sincerely,

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

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

Elmway Levee Project
Okanogan River Levees Project

NMFS Consultation Number: WCRO-2019-00027 and WRCO-2019-00119

Action Agency: Seattle District, Corps of Engineers

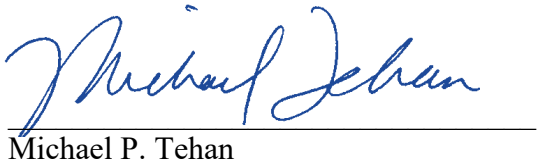
Affected Species and Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or critical habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify critical habitat?
Upper Columbia River steelhead	Threatened	Yes	No	No

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

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

Issued By:



Michael P. Tehan
Assistant Regional Administrator

Date: May 10, 2019

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ACRONYM GLOSSARY

BA	Biological Assessment
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
cu yd	cubic yard
DPS	Distinct Population Segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FR	Federal Register
HUC	Hydrologic Unit Code
ICTRT	Interior Columbia Basin Technical Recovery Team
ISAB	Independent Scientific Advisory Board
ITS	Incidental Take Statement
LIDAR	Light Detection and Ranging Imagery
MSA	Magnuson–Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NTU	Nephelometric Turbidity Units
opinion	Biological Opinion
OHWM	Ordinary High Water Mark
PBF	Physical and Biological Feature
PCE	Primary Constituent Element
Project	Elmway Levee and Okanogan River Levees Projects
RPM	Reasonable and Prudent Measure
RTT	Regional Technical Team
UCR	Upper Columbia River
U.S.C.	United States Code
WDFW	Washington State Department of Fish and Wildlife

1.0 INTRODUCTION

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

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.), and its implementing regulations at 50 CFR 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson–Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

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

1.2 Consultation History

In November 2017, the Army Corps of Engineers (Corps) contacted NMFS about damage to the Elmway Levee that occurred in the spring of 2017. While the Corps was drafting a biological assessment (BA) and working through the permitting process for a repair, the Okanogan River flooded in May 2018. During this flood, the Corps provided emergency assistance to Okanogan County, which consisted of flood fighting and emergency repairs to the Elmway and Riverside Levees. The emergency measures did not fully repair and restore the levees. On February 15, 2019, the Corps requested consultation on further repairs to these levees. On March 26, 2019, the Corps requested consultation for levee repairs at other sites along the Okanogan River. We have chosen to consider this suite of levee repairs in this single opinion.

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies (50 CFR 402.02). The Corps is requesting emergency consultation for their May 2018 flood fight repairs at two levees (Elmway and Riverside) and consultation for their 2019 permanent levee repairs at all five levees. The Corps is proposing repairs per the authority of Public Law (PL) 84-99. Okanogan County is the local sponsor under the PL 84-99 program. NMFS will only address the 2019 permanent repair portion in this opinion.

Descriptions, flood fight actions, and proposed repairs are described for each levee, proceeding from upstream to downstream, followed by general construction practices and conservation measures that will be employed at all levees.

1.3.1 Levee Descriptions

Riverside Levee

The levee extends approximately 4,800 feet and is part of a system that provides a 20-year level of protection to residential and agricultural properties. The Riverside Segment 3 Levee was constructed by an unknown entity prior to 1972. The riverward slope is not armored.

Omak Left Bank Federal Levee

This levee is a complete system approximately 6,700 feet long that provides a 500-year level of protection to residential, commercial, industrial property, as well as public parks. The levee is a federal project constructed by the Corps in 1979. The riverward slope is armored with Class II riprap.

Omak Right Bank Federal Levee

This levee is a complete system approximately 7,700 feet long that provides a 500-year level of protection to a school, residential, commercial, and industrial property. The levee was constructed in 1979 by the Corps. The riverward slope is armored with Class II riprap.

Elmway Levee

This non-federal levee is comprised of an earthen embankment along the right bank of the Okanogan River, approximately river mile 26.0 to 26.6, in the City of Okanogan. The levee was constructed by local entities and was extended on the downstream end in 1974. The total length after 1974 was 1,880 feet. It protects homes, businesses, public roads, and utilities.

Okanogan Treatment Plant Levee

The levee extends approximately 2,300 feet and is a complete ring system that provides a 1,000-year level of protection to the Okanogan Treatment Plant. The Corps constructed this levee in 1948. In the mid-1980s, the City of Okanogan improved the levee. These improvements included adding additional bank armor as well as raising and widening the levee prism. The riverward slope is armored with Class V riprap.

1.3.2 Emergency 2018 Flood Damage and Flood Fight

Rapid snowmelt in May of 2018 resulted in sustained high flows along the Okanogan River for 24 days. The flood event was the third largest recorded and corresponded to approximately a 25-year return interval. The flood damaged multiple levees along the Okanogan River.

Riverside Levee

During the May 2018 flood event, the Corps provided emergency assistance with flood fighting and emergency repairs to the levee. On May 9, 2018, the Corps received a request for immediate assistance from the Riverside Flood Control District, due to the imminent risk of flood impacts to life and property. As the water rose, the Riverside Levee Segment 3 breached. The levee breached along 175 linear feet. As a result of this determination of significantly-elevated risk of potential damage to human life, safety and property, the Corps' District Commander made a determination that immediate emergency repair activities were necessary to be undertaken prior to the conclusion of section 7 consultation and outside of the designated work window, pursuant to 50 CFR 402.05(a). The Corps' flood team constructed an emergency breach closure starting on May 24, 2019.

The temporary emergency protective measures in May 2018 included the placement of approximately 2,500 cubic yards of pit run fill to close the levee breach. The flood team completed the breach closure on May 26, 2018. The 2018 flood breach removed all existing trees and shrubs on the levee prism, by sweeping them away. Vegetation (predominately red-osier dogwood) at the toe of the former levee prism remained in place. After the 2018 flood, the level of protection for the damaged levee is at 1-year return period.

Omak Left Bank Federal Levee

Riprap comprising the riverward toe and slope armor, as well as embankment material from the levee prism, was scoured from approximately 355 linear feet of the levee at two locations. Site 1 is located adjacent to the rodeo grounds. Site 2 is located across the river from downtown Omak (230 feet). In the damaged state, the levee provides a 10-year level of protection.

Omak Right Bank Federal Levee

Riprap comprising the riverward toe and slope armor, as well as embankment material from the levee prism, was scoured from approximately 540 linear feet of the levee at two locations (Sites 1 and 3) affecting the Omak Right Bank Federal Levee. A 24-inch diameter culvert passing through the levee at Site 3 also sustained damage. Subsidence of the levee crest was observed at Site 2 (45 linear feet). In the damaged state, the levee provides a 10-year level of protection.

Elmway Levee

The Corps conducted temporary emergency repairs to supplement local efforts during the 2018 flood. The emergency repairs included the placement of approximately 1,000 cubic yards of Class III and Class IV riprap along 400 linear feet of levee. The riprap that was placed reduced erosion from the high river velocities, and reduced the risk of levee failure from slope instability

and seepage. These emergency levee repairs took 5 days to complete—they began on May 7 and were completed on May 11, 2018. The emergency repair used an excavator to clear all the vegetation from the top and upper slope of the damaged levee and placed riprap along the riverward levee slope. The excavator worked from the top of the levee, placing material by bucket load in a controlled manner to provide a blanket of armor to reduce the impacts from the high-velocity flows and high water levels. The emergency repair reduced the imminent threat of levee failure, but the levee prism remains in a damaged state, and scour protection along the toe was not addressed by the flood fighting action due to the high water levels.

Okanogan Treatment Plant Levee

Riprap comprising the riverward toe and slope armor, as well as embankment material from the levee prism was scoured from approximately 250 linear feet of the levee. Sinkholes, sand boils, and quicksand conditions were also observed within the interior of the leveed area. In the damaged state, the levee provides a 5-year level of protection.

1.3.3 Proposed 2019 Levee Repairs

The Corps proposes to repair the five levees to their pre-damaged footprint and alignment. Total construction length of repairs, including repair to the existing levees will be approximately 1,765 linear feet on the exterior of the levee and 1,190 linear feet on the interior of the levee. All work will occur within the designed and pre-damage footprint and profile. Work will require removing streamside shrubs and trees from the levee within the construction project footprint. No additional material will be added beyond the existing levee footprint. From start to completion, repair on each levee is expected to take 11 weeks and any in-water work for the repairs will occur within the approved in-water work window, which is from July 1 to August 15. Table 1 summarizes the repairs of each levee.

Table 1. Summary of levee repairs at each location.

Levee	Estimated Repair Length	Repair Description
Riverside Segment 3	175 Feet	Excavate the temporary fill and reconstruct the levee with imported, compacted embankment fill, and vegetate the slope. The embankment will be reconstructed to pre-damage crest elevation with a 12-foot-wide crest and 2H:1V side slopes using angular, well-graded embankment fill. The repair will stay within the existing levee prism and no vegetation will be removed by the repair.
Omak Left Bank	Site 1—125 feet Site 2—230 feet	Excavate sloughed material from the scoured section and re-grade the slope to eliminate a 6- to 8-foot-wide mid-slope bench in the embankment. A launchable toe will be reconstructed using Class III riprap. The damaged slope will be re-armored with a 3-foot-thick blanket of Class III riprap placed over a 12-inch layer of quarry spalls. Riprap will be placed at a 2H:1V slope to achieve good compaction and tight interlocking. During construction, 50 trees (greater than 20 feet tall) will be removed at Site 1, and 15 trees will be removed at Site 2.

Levee	Estimated Repair Length	Repair Description
Omak Right Bank	Site 1—360 feet Site 2—45 feet Site 3—180 feet	At Sites 1 and 3, reconstruct the launchable toe with Class III riprap and restore the riverward slope at 2H:1V with a 3-foot-thick blanket of Class III riprap backed by a 12-inch layer of quarry spalls. During construction, 15 large trees (greater than 20 feet tall) will be removed at Site 1. At Site 3, the damaged culvert will be replaced with a new, 24-inch diameter corrugated metal pipe culvert. The drainage into which the culvert will be placed is not occupied by fish, as documented by WDFW Site ID: 950129 (Washington State Department of Fish and Wildlife 2019). At Site 2, excavate the embankment material to identify the cause of piping and subsidence and reconstruct the levee embankment to its pre-damage elevation using compacted embankment fill. Blend upper Class III riprap into existing launchable toe. Re-armor the riverward slope with riprap backed by 12 inches of quarry spall. No anticipated in-water work. There will be five tall trees removed at Site 2.
Elmway	400 feet	Reconstruct the launchable toe with Class III riprap and restore the riverward slope at 2H:1V with a 3-foot-thick blanket of Class III riprap backed by a 12-inch layer of quarry spalls.
Okanogan Treatment Plan	Site 1—250 feet Interior—1,190 feet	At Site 1, reconstruct the riverward slope with a launchable toe and restore the riverward slope at 2H:1V with a blanket of Class V riprap backed by quarry spalls. There will be 25 tall trees removed on the riverward side of the levee due to construction. On the landward side of the levee, a seepage berm will be placed against the levee toe to address quicksand conditions observed during the recent high-water event, restoring the levee to its pre-existing level of protection. The seepage berm will be constructed of a well-graded, crushed rock fill and is anticipated to measure approximately 5 feet high by 10 feet wide.

Site Preparation

The first component of construction includes the preparation of access routes and the existing prism for material removal. Preparing the prism entails removing and clearing of any vegetation, preparing access, and establishing a consistent surface. Site limits will be clearly marked using stakes and flagging. Staging activities will consist of temporarily stockpiling construction materials, supplies, equipment, and vehicles. Work and staging areas will be limited to the areas shown in the plans for each site. The area that will be disturbed for reconstruction of the Riverside Segment 3 levee is approximately 0.15 acre; for Omak Left Bank Sites 1 and 2 is approximately 0.55 acre; for Omak Right Bank Sites 1, 2, and 3 is approximately 0.76 acre; and

for the Okanogan Treatment Plant Levee is approximately 0.43 acre along the river, and approximately 8.26 acres of disturbance within the interior of the ring levee.

Deconstruct Damaged Levee

Deconstruction will be slightly different at each site depending on the repair being implemented. At the Riverside Segment 3 Levee, the damaged portion of the levee has been temporarily filled with rounded cobbles and gravels. The damaged portion of the levee will be deconstructed by removing the temporary fill that was placed after the major flooding event. At the Omak Left Bank Federal Levee (Sites 1 and 2), the Omak Right Bank Federal Levee (Sites 1 and 3), Elmway Levee, and the Okanogan Treatment Plant Levee (Site 1), sloughed material will be excavated from the scoured portion. At the Omak Right Bank Federal Levee Site 3, the damaged 24-inch-diameter culvert will be excavated. At Site 2 of the Omak Right Bank Federal Levee, the existing embankment material will be excavated from the slope to identify the cause of piping and subsidence.

Construct Levee Repair

Repairs to the Riverside Segment 3 Levee, the Omak Left Bank and Right Bank Federal levees, Elmway Levee, and Site 1 at the Okanogan Treatment Plant Levee (repair-in-kind sites) will start with reconstruction of the levee toe. Then the riverward slope will be restored at 2 horizontal (H):1 vertical (V) slope with a blanket of Class III riprap backed by quarry spalls at the Omak Left Bank Levee, Omak Right Bank Federal Levee, and Elmway Levee. At the Riverside Segment 3 Levee, and Site 2 of the Omak Right Bank Federal Levee, the levee embankment will be reconstructed using compacted embankment fill. At Site 1 of the Okanogan Treatment Plant Levee, the damaged slope will be re-armored with a 4-foot-thick blanket of Class V riprap placed over a layer of quarry spalls. See Table 2 for more specific quantities of materials.

Table 2. Estimated materials and quantities for proposed 2019 repair.

Material	Quantity					Location	Use
	Riverside	Omak Left Bank	Omak Right Bank	Elmway	Okanogan Sewer Treatment Plant		
Quarry Spalls (cu yd)	0	710	1,150	1,000	390	Levee slope between riprap and levee embankment material	Bedding course
Class III Riprap (cu yd)	0	1,670	2,320	500	0	Levee slope	Levee armor
Class V Riprap (cu yd)	0	0	0	0	2,330	Levee slope	Levee armor
Embankment Fill (cu yd)	1,090	0	230	0	2,710	Levee prism	Structural
Top Soil (cu yd)	0	50	80	370	30	Soil for willow stakes at existing vegetation	Soil for willows

Material	Quantity					Location	Use
	Riverside	Omak Left Bank	Omak Right Bank	Elmway	Okanogan Sewer Treatment Plant		
						line	
Willows and Red-Osier dogwood stakes	0	355	540	400 + 70 bundles	250	1 foot above OHWM	Riparian habitat
Crushed Surface Base Course (cu yd)	50	110	190	345	130	Levee crown	Access road
Flowable Fill	0	0	30	0	0	N/A	N/A
Cottonwood (1-gallon containers)	0	15	49	9 poles	0	Riverside and Elmway off-site riparian planting area	Planting 73 Cottonwood for riparian habitat
Pine (1-gallon containers)	0	45	146	0	75	Riverside and Elmway off-site riparian planting area	Planting 266 pine for riparian habitat
Typical Class III riprap is between 7–24 inches diameter, weight between 32–1,100 lbs. Typical Class V riprap is between 11–36 inches diameter, weight between 110–3,800 lbs. Quarry spalls are between 4–8 inches in diameter. Embankment material consists of soil mixed with unsorted small rock. CSBC is small gravel material.							

Upon completion of all construction activities, areas disturbed by the repairs, staging activities or road access will be hydro-seeded with native grasses, as appropriate. Areas on the levee crown disturbed by construction activities will be topped with up to 6 inches of crushed gravel to repair any rutting or damage to the levee top.

Typical best management practices will be implemented, such as erosion control, spill, and pollution prevention. The Corps will implement their water quality sampling protocol. In summary, they will regularly monitor turbidity 300 feet downstream of sediment-generating activities. Maximum turbidity levels will meet WAC 173-201 A-210 (i.e., turbidity must not exceed 5 Nephelometric Turbidity Units (NTU) over background when the background is 50 NTU or less; or a 10 percent increase in turbidity when the background turbidity is more than 50 NTU). If turbidity levels exceed these values, activities will cease and actions will be taken to avoid or reduce turbidity levels. The Corps' protocol stipulates they will complete a final monitoring report after construction.

Planting Details

Willow stakes and willow bundles will be planted at the Treatment Plant, Elmway, Omak Right Bank, and Omak Left bank levee sites within the slope armor to provide shade and other habitat amenities to aquatic and terrestrial species. Per the recommendation of the local sponsor, Coyote willow (*Salix exigua*) and red-osier dogwood (*Cornus stolonifera*) cuttings will be utilized as practicable. If coyote willow and dogwood are unavailable, Sitka (*Salix sitchensis*) and/or

Hooker's willow (*Salix hookeriana*) cuttings (in that order of preference) would be used as a replacement. The willow stakes will be planted 1 foot on center in a line. The willow bundles will be planted 6 foot on center in a line. All plantings will be placed at the lowest vegetation line, approximately 1 foot above ordinary high water mark (OHWM). To install the willows, half of the soil in the 12-inch lift is placed, then the willows are placed horizontally so that approximately 80 percent of their length is covered with soil; the remaining half of the soil is placed over the top or a stinger will be used to place the stakes in the soil layer. The soil for all plantings consists of engineered topsoil that has been sorted through a half-inch sieve so that small rocks may be retained for soil structure. Approximately 1,365 stakes and 70 willow bundles will be planted across the four sites. These plantings will reestablish overhanging cover along the river's edge. Because the willows and dogwood are relatively fast growing, a 1:1 replacement ratio was used.

In addition, offsite plantings are required to compensate for the loss of trees removed as a result of the repairs at the Okanogan Treatment Plant Levee, Omak Right Bank Levee, Omak Left Bank Levee, and Elmway Levee. A 3:1 replacement ratio was used to calculate required plantings to compensate for loss of the shade function at each of these four sites; this approximates to about 3.5 acres of plantings in two different locations (Elmway Levee mitigation site and Salmon Creek mitigation site).

The Corps will plant 64 black cottonwoods and 191 pine trees on the right bank of the river, at the offsite mitigation area to compensate for lost vegetation cover on the riverward levee slope for the Omak right bank and left bank projects. They will also plant 75 pine trees at the off-site location on Salmon Creek at a site owned by the city of Okanogan to compensate for vegetation removed by the Treatment Plant levee repair. As mitigation for the Elmway Levee site, nine black cottonwood poles will be planted on the right bank of the river, just upstream of the levee repair location to compensate for lost vegetation cover on the riverward levee slope. The poles will be planted on 10-foot centers. In addition, 400 live stakes consisting of red-osier dogwood, coyote and Drummond willow. The trees will be planted on 10-foot centers. No off-site mitigation will be required for the Riverside repair since no vegetation will be removed during that repair and none was removed during the flood fight and breach closure.

The Corps will coordinate with Okanogan County (local sponsor) to ensure that the planting survival standard is met. The Corps will inform the sponsor that these plantings are part of the repair mitigation and should only be trimmed to the minimal amount necessary to retain adequate visual fields for inspection. No trimming will be done to the off-site cottonwood plantings. The Corps will maintain the on-site and off-site plantings and they will be monitored for 1 year, post construction, to ensure 80 percent survival. If less than 80 percent survival is recorded after 1 year, the Corps will replace dead plants and monitor for an additional growing season.

Interrelated and Interdependent Activities

"Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from

the action under consideration (50 CFR 402.02). There are no interdependent or interrelated activities associated with the proposed action.

2.0 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, federal agencies must ensure that their 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 provides an opinion stating how the agency's actions would affect listed species and their critical habitat. If incidental take is expected, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1 Analytical Approach

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

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

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

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

1. Identify the range-wide status of the species and critical habitat expected to be adversely affected by the proposed action.
2. Describe the environmental baseline in the action area.

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

2.2 Range-wide Status of the Species and Critical Habitat

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

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 describe 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 3) and in the most recent 5-year status review (National Marine Fisheries Service 2016), as well as applicable recovery plans and 5-year status reports. These additional documents are incorporated by reference.

Table 3. 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*)			
Upper Columbia River	T 1/05/06; 71 FR 834	9/02/05; 70 FR 52630	2/01/06; 71 FR 5178

Upper Columbia River Steelhead

The Upper Columbia River (UCR) steelhead Distinct Population Segment (DPS) was listed as endangered on August 18, 1997 (62 FR 43937), and their status was upgraded to threatened on January 5, 2006 (71 FR 834). The threatened status was affirmed on August 15, 2011, after a 5-year status review (76 FR 50448) and again on May 26, 2016, after a 5-year status review (81 FR 33468). The UCR steelhead DPS includes all naturally-spawned populations of steelhead in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the United States–Canada border (62 FR 43937). There are four populations of UCR steelhead included in this DPS: the Wenatchee, Entiat, Methow, and Okanogan. Six artificial propagation programs are considered part of the DPS: the Wenatchee River, Wells Hatchery in the Methow

and Okanogan rivers, Winthrop National Fish Hatchery, Omak Creek, and the Ringold steelhead hatchery programs.

The life-history pattern of steelhead in the Upper Columbia is complex (Peven et al. 1994). Adults return to the Columbia River in the late summer and early fall. Unlike spring-run Chinook salmon, most steelhead do not move up quickly to tributary spawning streams. A portion of the returning run overwinters in the mainstem reservoirs, passing over the UCR dams in April and May of the following year. Spawning occurs in the late spring. Juvenile steelhead generally spend 1 to 3 years rearing in freshwater before migrating to the ocean, but have been documented spending up to 7 years in freshwater before migrating. Most adult steelhead return to the Upper Columbia after 1 or 2 years at sea.

Abundance and Productivity. Both abundance and productivity characteristics remain at "high" risk for three of the four populations in this DPS (Table 4). Although, UCR steelhead populations have increased in natural origin abundance in recent years, productivity levels remain low, except for the Wenatchee population. The proportions of hatchery origin returns in natural spawning areas remain extremely high across the DPS, especially in the Methow and Okanogan river populations, 76 percent and 87 percent respectively (National Marine Fisheries Service 2014; Northwest Fisheries Science Center 2015). The modest improvements in natural returns in recent years are primarily the result of several years of relatively good survival in the ocean and tributary habitats.

Table 4. Summary of the Upper Columbia River steelhead population status and Interior Columbia Basin Technical Recovery Team viability criteria.

	Abundance and Productivity Metrics				Spatial Structure and Diversity Metrics			Rating
Population	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
Wenatchee	1000	1,025	1.207	Low	Low	High	High	Maintained
Methow	1000	651	0.371	High	Low	High	High	High Risk
Entiat	500	146	0.434	High	Moderate	High	High	High Risk
Okanogan	500	189	0.154	High	High	High	High	High Risk

Spatial Structure and Diversity. The integrated spatial structure and diversity risk ratings for all four populations of UCR steelhead are at "high" risk. These ratings are largely driven by chronic high levels of hatchery spawners of 42 to 87 percent (Table 5) within natural spawning areas, and lack of genetic diversity among the populations. The relative effectiveness of hatchery origin spawners and the long-term impact on productivity of high levels of hatchery contribution to natural spawning are key uncertainties for these populations (Ford 2011; National Marine Fisheries Service 2014; Northwest Fisheries Science Center 2015).

Table 5. Estimate of hatchery origin spawning escapement for Upper Columbia River steelhead populations.

Population	Percent Hatchery Origin (5-year average)		
	2000 to 2004	2005 to 2009	2010 to 2014
Wenatchee	66	62	42
Entiat	76	76	69
Methow	89	85	76
Okanogan	94	91	87

The UCR steelhead DPS is not currently meeting the viability criteria (adapted from the Interior Columbia Basin Technical Recovery Team [ICTRT]) of the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan. Overall, the viability of the UCR steelhead DPS has likely improved somewhat since the last status review, but the DPS is still in a condition that, but for continued hatchery supplementation, places it at "high" risk of extinction (Ford 2011; Northwest Fisheries Science Center 2015) in the next 100 years (Table 6).

Table 6. Matrix used to assess the status of Upper Columbia River steelhead populations across Viable Salmonid Population parameters or attributes.

Risk Rating for Abundance/Productivity	Risk Rating for Spatial Diversity			
	Very Low	Low	Moderate	High
Very Low (<1%)	High Viable	Highly Viable	Viable	Maintained
Low (1–5%)	Viable	Viable	Viable	Maintained ***Wenatchee***
Moderate (6–25%)	Maintained	Maintained	Maintained	High Risk
High (>25%)	High Risk	High Risk	High Risk	High Risk ***Entiat Methow Okanogan***

Limiting factors for UCR steelhead. The UCR steelhead DPS continues to experience many problems that limit their productivity, and hence the ability to recover to a non-threatened level. The most significant factors limiting productivity of these species 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) altered channel structure and complexity; (5) reduced streamflow; 6) hatchery-related adverse effects; and 7) predation and competition (National Marine Fisheries Service 2011b).

Recovery Plan. In 2007, NMFS adopted a recovery plan for UCR steelhead that was developed by the Upper Columbia Salmon Recovery Board. The Upper Columbia Salmon Recovery Plan's overall goal is "to achieve recovery and delisting of steelhead by ensuring the long-term persistence and viable populations of naturally-produced fish distributed across their native

range." The recovery plan outlined specific recovery actions that were intended to reduce threats associated with land and water management activities in the Upper Columbia Basin. These actions were to address primary threats associated with population abundance, productivity, spatial structure, and diversity. Some of these actions were specific to actions included in the proposed action such as improving road maintenance to reduce fine sediment recruitment to the stream, improving water quality, improving habitat diversity and quantity by restoring riparian habitat, and removing or replacing barriers to fish passage. In addition, the UCR Regional Technical Team (RTT) further refined and expanded on these actions in their 2014 Biological Strategy to include universal actions that include protecting and restoring riparian areas, and addressing road-related sediment and other road-related issues. They also recommended that the Forest should complete an inventory of their road system and reduce their road system to what is reasonably maintainable given existing budgets. The RTT went further to address fifth-field hydrologic unit code (HUC5) actions to address limiting factors for ESA-listed fish, with an example being the Upper Chewuch where they recommended that the number one and two priority actions were to reduce sediment through road management actions and restore riparian areas that have been degraded. Many other HUC5s had similar priorities and actions.

Summary. Although the abundance of steelhead in the Upper Columbia has increased, the improvement has been minor, and only one of the populations (UCR steelhead, Wenatchee) meet any of the recovery criteria established in their respective recovery plans. In addition, all but one population for both species remain at high risk in their overall viability rating and risk of extinction (National Marine Fisheries Service 2011a; Northwest Fisheries Science Center 2015).

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 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:

1) The quantity and quality of habitat features (e.g., spawning gravels, wood and water condition, side channels).
2) The relationship of the area compared to other areas within the species' range.
3) 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).

The following table 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 7. Physical and biological features of critical habitats designated for ESA-listed steelhead 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 (Table 7). 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 (National Marine Fisheries Service 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 all listed salmon and steelhead species in this area (National Marine Fisheries Service 2007; National Marine Fisheries Service 2011c).

Despite these degraded habitat conditions, the HUCs that have been identified as critical habitat for these 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 (Independent Scientific Advisory Board 2007; Northwest Fisheries Science Center 2015; Scheuerell and Williams 2005; Zabel et al. 2006). Average annual Northwest air temperatures have increased by approximately 1ºC since 1900, or about 50 percent more than the global average over the same period (Independent Scientific Advisory Board 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; Independent Scientific Advisory Board 2007). While the intensity of effects will vary by region (Independent Scientific Advisory Board 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 percent 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; Independent Scientific Advisory Board 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 targets for these salmon populations more difficult to achieve. However, habitat restoration actions can ameliorate the adverse impacts of climate change on salmon. 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 reduce stream temperature; retiring irrigation water diversions; and purchasing or applying easements to lands that provide important cold water or refuge habitat (Battin et al. 2007; Independent Scientific Advisory Board 2007).

2.3 Action Area

"Action area" means all areas affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). For this consultation, the action area includes all aquatic habitats extending one-quarter mile upstream and one-half mile downstream of each levee repair site within the Okanogan River. This area includes sufficient river area to encompass all reasonably likely effects to ESA-listed species and designated critical habitat, and extends to the point where any far field effects would be lost.

The action area is used by UCR steelhead, and is designated as critical habitat (September 2, 2005; 70 FR 52630). This area supports rearing and migration. The action area is also designated as EFH for Chinook salmon (Pacific Fishery Management Council 2014).

2.4 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7

consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

The Okanogan River subbasin is located in the northern part of central Washington and southern British Columbia, Canada. The Okanogan River mainstem is characterized by two divergent habitat types roughly separated by the international border. Conditions in the United States portion of the Okanogan mainstem are dominated by runoff from the Similkameen River, a turbid, snowmelt-fed basin that drains the northern portion of the Cascade Mountain Range in southern British Columbia. The upper Okanogan River above the Similkameen is fed by a series of large lakes that moderate hydrographic fluctuations. Both segments of the Okanogan mainstem have been altered through urban and agricultural development. The United States portion of the mainstem has retained a semblance of historic sinuosity and habitat complexity, while the Canadian portion has been extensively channelized and straightened. Stream flows in both segments are affected by agricultural withdrawals.

The Okanogan River's primary tributary is the Similkameen River, which enters the Okanogan River just downstream of Oroville, Washington. The Similkameen River normally contributes three-quarters of the combined flow in the Okanogan River. About 20 small tributary streams also drain the 2,600 square miles of the Washington portion of the basin. Overall, the basin is lightly populated, with the cities of Omak and Okanogan comprising the largest population centers. Agriculture, forestry, mining, and recreation are the major land-use activities in the Okanogan watershed.

Vegetation across the Okanogan Basin is a mixture of forest, grassland (shrub/steppe), and croplands. The eastern foothills of the Cascade Mountains rise quickly to the west river basin. The project site is a mixture of urbanized area on the right bank (levee side), and croplands on the left bank. Historically the Okanogan Valley was shrub/steppe with a riparian forest; however much of this habitat has been converted to cropland or is urbanized. Human impacts along the Okanogan River have included road construction, conversion of riparian habitat for agricultural, residential, and commercial development, and water diversion for agricultural irrigation. These impacts can increase sedimentation and bank erosion, reduce the extent and availability of riparian vegetation, and limit channel function.

The Okanogan River has long been considered suboptimal habitat for salmon and steelhead due to its regionally unique characteristics, most notably its low gradient, high summer temperatures, turbid water (downstream of the Similkameen River confluence), and small, flashy tributary streams (Doyle 2013; Kistler and Arterburn 2007). Despite these limitations, the subbasin still supports relatively healthy populations of sockeye salmon (*O. nerka*) and summer/fall-run Chinook salmon (*O. tshawytscha*), as well as a smaller population of summer steelhead (*O. mykiss*) (Doyle 2013).

Riverside Levee

The repair site at the Riverside Levee is located on the left bank of the Okanogan River just north of the town of Riverside. At the upstream end of the repair section, there are two large cottonwoods near the foot of the levee. On the landward side of the levee at the repair site, there

is a row of young cottonwoods and poplars adjacent to a farmer's field. Willows are prevalent along the riverside of the levee at its base, as well as along the shoreline. On the landward side of the levee, there is a large field that is irregularly inundated with shallow water.

Omak Left Bank Federal Levee

Site 1 is a section of levee located east of the Omak Stampede fairgrounds next to a camping area with gravel roadways and a few trees and areas of mowed lawn. The river at Site 1 is approximately 300 feet wide and comprised of relatively shallow run habitat and about 2 to 4 feet in depth near the left bank. The substrate in the project reach is dominated by cobble with some gravel and provides potential spawning habitat for salmonids. The riverside of the levee at Site 1 is vegetated with willows and shrubs, as well as mature cottonwood trees.

Site 2 is approximately 230 feet in length and is located on a section of the levee downstream from Site 1 and south of the Omak Avenue E Bridge. Levees line both banks of the river in this reach, and each has patches of mature trees and shrubs on the riverward slopes of the levees. The river at Site 2 is approximately 320 feet wide and is deeper than at Site 1. The substrate at the base of the levee was predominantly sand with a few cobbles. The eroded areas at the repair site have sandy slopes that have slid out into the river between areas where tree roots have held some bank material in place. The riverward slope of the levee is vegetated by trees and shrubs and the riparian corridor is dominated by cottonwoods and hackberry trees.

Omak Right Bank Federal Levee

Sites 1 and 2 are located along a section of levee on the right bank of the river just upstream of the Omak Avenue E Bridge. The river in the project reach is approximately 320 feet wide and comprised of run habitat with an exposed gravel bar approximately two-thirds of the way across the river. The substrate in the project reach is likely a mixture of cobble and gravel and is within a reach of the river reported by Washington Department of Fish and Wildlife as spawning habitat for summer-run Chinook salmon and juvenile Chinook and steelhead seasonal rearing habitat. The riverside of the levee at the project site is vegetated with willows and shrubs, as well as mature trees. On the landward side of the levee lies an apartment complex with a lawn. A row of three widely-spaced, planted young maple trees occur towards the downstream end at Site 2.

Site 3 is approximately 180 feet in length and located along the right bank south of the Omak Avenue E bridge, approximately 600 feet downstream of Site 2. The river in this reach is approximately 380 feet wide with cobble and gravel substrate below a riprap toe. The river channel is comprised of run habitat along the right bank shore with the main flow along the opposite bank. This reach is considered as both migratory and potential spawning habitat for Chinook salmon. There are no trees along the levee in this section but some willow shrubs, maple saplings, and grasses exist along the riverward side of the levee.

Elmway Levee

The proposed repair is located adjacent to commercial properties and Washington State Route 215. Prior to the 2018 flood fight, the levee was vegetated with approximately 25 smaller

deciduous trees/large shrubs, approximately 20-foot tall, 4 to 8 inches diameter at breast height trees; and 3 or 4 larger trees; approximately 40 feet tall. Species were predominately mountain alder, wild rose, and red-osier dogwood, with portions of the levee crown composed of grasses and forbs. Many of the pre-existing trees and shrubs were lost because of the flood flows. The remainder of the vegetation was removed as a necessary element of the May 2018 emergency repairs.

Okanogan Treatment Plant Levee

The repair section at Site 1 is located on the right bank of the river at the south end of the wastewater treatment plant. The river at the site is approximately 160 feet wide and the substrate is likely a mixture of cobble and gravel and is within a reach of the river that is considered spawning habitat for Chinook salmon and seasonal rearing habitat for juvenile steelhead. Just upstream of the repair site, the levee toe has been largely eroded, and the levee has experienced a loss of surface materials. There are also areas of exposed tree roots along the base of the levee near the water line.

The riverside of the levee at the project site is vegetated with mature trees and shrubs including several large cottonwoods, aspen, hackberry, and a few black locust trees. Most tree cover is at the southern end of the repair site and includes a stand of quaking aspen, as well as several black locust trees, and some hackberry and willow. Several large cottonwoods occur throughout the repair site, primarily rooted near the bottom of the levee slope. Tree cover is less near the north end of the repair site with two clumps of large cottonwoods. This large amount of tree cover at the site provides overwater shading near shore, nutrient, and wood input to the river.

2.5 Effects of the Action

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

2.5.1 Effects on ESA-Listed Species

Steelhead Presence in the Action Area

During the 2019 proposed repair in-water work window (July 1–August 15), steelhead juveniles may be present and rearing in the action area. Juvenile steelhead use the Okanogan River for rearing year around, but their presence in the summer is limited by high river temperatures. In annual snorkel surveys in the Okanogan River from 2004–2017, counts of juvenile steelhead in all survey reaches remained near or at zero during the summer (The Okanogan Basin Monitoring and Evaluation Program 2018). High temperatures in this reach of the Okanogan River (greater than 22 ºC) make it highly unlikely that juveniles would be rearing along the face of the levees or adjacent. It is unlikely that any adults will be present in the action area during construction activities, because they spawn in the spring. Adult steelhead migrate from the ocean upstream

through the mainstem Columbia River from July through September. After passing over Wells Dam (downstream of the confluence of the Okanogan River with the Columbia River), adult steelhead generally hold in the Wells Pool until summer water temperatures in the Okanogan River drop in late August and September.

Proposed 2019 Levee Repair

The proposed levee repair project is anticipated to have adverse effects to steelhead from noise, turbidity, and injury from rock placement. The in-water work will occur during the standard in-water work window for the Okanogan River (July 1–August 15).

Noise. The proposed action will produce underwater sound from the removal and placement of rock in and along the Okanogan River. The construction activity's greatest sound levels will likely be generated by removal and placement of rock below the waterline. Work conducted above the waterline could create sound that propagates through the ground to the water, albeit at a lower level than the source. Studies directly measuring underwater sound from rock placement are lacking. If fish are located near the levee repair areas, they are likely to be disturbed by increases in noise caused by the proposed action. This would likely result in fish moving away from the immediate repair sites. However, this behavior is likely to occur regardless, due to the ground and water disturbance associated with heavy machinery removing and placing rock along the face of the levees.

Turbidity. The Corps' in-water work activities are likely to temporarily increase suspended sediment concentrations. However, by placing the rock individually, the amount of substrate that will be disturbed will be minimal, the disturbance will not be continuous, and the suspended sediment will be diluted by the current. In addition, the Corps will monitor turbidity and will halt in-water activities if turbidity measured 300 feet downstream of the in-water activity exceeds background levels by 5 NTUs. These efforts will keep suspended sediment concentrations low and will limit the duration of potential exposure on ESA-listed fish. Based on criteria outlined in Newcombe and Jensen (1996), adverse effects are not anticipated if the Corps maintains turbidity levels at or below 5 NTUs.

Mechanical injury. Juvenile steelhead present within the in-water footprint at each site are at risk of being crushed by equipment or buried by material placed to repair the levees. NMFS expects that, due to very low densities or absence of adult Middle Columbia River steelhead in the Okanogan River during the in-water work window, none will be exposed to construction effects. However, juvenile steelhead are likely to be present in the Okanogan River, although at very low densities. We referred to juvenile steelhead densities reported in Mullan et al. (1992) to estimate the number of juvenile fish that will be directly injured or killed by burial or crushing. Mullan et al. (1992) reported that juvenile steelhead densities in poor-quality habitat in Columbia River tributaries averaged 2.4 per 120 square yards (1.3 age-0, plus 1.1 parr per 120 square yards).

NMFS considers the habitat within the in-water footprints of each levee to be poor quality because they are generally composed of riprap and embankment fill with little habitat complexity and limited riparian vegetation function. We also believe that during the work window with

expected high water temperatures in the Okanogan River, fish densities will be lower than those reported in Mullan et al (1992). Furthermore, any juveniles present would be free-swimming and able to flee the immediate area of construction. We thus estimate that the levee repairs will not kill or injure more than 25 percent as many juvenile steelhead as suggested by the densities reported in Mullan et al (1992). Given an estimated in-water construction footprint of 17,555 square feet, which includes the total area below the OHWM and the distance of each levee repair. We estimate that construction will injure or kill 10 juvenile steelhead. Given the very low survival rates of steelhead in the Okanogan subbasin from the rearing juvenile stage to returning adult stage, the injury or death of 10 juveniles is likely to represent no more than one adult steelhead returning to the basin.

Riparian Planting

As described above, the Corps proposes to plant willow stakes in soil lifts about 1 foot above the OHWM at the Treatment Plant, Omak Right Bank, and Omak Left Bank levee sites. Seventy willow bundles will be planted at the Elmway Levee site within the slope armor to provide shade and other habitat amenities to aquatic and terrestrial species. The willow bundles will be planted 6 foot on center in a line, approximately 1 foot above OHWM. To install the stakes and bundles, half of the soil in the 12-inch lift is placed, then the willows are placed horizontally so that approximately 80 percent of their length is covered with soil, then the remaining half of the soil is placed over the top. Approximately 1,365 willow stakes and 70 willow bundles of 6 stakes each will be planted.

The Corps is also planting riparian vegetation to compensate for the loss of vegetation on the levees and to compensate for in-water fill as a result of the repairs at the Okanogan Treatment Plant Levee, Omak Right Bank Levee, Omak Left Bank Levee, and the Elmway Levee. A 3 to 1 replacement ratio was used to calculate the number of plantings to compensate for lost shade function including temporal loss associated with the time required for new plantings to mature. They will plant 64 black cottonwood and 191 pine trees to compensate for lost vegetation cover on the riverward levee slope for the Omak right bank and left bank projects. They will also plant 75 pine trees at the Salmon Creek site owned by the city of Okanogan to compensate for vegetation removed by the Treatment Plant levee repair. The trees will be planted on 10-foot centers. No off-site mitigation will be required for the Riverside repair since no vegetation will be removed during that repair and none was removed during the flood fight and breach closure. For the Elmway Levee, nine black cottonwoods will be planted just upstream of the levee repair location to compensate for lost vegetation. In addition, 400 live stakes consisting of red-osier dogwood, coyote and Drummond willow will be planted as a beneficial habitat feature in compensatory mitigation for placing fill into waters of the United States.

The Corps will monitor the plantings for 1 year, post construction, and ensure 80 percent survival. If less than 80 percent survival is recorded after 1 year, the Corps will replace dead plants and monitor for an additional growing season.

NMFS anticipates that the willow stakes and bundles will be ineffective in ameliorating the impacts of the levee repairs on habitat function. This is based on the apparent failure of a similar planting plan carried out by the Corps in 2017; NMFS expects a very high proportion of the

willow stakes to die. The Corps installed willows along several sites of the Yakima Right Bank levee in 2017 (NMFS consultation WCR-2016-5868), which appear to have failed due to a combination of poor design and implementation. The NMFS informed the Corps of the failures at these sites in November 2017. The proposed planting plan for the proposed action is responsive to some of the problems identified in the 2017 project. However, the proposal is to install willows horizontally at or above the high water line, which is very likely to result in desiccation and death of the willows soon after installation, especially with the very dry and hot weather conditions in the Okanogan subbasin.

Floodplain Isolation and Channel Migration

As described in the Environmental Baseline section, levees throughout the action area have a profound effect on the function of the river system and reduce its ability to provide habitat for UCR steelhead. These are ongoing effects of past actions to construct the levees. Over time, as floods, erosion, and other events occur, levees are damaged and their ability to function as originally constructed may be reduced. Thus, as levees deteriorate, levee function and attendant effects on the environment change unless they are maintained and repaired.

The 2018 flood reduced the level of protection provided by these levees. The purpose of the proposed repairs are to ensure that the levees function as constructed far into the future. Therefore, one potential effect of the proposed action is that these levees will exist in a functional state in the long term, instead of falling into disrepair over time. To determine if, and to what extent, the proposed action will extend the useful life of the subject levees in a meaningful way, NMFS relies on the BAs provided by the Corps.

The BAs identify the existing and proposed Level of Protection afforded at each levee. The Corps (2006) defines Level of Protection as "the degree of protection against flooding provided by an [Flood Control Works], normally expressed in terms of the cyclical flood-level against which protection is provided." The proposed repairs will increase the Level of Protection of the subject levees by decades, increasing the level of protection from an increase of 19 years at the Riverside Levee to 995 years at the Okanogan Treatment Plant Levee.

Because the mode of damage and focus of repair at these levees is toe and slope erosion, NMFS concludes that the Corps' Level of Protection estimates for the existing condition are an expression of the levees' ability to withstand continued erosion of the riverward side of the levee. Therefore, because the proposed action will increase the Level of Protection relative to their current (damaged) condition, NMFS concludes that the action will meaningfully extend the useful life of each of the subject levees (Table 8).

Table 8. Levee age and level of protection

Levee	Age of Levee (Years)	Proposed Level of Protection (Years)	Existing Damaged Level of Protection (Years)
Riverside	More than 47	20	1
Omak Right Bank	40	500	10
Omak Left Bank	40	500	10
Elmway	More than 45	50	3
Okanogan STP	71	1,000	5

In general, extending the useful life of levees will forestall: (l) erosion and deposition processes, which have the potential to create additional channels, but also threaten floodplain development; and (2) inundation of disconnected floodplain, which can improve habitat function by reducing flood stage in downstream areas, recharge the local water table, and provide critical slow-water refuge to fish during flood events, but also flood developed areas. The following analysis will explore the effects of doing so at each location.

Riverside Levee. The Okanogan River at the Riverside Levee location is a single-threaded channel confined by levees on both sides of the river. NMFS estimates that the levee has confined the channel to about 20 percent of its historical channel migration zone based on Light Detection and Ranging (LIDAR) imagery (Washington State Department of Natural Resources LIDAR Portal, accessed March 29, 2019). The repair of the Riverside Levee is proposed to prevent failure of the levee and lateral channel migration. Based on LIDAR imagery and orthophotography, NMFS estimates that if the levee were left to fail, the Okanogan River would move laterally and lengthen itself, creating hundreds of feet of additional channel. Therefore, the effect of extending the life of the levee and protecting the area behind the levee, which is mostly agricultural land and a couple of residences, is the prevention of the lateral movement of the Okanogan River across approximately 400 feet of floodplain. This lateral movement of the river would create additional river length in this location, but it is difficult to determine what that would consist of. Likely, the mainstem would move across the floodplain over time, creating a more diverse area of habitat types.

Omak right and left bank levees. There are five repair sites on the Omak right and left bank levees. The river in this location is approximately 300 to 380 feet wide and comprised of relatively shallow water habitat. These levees are located in the town of Omak and prevent the town and fairgrounds from flooding. The location of the levee is also confined by an upstream and downstream bridge, which appear to have stabilized the river in this location for some time. Given the dramatic confinement enforced by multiple structures, it does not appear that extending the useful life of the levee in a meaningful way will affect the future alignment of the river.

Elmway Levee. The Elmway Levee is located near the City of Okanogan and abuts commercial buildings and State Route 215. Immediately downstream are both commercial and residential buildings as well as roads and other infrastructure. Allowing the levee to fail over time would not provide additional aquatic floodplain habitat along the right bank of the Okanogan River and this is not expected to change in the future.

Okanogan Sewer Treatment Plant. The repair section at Site 1 is located on the right bank of the river at the south end of the treatment plant. The river at the site is approximately 160 feet wide. The treatment plant is located just downstream of a bridge, which limits the river's lateral movement at this location. On the bank opposite the levee and downstream of the levee there is room for the river to access the floodplain. At this time, we are unaware of plans to relocate the sewer treatment plant to a different location and expect it to remain in its existing location for the foreseeable future.

2.5.2 Effects to Critical Habitat

The PBF characteristics affected by the proposed action are water quality, floodplain connectivity, substrate, forage, and natural cover.

Water Quality

In-water construction activities will increase suspended sediments. This will only affect water quality during and immediately following construction, causing no long-term effects to critical habitat.

Floodplain Connectivity

The repair of the levees prevents the reconnection of floodplain habitats that would happen when the levee eventually fails. However, the benefit of floodplain reconnection at all but one levee in an urbanized environment would not likely have much benefit to critical habitat. However, at the Riverside Levee, floodplain reconnection would allow river processes to be re-established to some degree. The Riverside Levee restricts the lateral movement of the Okanogan River across approximately 400 feet of floodplain. This restriction is expected to remain as long as the Riverside Levee exists, and will limit floodplain connectivity into the foreseeable future.

Substrate

The hardened levee banks prevent spawning gravel recruitment that would otherwise occur via bank erosion and entrainment in an unconfined channel. Bank erosion also provides a sediment source that creates riparian habitat, creates and maintains diverse structure and habitat functions, and modulates changes in channel morphology and pattern. Maintaining these levees will prevent gravel recruitment and bank erosion from occurring, and they will continue to degrade habitat conditions at these locations.

Forage

The Corps removed approximately one acre of riparian vegetation from the top and sides of the levees, which reduced forage availability. Allochthonous input also supports productivity, which results in forage for steelhead (e.g., aquatic insects). The Corps is proposing to plant about 3.5 acres of vegetation in two locations as mitigation for vegetation loss. In addition, the Corps is proposing to use willow bundles and willow stakes in the levee repair projects. We anticipate that the off-site mitigation sites will be successful and will help compensate for lost riparian function; however, if the levee willow plantings fail, as detailed above, then forage is expected to be reduced at the levee sites by the proposed action.

Natural Cover

The levee repairs will reduce the already highly-degraded habitat complexity at the levee face due to the insufficiency of proposed in-levee planting relative to the proposed clearing of one acre of riparian vegetation. This will limit cover for juvenile steelhead from both high flows and predators. Riparian vegetation provides overhead cover, shade, and a source of woody material,

which provides complex cover in-stream. However, the 3.5 acres of planting at the two off-site locations will help improve natural cover in those locations. We expect the Corps' plantings to be beneficial if successful, and neutral or slightly degrading to habitat conditions if the willow plantings are unsuccessful.

2.6 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation (50 CFR 402.02). Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline vs. cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4).

NMFS is not aware of any specific future actions that are both reasonably certain to occur in the action area and that would likely contribute to cumulative effects on steelhead. For this description of cumulative effects, NMFS assumes that future non-federal activities in the area of the proposed action will continue into the future at present or increased intensities.

NMFS searched for information on future state, tribal, local, or private actions that were reasonably certain to occur in the action area. Most activities that occur across the Project area either are on federal land or require some type of federal permit, which will require some type of future ESA consultation. In addition, most future state or tribal actions would likely have some form of federal funding or authorization and therefore would be reviewed by NMFS.

2.7 Integration and Synthesis

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

The status of UCR steelhead is driven by the high risk of extinction from low abundance, productivity, spatial structure, and diversity for all of their component populations. The ICTRT

(2005) noted a high viability risk for UCR steelhead populations. UCR steelhead are not meeting the five recovery criteria as outlined in the Recovery Plan (Upper Columbia Salmon Recovery Board 2007).

The information presented in the environmental baseline section (Section 2.4) details that the 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 (National Marine Fisheries Service 2009; Wissmar et al. 1994). In general, the Okanogan River offers suboptimal habitat for salmon and steelhead. It experiences high summer temperatures, frequent high turbidity (downstream of the Similkameen River confluence), and most of its tributaries are either intermittent or experience very low base flow.

The cumulative effects of state and private actions within the action area will continue largely unchanged. It is also likely that the overall pattern of state and private development, especially in the Cities of Omak and Okanogan, and outlying areas will contribute adversely, in some areas, to the condition of riparian habitat.

As noted in section 2.2, climate change is likely to affect steelhead in the Okanogan Basin. The 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 percent 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 steelhead yearlings to smolt and emigrate to the ocean earlier in the spring (Independent Scientific Advisory Board 2007; O'Neal 2002).

The proposed action will reduce abundance in the short term by killing or injuring (that later die) juvenile fish as a consequence of in-water work. Based upon densities described above, NMFS estimates that a total of 10 steelhead juveniles will be killed or injured during construction. All killed and injured fish will be from the Okanogan population of the UCR steelhead DPS. Even assuming a very high juvenile-to-adult survival rate of 2 percent, 10 juvenile steelhead are expected to produce not more than one adult steelhead. In the context of the Okanogan population's 10-year geomean abundance of 189 spawners, the expected injury or death of these fish from direct construction impacts is not expected to meaningfully affect adult returns.

The effects also include clearing approximately one acre of vegetation from the levees, which will reduce riparian vegetation, food availability, and shade. However, the small size of the reduction is not likely to reduce growth, and ultimately survival, for juvenile steelhead. The proposed mitigation plantings will likely partially compensate the lost function over time; however, there remains some uncertainty on the success of the willow plantings.

Additional indirect effects include meaningfully extending the useful life of the levees that are being repaired. At these locations, that means preventing the eventual formation of additional channels that would support steelhead spawning and rearing. However, most of the levees are within city limits or adjacent to significant infrastructure, including both commercial and

residential structures as well as roads and highways. The Riverside Levee is the only repair that is adjacent to agricultural lands where a setback levee could be completed more inexpensively and with fewer impacts to infrastructure than the other locations.

In sum, the proposed levee repair will kill or injure 10 juvenile steelhead and either be neutral or slightly degrade habitat conditions if the willow plantings fail. The proposed action also plants riparian vegetation as mitigation for both the emergency repair and proposed repair, with vegetative success uncertain. Given the context of the action area that is already degraded but highly developed—and with these conditions not likely to change—we feel that the adverse effects of the proposed action are not expected to appreciably diminish the likelihood that UCR steelhead will survive and recover.

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 action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' opinion that the proposed action is not likely to jeopardize the continued existence of UCR steelhead, or destroy or adversely modify their designated critical habitat.

2.9 Incidental Take Statement

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that 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 of UCR steelhead is reasonably certain to occur from mechanical injury and reduced forage from riparian vegetation removal. Only the juvenile life stage is expected to be adversely affected. We estimate that 10 juvenile steelhead will be injured or killed by the 2019 levee repair actions.

Because it would be nearly impossible to count the number of injured juveniles and because of the uncertainty in estimating the number of individuals that will be affected through reduced riparian vegetation, we will use a habitat surrogate to account for this take. The extent of habitat change to which juvenile steelhead will be exposed is readily discernible and presents a reliable

measure of the extent of take that can be monitored and tracked. Therefore, when the specific number of individuals "harmed" cannot be predicted, NMFS quantifies the extent of take based on the extent of habitat modified (June 3, 1986, 51 FR 19926 at 19954).

The estimated extent of habitat affected by reduced riparian vegetation and in-water work represents the extent of take exempted in this ITS. The amount of take will increase as the area disturbed by construction activities increases. Therefore, the extent of take is best identified by the total area the Corps is proposing to clear of riparian vegetation (1 acre), the area of riparian vegetation planting (3.5 acres), and the area to be excavated and filled (17,555 square feet), the effects of which have been analyzed in this opinion. Although these surrogates could be considered coextensive with the proposed action, monitoring and reporting requirements will provide opportunities to check throughout the course of the proposed action whether the surrogates are exceeded. For this reason, the surrogates function as effective reinitiation triggers. The Corps shall reinitiate consultation if they clear more than 1 acre of riparian vegetation, plant less than 3.5 acres of vegetation, and their in-water construction footprint (i.e., the area where riprap is placed and where any in-water disturbance occurs) exceeds 17,555 square feet.

The estimated extent of habitat affected by meaningfully extending the useful life of levees are floodplain and side channels that could be created in the absence of the action. At the Riverside Levee site, there is an opportunity to modify the levee to provide the Okanogan River access to its floodplain. Therefore, the extent of take is the length of repair at the Riverside Levee under the proposed action (175 linear feet).

2.9.2 Effect of Take

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

2.9.3 Reasonable and Prudent Measures

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

The Corps shall:

1. Minimize the extent of construction activities.
2. Minimize effects to riparian vegetation.
3. Monitor the project to ensure that the conservation measures are meeting the objective of minimizing take and that the amount or extent of take is not exceeded.

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.

1. The following terms and conditions implement RPM 1:
    a. Do not exceed an in-water construction footprint of 17,555 square feet.

2. The following terms and conditions implement RPM 2:
    a. Ensure that willows grow on the repaired sections of levee.
    b. Install live willow poles and necessary soil substrate along all repaired sections of the levees.
    c. Install willow poles according to the specifications of the NRCS publication: TN Plant Materials No. 21: Planting Willows and Cottonwood Poles under Rock Riprap (NRCS 2007), including but not limited to:
        i. Willow poles will be installed in bundles installed between 45 degrees and vertical along every 6 feet of repaired bank length.
        ii. Willows poles must be installed to reach a minimum of 6 inches deep into the seasonal low water table and extend above the typical high water line and 6–12 inches above the riprap.
    d. Soil must be installed such that at least the lowest 60 percent of the length of each pole is in contact with soil substrate that is stabilized by a filter layer.
    e. Ensure that willow poles survive the establishment period by watering as necessary. This will be most important for willows installed during summer and early fall.
    f. Ensure that willows are allowed to grow and provide habitat functions by coordinating with entities responsible for levee maintenance.
    g. Ensure that at least 80 percent of bundles have at least one live pole surviving in October 2020. If less than 80 percent of the bundles have at least one live pole, replace the failed bundles and soil (as necessary), and monitor for an additional year.

3. The following terms and conditions implement RPM 3:
    a. By December 31, 2020, the Corps shall report monitoring items to include, at a minimum, the following:
        i. Project identification
            1. Project name: Okanogan Levee (WCRO 2019-00027) or Okanogan River Levees Project (WRCO 2019-00119)
            2. Corps contact person
        ii. Construction details
            1. Starting and ending dates for work completed for construction
            2. Total area (square feet) of in-water construction footprint
            3. Total area (square feet) of riparian area disturbance (i.e., waterward face of the levee)
            4. Results of turbidity monitoring

5. A description of any elements of the project that were constructed differently than depicted in the BAs, associated addendums and communications, or this opinion

iii. Willow stake and bundle survival at the end of the 2020 growing season, and if necessary, remedial measures planned to replace failed plantings

b. If less than 80 percent of willow bundles have at least one live pole surviving by October 2020, submit an additional monitoring report following one growing season after bundles are replaced.
c. If take is exceeded, contact NMFS promptly to determine a course of action.
d. All reports will be sent to National Marine Fisheries Service, Attention: Justin Yeager, 304 South Water Street, Suite 201, Ellensburg, Washington, 98926. NOTICE: To follow inactive projects and, if necessary, withdraw the opinion for an incomplete project, the Corps shall provide an annual report even if no actual work was completed in a particular year.

2.10 Conservation Recommendations

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

The Corps should pursue options to set back the entirety of the Riverside Levee or portions of the levee.

2.11 Reinitiation of Consultation

This concludes formal consultation for the Elmway Levee and Okanogan River Levees Project.

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

3.0 MAGNUSON–STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.”

Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

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

3.1 Essential Fish Habitat Affected by the Project

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

3.2 Adverse Effects to Essential Fish Habitat

See Section 2.4 of the opinion for a description of the adverse effects on anadromous species habitat for Pacific salmon. The effects of the action on Pacific Coast salmon are similar to those described above in the ESA portion of the document.

NMFS concludes that the proposed action will have adverse effects on EFH designated for Pacific Coast salmon in freshwater habitats where Corps program activities occur. Based on information provided by the action agency and the analysis of effects presented in the ESA portion of this document (Section 2.4), we conclude that the proposed action will have the following adverse effects on EFH for Pacific Coast salmon.

Specifically, NMFS has determined that the action will adversely affect EFH as follows:

1. Freshwater EFH quantity and quality, including juvenile rearing and salmon spawning habitat will be reduced from increased sedimentation/substrate embeddedness at the site scale.
2. Freshwater EFH quality, including juvenile rearing and salmon spawning habitat will be reduced from decreased allochthonous inputs at the site scale.

3.3 Essential Fish Habitat Conservation Recommendations

NMFS believes that the following conservation measures are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH.

1. The Corps should follow Terms and Condition #1 and #2 above (Section 2.9.4) in the ESA portion of this document to offset adverse effects to EFH from the proposed action.

2. The Corps should follow Term and Condition #3 to report the measures implemented in item "1" above.

Fully implementing these EFH recommendations would protect, by avoiding or minimizing adverse effects described in section 3.2 above.

3.4 Statutory Response Requirement

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

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

3.5 Supplemental Consultation

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

4.0 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the Corps and Okanogan County. Other interested users could include potential users of the Okanogan

River as well as people interested in the conservation of UCR steelhead. Individual copies of this opinion were provided to the Corps.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan

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

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion (and EFH consultation, if applicable) 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, if applicable), and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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