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

Refer to NMFS Consultation No.:
WCRO-2019-00197

October 24, 2019

Kathy Hollar
Chief, Wildlife and Sport Fish Restoration Program
U.S. Fish and Wildlife Service
Portland, Oregon 97232-4181

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Klaskanine River Boat Ramp project; Clatsop County, Oregon; HUC12- 170800060205 – Lower Youngs River - Frontal Youngs Bay; Lat. 46.090488 N; Long. -123.754605 W

Dear Ms. Hollar:

Thank you for your letter of April 3, 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) (16 U.S.C. 1531 et seq.) for the Klaskanine River Boat Ramp project as designated under the Sport Fish Restoration Act of 1950. The enclosed document contains a biological opinion (opinion) prepared by the NMFS pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the U.S. Fish and Wildlife Service (FWS) proposal to install a boat ramp on the Klaskanine River, located in Clatsop County, Oregon.

In this opinion, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*), LCR coho salmon (*O. kisutch*), Columbia River chum salmon (*O. keta*), Upper Willamette River steelhead (*O. mykiss*), the southern designated population segment (sDPS) of green sturgeon (*Acipenser medirostris*), or result in the destruction or adverse modification of designated critical habitats for these species.

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

Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. 1855(b)) for this action. NMFS also reviewed the likely effects of the proposed action on essential fish habitat (EFH), pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)), and concluded that the action would adversely affect the EFH of Chinook salmon and coho salmon listed in the Pacific Coast Salmon Fishery Management Plan. Therefore, we have included the results of that review in Section 3 of this document.

If the response is inconsistent with the EFH conservation recommendations, the USFWS must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and recommendations. 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 request that in your statutory reply to the EFH portion of this consultation you clearly identify the number of conservation recommendations accepted.

Please contact Scott Sebring of NOAA Fisheries Oregon-Washington Coastal Office in Lacey, Washington at scott.sebring@noaa.gov or 360-753-9887, if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Kim W. Kratz, Ph.D.
Assistant Regional Administrator
Oregon Washington Coastal Office

cc: Barb Behan (USFWS)
Paul Hayduk (USFWS)

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

Howard Island Sump Relocation project; Columbia County, Oregon;
HUC12-170800030900-Cathlamet Channel Columbia River

NMFS Consultation Number: WCRO-2019-00197

Action Agency: U.S. Army Corps of Engineers, Portland District

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*)	Threatened	Yes	No	No	No
Columbia River (CR) chum salmon (*O. keta*)	Threatened	Yes	No	No	No
LCR coho salmon (*O. kisutch*)	Threatened	Yes	No	Yes	No
Southern designated population segment of green sturgeon (*Acipenser medirostris*)	Threatened	Yes	No	Yes	No

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

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

Issued By:

Kim W. Kratz, Ph.D.
Assistant Regional Administrator
Oregon Washington Coastal Office

Date: October 24, 2019

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1. INTRODUCTION

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

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), and implementing regulations at 50 CFR 402.

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

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

1.2 Consultation History

On April 3, 2019 the COE sent a letter to the NMFS requesting formal consultation under Section 7 of the Endangered Species Act for the Klaskanine River Boat Ramp project. In this letter the FWS determined that the proposed action was likely to adversely affect the following species and their designated critical habitats: Lower Columbia River (LCR) coho salmon (*Oncorhynchus kisutch*) and its designated critical habitat. The FWS determined that the proposed action will have no effect on LCR Chinook salmon (*O. tshawytscha*), upper Willamette River (UWR) steelhead (*O. mykiss*), Columbia River (CR) chum salmon (*O. keta*), the southern designated population segment (sDPS) of eulachon (*Thaleichthys pacificus*), or the sDPS of green sturgeon (*Acipenser medirostris*).

On May 10, 2019 the NMFS contacted the FWS and noted that the proposed action occurs within designated critical habitat for the sDPS of green sturgeon. The NMFS requested an effect determination for this species. The FWS responded the same day and requested whether an additional letter with an effect determination was warranted.

On May 13, 2019 the NMFS responded to the FWS and provided a map identifying critical habitat for the sDPS of green sturgeon in the action area and the associated copy of the federal register citation. The FWS responded the same day requesting to consider the sDPS of green sturgeon and its designated critical habitat within formal consultation for the proposed action. The NMFS consulted on LCR coho salmon, sDPS green sturgeon, and their designated critical habitat. The NMFS also consulted on CR chum salmon and LCR Chinook salmon, but did not consult on effects to designated critical habitat because the action area does not include critical habitats for these species.

On August 7, 2019 NMFS and FWS conducted a teleconference and discussed the proposed revegetation, potential vehicular access to cleared areas on the southeast side of a small wetland, and methods to minimize and mitigate for permanent effects to streambank. The NMFS requested FWS include additional revegetation planting.

On August 8, 2019 FWS contacted NMFS with modifications to the proposed action addressing concerns related at the meeting the previous day. Consultation was initiated at this time. The FWS proposed the following alterations:

1) Install large boulders to block/prevent vehicular access to the southeast corner of the property purchased by ODFW.
2) Revegetating the southeast corner of the property purchased by ODFW.
3) Installing large and small woody debris pieces on the eastern corner of the property purchased by ODFW.

1.3 Proposed Federal 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). Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910). "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).

The FWS proposes to fund the Oregon Department of Fish and Wildlife's (ODFW) construction of a concrete boat ramp and vehicle maneuvering area of approximately 5,700 square feet and an adjoining gravel parking area of approximately 25,000 square feet (Figures 1-3, see Appendix A) to provide recreational use to the public on the south bank of the Klaskanine River in rural Clatsop County, near the town of Olney, Oregon. In 2015 the ODFW purchased 2.2 acres of property from Clatsop County that was used as a temporary gravel storage yard to ensure access to recreational anglers. ODFW was concerned that an adjacent privately-owned lot located about 500 feet upstream from the aforementioned 2.2-acre parcel used by boaters and anglers launch vessels might be closed related to concerns pertaining to legal liability. Based on the dimensions of the boat ramp and parking area NMFS estimates the facility may accommodate 20 to 30 vessels with vehicles and trailers.

ODFW proposes to install rock riprap adjacent to the concrete boat ramp that will be capped with native, streambed substrate materials. The parking and vehicle maneuvering area will consist of graded and compacted gravel and space for handicap parking area adjacent to the boat ramp that is bordered by a cast-in-place 6-inch concrete curb. ODFW estimates a total of 600 cubic yards (cy) of gravel will be placed on the existing cleared lot to a depth of about 4 inches. The ODFW also proposes to construct a concrete pad for portable restroom facilities, a stormwater swale for on-site stormwater treatment. The ODFW proposes to install a guardrail adjacent to the stormwater retention area and 60 feet of fence along the western property line.

The parking area is covered in fill, likely from its use by Clatsop County as a gravel storage area. The riverbank contains abundant, coarse, angular, cobble fill and appears heavily eroded, likely from seasonal flooding that is common for the river (Archaeological Investigations Northwest, Inc. 2017). The ODFW proposes to use standard heavy construction equipment (e.g., excavators, trucks, graders) to excavate stream substrates, grade the streambank, improve the parking area, position pre-cast concrete slabs, place woody debris material, and other small tasks. Most of the boat ramp and maneuvering area will be formed by placing 4 feet by 15 feet pre-cast concrete slabs. Sections of the ramp near the toe will be cast-in-place concrete. The ODFW proposes to stabilize the toe of the streambed at elevations inundated each day by tides by placing riprap adjacent to the base of the ramp. Further up the streambank the FWS proposes to alter the grade of the bank with excavated material and turf reinforcement mat. The structured fabric mat stabilizes the soil by allowing vegetation to grow through the fabric.

ODFW also proposes to conduct several actions on a 0.25 acre open gravel lot east of the wetland area for the purposes of increasing habitat recovery potential for listed species that utilize the Klaskanine River (Figure 4). The ODFW proposes to: 1) install large rocks to preclude access to the area by vehicles; 2) revegetate a parking area with native conifers (e.g., western red cedar and Sitka spruce); and 3) install large and small woody debris pieces on the streambank where a small off-channel backwater pool is located.

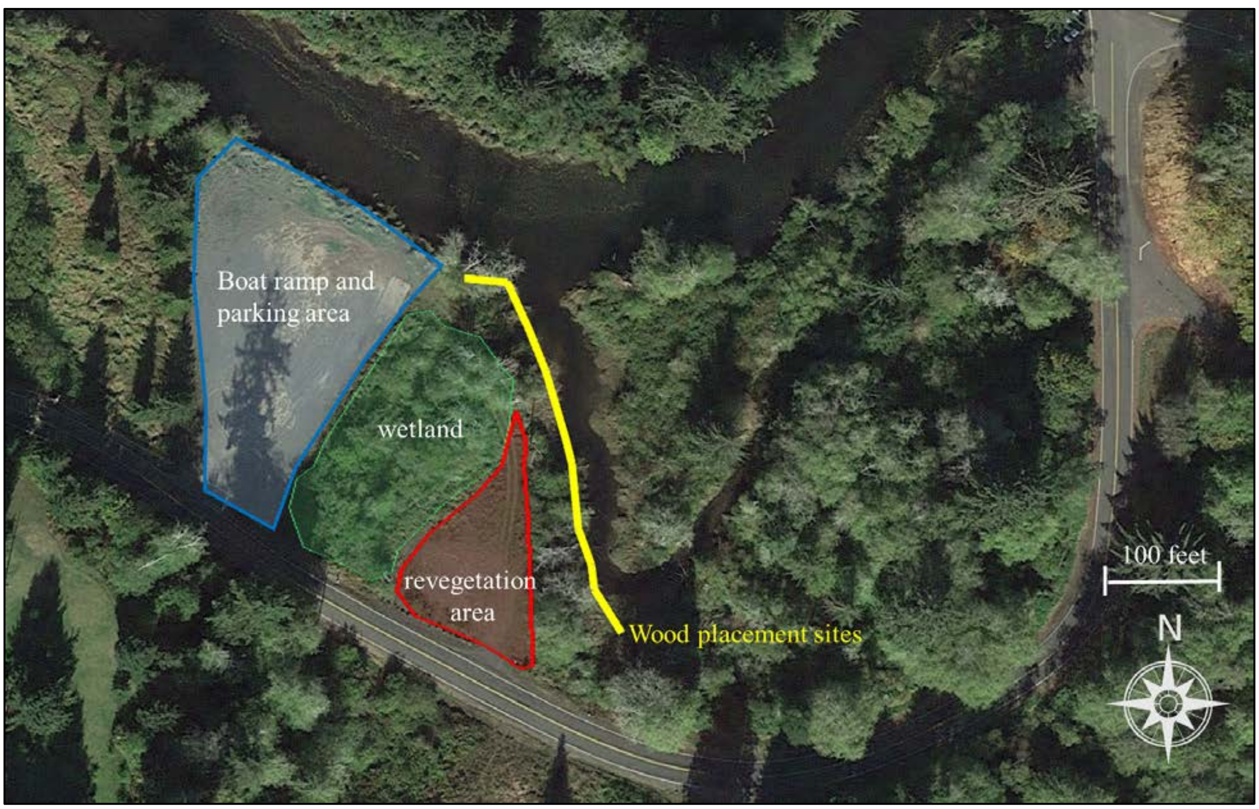

Figure 1. Proposed construction, existing wetland, habitat revegetation, and wood placement area.

The ODFW proposes to install pre-cast concrete planks in areas below low tide. The ODFW will also conduct work during low tide in areas below ordinary high water. The ODFW estimates construction will require 1-2 months to complete and proposes a work window of July 1-September 15. Although contractors will conduct a limited amount of inwater construction the proposed action does not include methods for fish salvage.

The ODFW proposed to the following measures to minimize exposure to listed species:

- Install a floating silt curtain or other isolation methods to prevent distributing a turbidity plume into the river that will be located below ordinary high water during the installation of the toe of the boat ramp.
- Install and maintain a silt fence in upland areas to reduce runoff from entering the river during construction.
- Install native conifers approximately 200 feet adjacent to the boat ramp to compensate for approximately 150 feet of riparian habitat degraded by the proposed construction.

The interrelated activities are the future recreational uses of the site by the public, including vehicle access, fishing, and boating, however these are not under the jurisdiction of the ODFW.

1.4 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The proposed action is located in a tidal portion of the Klaskanine River, one of four tributaries to Youngs Bay (Figure 5). The action area is located in a tidally-influenced section of the Klaskanine River approximately 3 miles downstream of the Klaskanine River Hatchery. This location is identified as designated critical habitat for two species: LCR coho salmon and sDPS of green sturgeon. All three ESA-listed species known to use the action area are identified as part of the Youngs Bay population for their respective species. These species: CR chum salmon, LCR Chinook salmon, and LCR coho salmon. Green sturgeon that may use the action area are part of the southern designated population segment, which includes individuals that spawn and rear primarily in central California. The action area is also identified as essential fish habitat for Chinook salmon and coho salmon under the MSA.

Figure 2. Action area location

The boundaries of the action area are limited to the 2.2-acre parcel owned by ODFW and approximately 1.10 acres of aquatic habitat contained within a 660 linear foot section of the Klaskanine River. The quantity of aquatic habitat included in the action area is based on NMFS best estimate of turbidity dispersal given site specific conditions, such as: sediment composition, proposed inwater construction methodologies, and use of construction best management practices. NMFS estimate of the extent of the action area altered by suspended sediment and chemical contaminants is about 660 linear feet of aquatic habitat (Figure 3). Due to the regular shifting flow (i.e., bidirectional) at this location the dispersal of suspended sediment and chemical contaminants are reasonably likely to be limited to a 660 feet distance because NMFS estimates suspended sediment may be distributed up to 200 feet upstream and downstream of the proposed boat ramp. Therefore the action area includes 660 feet of aquatic habitat in the Klaskanine River centered at the location of the proposed boat ramp.

Figure 3. The action area located in terrestrial habitats is outlined in red and aquatic habitats are outlined in pink. The existing wetland is outlined in green.

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

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

2.1 Analytical Approach

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

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

Updates to the regulations governing interagency consultation (50 CFR part 402) will become effective on October 28, 2019 [84 FR 44976]. Because this consultation was pending and will be completed prior to that time, we are applying the previous regulations to the consultation. However, as the preamble to the final rule adopting the new regulations noted, "[t]his final rule does not lower or raise the bar on section 7 consultations, and it does not alter what is required or analyzed during a consultation. Instead, it improves clarity and consistency, streamlines consultations, and codifies existing practice." Thus, the updated regulations would not be expected to alter our analysis.

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

- Identify the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- 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.
- Reach a conclusion about whether species are jeopardized or critical habitat is adversely modified.
- If necessary, suggest a RPA to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

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

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

During the last century, average regional air temperatures in the Pacific Northwest increased by 1-1.4°F as an annual average, and up to 2°F in some seasons (based on average linear increase per decade; Abatzoglou et al. 2014; Kunkel et al. 2013). Warming is likely to continue during the next century as average temperatures are projected to increase another 3 to 10°F, with the largest increases predicted to occur in the summer (Mote et al. 2014). Decreases in summer precipitation of as much as 30% by the end of the century are consistently predicted across climate models (Mote et al. 2014). Precipitation is more likely to occur during October through March, less during summer months, and more winter precipitation will be rain than snow (ISAB 2007; Mote et al. 2014). Earlier snowmelt will cause lower stream flows in late spring, summer, and fall, and water temperatures will be warmer (ISAB 2007; Mote et al. 2014). Models consistently predict increases in the frequency of severe winter precipitation events (i.e., 20-year and 50-year events), in the western United States (Dominguez et al. 2012). The largest increases in winter flood frequency and magnitude are predicted in mixed rain-snow watersheds (Mote et al. 2014).

Overall, about one-third of the current cold-water salmonid habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (Mantua et al. 2009). Higher temperatures will reduce the quality of available salmonid habitat for most freshwater life stages (ISAB 2007). Reduced flows will make it more difficult for migrating fish to pass physical and thermal obstructions, limiting their access to available habitat (Mantua et al. 2010; Isaak et al. 2012). Temperature increases shift timing of key life cycle events for salmonids and species forming the base of their aquatic foodwebs (Crozier et al. 2011; Tillmann and Siemann 2011; Winder and Schindler 2004). Higher stream temperatures will also cause decreases in dissolved oxygen and may also cause earlier onset of stratification and reduced mixing between layers in lakes and reservoirs, which can also result in reduced oxygen (Meyer et al. 1999; Winder and Schindler 2004; Raymondi et al. 2013). Higher temperatures are likely to cause several species to become more susceptible to parasites, disease, and higher predation rates (Crozier et al. 2008; Wainwright and Weitkamp 2013; Raymondi et al. 2013).

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

In addition to changes in freshwater conditions, predicted changes for coastal waters in the Pacific Northwest as a result of climate change include increasing surface water temperature, increasing but highly variable acidity, and increasing storm frequency and magnitude (Mote et al. 2014). Elevated ocean temperatures already documented for the Pacific Northwest are highly likely to continue during the next century, with sea surface temperature projected to increase by 1.0-3.7^{o}C by the end of the century (IPCC 2014). Habitat loss, shifts in species' ranges and abundances, and altered marine food webs could have substantial consequences to anadromous, coastal, and marine species in the Pacific Northwest (Tillmann and Siemann 2011; Reeder et al. 2013).

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

Global sea levels are expected to continue rising throughout this century, reaching likely predicted increases of 10-32 inches by 2081-2100 (IPCC 2014). These changes will likely result in increased erosion and more frequent and severe coastal flooding, and shifts in the composition of nearshore habitats (Tillmann and Siemann 2011; Reeder et al. 2013). Estuarine-dependent salmonids such as chum and Chinook salmon are predicted to be impacted by significant reductions in rearing habitat in some Pacific Northwest coastal areas (Glick et al. 2007). Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances, and therefore these species are predicted to fare poorly in warming ocean conditions (Scheuerell and Williams 2005; Zabel et al. 2006). This is supported by the recent observation that anomalously warm sea surface temperatures off the coast of Washington from 2013 to 2016 resulted in poor coho and Chinook salmon body condition for juveniles caught in those waters (NWFSC 2015). Changes to estuarine and coastal conditions, as well as the timing of seasonal shifts in these habitats, have the potential to impact a wide range of listed aquatic species (Tillmann and Siemann 2011; Reeder et al. 2013).

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

2.2.1 Status of the Critical Habitat

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

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

Impaired side channel and wetland conditions and degraded floodplain habitat have significant negative impacts on juvenile coho salmon throughout the ESU and are identified as primary limiting factors for all populations (NMFS 2013). Degraded riparian conditions also are a primary limiting factor for juveniles and adults of all populations within the ESU, as are channel structure and form issues. Extensive channelization, diking, wetland conversion, stream clearing, and, in some subbasins, gravel extraction have severed access to historically productive habitats, simplified many remaining tributary habitats, and weakened the watershed processes that once created healthy ecosystems. In addition, the lack of large woody debris and appropriately sized gravel has significantly reduced the amount of suitable spawning and rearing habitat.

Sediment conditions (affecting egg to fry survival) are identified as a primary limiting factor for all Washington populations and a secondary limiting factor for the Oregon portion of the ESU. The high density of forest and rural roads throughout the Lower Columbia subdomain leads to an abundance of fine sediment in tributary streams that covers spawning gravel and increases turbidity. Water quantity issues related to withdrawals or to land uses that alter hydrology have been identified as either primary or secondary for all coho salmon populations. In addition, water quality—specifically, elevated water temperature, generally brought about through land uses, lack of functional riparian habitat, and water withdrawals—is a secondary limiting factor for all populations except the Lower Gorge. Private and state forest land used for timber harvest predominates in the upper reaches of these watersheds, while lower reaches are mostly in agricultural and rural residential use and have been extensively modified by bank stabilization, levees, and tide gates. Water quantity issues related to withdrawals or to land uses that alter hydrology are identified as a primary limiting factor for winter parr in Youngs Bay and Big Creek and as secondary for all other Coast-stratum populations.

For southern DPS green sturgeon, a team similar to the CHARTs — a critical habitat review team (CHRT) — identified and analyzed the conservation value of particular areas occupied by southern green sturgeon, and unoccupied areas necessary to ensure the conservation of the species (USDC 2009). The CHRT did not identify those particular areas using HUC nomenclature, but did provide geographic place names for those areas, including the names of freshwater rivers, the bypasses, the Sacramento-San Joaquin Delta, coastal bays and estuaries, and coastal marine areas (within 110 m depth) extending from the California/Mexico border north to Monterey Bay, California, and from the Alaska/Canada border northwest to the Bering Strait; and certain coastal bays and estuaries in California, Oregon, and Washington.
A summary of the status of critical habitats, considered in this opinion, is provided in Table 1, below. There is no designated critical habitat in the action area for CR chum salmon and LCR Chinook salmon.

Table 1. Critical habitat, designation date, federal register citation, and status summary for critical habitat considered in this opinion.

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Lower Columbia River coho salmon	2/24/16 81 FR 9252	Critical habitat encompasses 10 subbasins in Oregon and Washington containing 55 occupied watersheds, as well as the lower Columbia River and estuary rearing/migration corridor. Most HUC5 watersheds with PCEs for salmon are in fair-to-poor or fair-to-good condition (NMFS 2005). However, most of these watersheds have some or a high potential for improvement. We rated conservation value of HUC5 watersheds as high for 34 watersheds, medium for 18 watersheds, and low for three watersheds.
Southern DPS of green sturgeon	10/09/09 74 FR 52300	Critical habitat has been designated in coastal U.S. marine waters within 60 fathoms depth from Monterey Bay, California (including Monterey Bay), north to Cape Flattery, Washington, including the Strait of Juan de Fuca, Washington, to its United States boundary; the Sacramento River, lower Feather River, and lower Yuba River in California; the Sacramento-San Joaquin Delta and Suisun, San Pablo, and San Francisco bays in California; tidally influenced areas of the Columbia River estuary from the mouth upstream to river mile 46; and certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor), including, but not limited to, areas upstream to the head of tide in various streams that drain into the bays, as listed in Table 1 in USDC (2009). The CHRT identified several activities that threaten the PCEs in coastal bays and estuaries and necessitate the need for special management considerations or protection. The application of pesticides is likely to adversely affect prey resources and water quality within the bays and estuaries, as well as the growth and reproductive health of Southern DPS green sturgeon through bioaccumulation. Other activities of concern include those that disturb bottom substrates, adversely affect prey resources, or degrade water quality through re-suspension of contaminated sediments. Of particular concern are activities that affect prey resources. Prey resources are affected by: commercial shipping and activities generating point source pollution and non-point source pollution that discharge contaminants and result in bioaccumulation of contaminants in green sturgeon; disposal of dredged materials that bury prey resources; and bottom trawl fisheries that disturb the bottom (but result in beneficial or adverse effects on prey resources for green sturgeon).

2.2.2 Status of the Species

Table 2, below provides a summary of listing and recovery plan information, status summaries and limiting factors for the species addressed in this opinion. More information can be found in recovery plans and status reviews for these species. These documents are available on the NMFS West Coast Region website (http://www.westcoast.fisheries.noaa.gov/).

The poor baseline population status of ESA-listed species in this portion of the LCR is the result of a number of long-term trends (ODFW 2010). The very low persistence probability for most Lower Columbia River coho salmon populations is related to low abundance and productivity, loss of spatial structure, and reduced diversity. Most populations in the Youngs Bay and the Coast stratum are believed to have very low abundance of natural-origin spawners (50 fish or fewer, compared to historical abundances of thousands or tens of thousands). In the Coast stratum, four of seven populations are targeted for high or very high persistence probability. Two populations—Youngs Bay and Big Creek—are not targeted for improvements in their baseline persistence probability of very low. This decision represents a strategic choice to provide harvest opportunity through terminal fisheries targeting hatchery fish in these subbasins; consequently, the proportion of hatchery origin spawners in these two populations is expected to remain high (NMFS 2013).

Harvest-related mortality is identified as a primary limiting factor for all populations within the ESU and occurs as a result of direct and incidental mortality of natural-origin fish in ocean fisheries, Columbia River recreational fisheries, and commercial gillnet fisheries. The harvest targets hatchery-origin fish, which make up the vast majority of coho salmon returning to the Columbia River (Ford 2011). For the period from 1970 to 1993, harvest rates averaged 82 percent (NMFS 2008c). Since 2005, when NMFS listed Lower Columbia River coho salmon, harvest impacts have been reduced through measures such as mark-selective fisheries and time and area closures in both ocean and in-river fisheries, such that exploitation rates on natural-origin populations of Clackamas and Sandy rivers LCR coho salmon have averaged 16 percent. However, some populations experience higher impacts. ODFW estimated that harvest impacts on natural- and hatchery-origin fish from the Youngs Bay and Big Creek populations are as high as 90 percent and 70 percent, respectively, because of terminal fisheries that target hatchery-origin returns to these off-mainstem areas. Although harvest has been reduced substantially in recent years, recovery efforts will continue to focus on refinements in harvest management. Harvest and hatchery effects have been a significant threat to most Lower Columbia River coho salmon populations. Although recent actions have substantially reduced coho salmon harvest levels from baseline conditions, further refinements in harvest management are still needed. Hatchery impacts remain significant for many populations, including the Youngs Bay and the nearby Grays and Chinook rivers.

Table 2. Listing classification and date, recovery plan reference, most recent status review, status summary, and limiting factors for each species considered in this opinion.

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Lower Columbia River Chinook salmon	Threatened 6/28/05	NMFS 2013	NWFSC 2015	This ESU comprises 32 independent populations. Twenty-seven populations are at very high risk, 2 populations are at high risk, one population is at moderate risk, and 2 populations are at very low risk Overall, there was little change since the last status review in the biological status of this ESU, although there are some positive trends. Increases in abundance were noted in about 70% of the fall-run populations and decreases in hatchery contribution were noted for several populations. Relative to baseline VSP levels identified in the recovery plan, there has been an overall improvement in the status of a number of fall-run populations, although most are still far from the recovery plan goals.	• Reduced access to spawning and rearing habitat • Hatchery-related effects • Harvest-related effects on fall Chinook salmon • An altered flow regime and Columbia River plume • Reduced access to off-channel rearing habitat • Reduced productivity resulting from sediment and nutrient-related changes in the estuary • Contaminant
Columbia River chum salmon	Threatened 6/28/05	NMFS 2013	NWFSC 2015	Overall, the status of most chum salmon populations is unchanged from the baseline VSP scores estimated in the recovery plan. A total of 3 of 17 populations are at or near their recovery viability goals, although under the recovery plan scenario these populations have very low recovery goals of 0. The remaining populations generally require a higher level of viability and most require substantial improvements to reach their viability goals. Even with the improvements observed during the last five years, the majority of populations in this ESU remain at a high or very high risk category and considerable progress remains to be made to achieve the recovery goals.	• Degraded estuarine and nearshore marine habitat • Degraded freshwater habitat • Degraded stream flow as a result of hydropower and water supply operations • Reduced water quality • Current or potential predation • An altered flow regime and Columbia River plume • Reduced access to off-channel rearing habitat in the lower Columbia River • Reduced productivity resulting from sediment and nutrient-related changes in the estuary • Juvenile fish wake strandings • Contaminants

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Lower Columbia River coho salmon	Threatened 6/28/05	NMFS 2013	NWFSC 2015	Of the 24 populations that make up this ESU, 21 populations are at very high risk, 1 population is at high risk, and 2 populations are at moderate risk. Recent recovery efforts may have contributed to the observed natural production, but in the absence of longer term data sets it is not possible to parse out these effects. Populations with longer term data sets exhibit stable or slightly positive abundance trends. Some trap and haul programs appear to be operating at or near replacement, although other programs still are far from that threshold and require supplementation with additional hatchery-origin spawners .Initiation of or improvement in the downstream juvenile facilities at Cowlitz Falls, Merwin, and North Fork Dam are likely to further improve the status of the associated upstream populations. While these and other recovery efforts have likely improved the status of a number of coho salmon populations, abundances are still at low levels and the majority of the populations remain at moderate or high risk. For the Lower Columbia River region land development and increasing human population pressures will likely continue to degrade habitat, especially in lowland areas. Although populations in this ESU have generally improved, especially in the 2013/14 and 2014/15 return years, recent poor ocean conditions suggest that population declines might occur in the upcoming return years	• Degraded estuarine and near-shore marine habitat • Fish passage barriers • Degraded freshwater habitat: Hatchery-related effects • Harvest-related effects • An altered flow regime and Columbia River plume • Reduced access to off-channel rearing habitat in the lower Columbia River • Reduced productivity resulting from sediment and nutrient-related changes in the estuary • Juvenile fish wake strandings • Contaminants

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Southern DPS of green sturgeon	Threatened 4/7/06	NMFS 2018	NMFS 2015	The Sacramento River contains the only known green sturgeon spawning population in this DPS. The current estimate of spawning adult abundance is between 824-1,872 individuals. Telemetry data and genetic analyses suggest that Southern DPS green sturgeon generally occur from Graves Harbor, Alaska to Monterey Bay, California and, within this range, most frequently occur in coastal waters of Washington, Oregon, and Vancouver Island and near San Francisco and Monterey bays. Within the nearshore marine environment, tagging and fisheries data indicate that Northern and Southern DPS green sturgeon prefer marine waters of less than a depth of 110 meters.	• Reduction of its spawning area to a single known population • Lack of water quantity • Poor water quality • Poaching

Coho salmon inhabiting the Columbia watershed are typically categorized into early- and late-returning stocks. Early-returning (Type S) adult coho salmon enter the Columbia River in mid-August and begin entering tributaries in early September, with peak spawning from mid-October to early November. Late-returning (Type N) coho salmon pass through the lower Columbia from late September through December and enter tributaries from October through January. Most spawning occurs from November to January, but some occurs as late as March (LCFRB 2010). Migration and spawning timing of specific local populations may be mediated by factors such as latitude, migration distance, flows, water temperature, maturity, or migration obstacles (ODFW 2010). For example, coho salmon spawning in warmer tributaries spawn later than those spawning in colder tributaries (LCFRB 2010).

Historically, coho salmon spawned in almost every accessible stream system in the lower Columbia River (LCFRB 2010). Coho salmon generally occupy intermediate positions in tributaries, typically further upstream than chum or fall-run Chinook, but often downstream of steelhead or spring-run Chinook (ODFW 2010). Early-run fish usually spawn farther upstream within a basin than late-run fish. Coho salmon typically spawn in small to medium, low- to-moderate elevation streams from valley bottoms to stream headwaters. Coho salmon particularly favor small, rain-driven, lower elevation streams characterized by relatively low flows during late summer and early fall, and increased river flows and decreased water temperatures in winter (LCFRB 2010). On their return, adult fish often mill near the river mouths or in lower river pools until the first fall freshets occur (LCFRB 2010).

Chinook salmon and coho salmon construct redds in gravel and small cobble substrate in pool tailouts, riffles, and glides, with sufficient flow depth for spawning activity (NMFS 2013). Eggs incubate over late fall and winter for about 45 to 140 days, depending on water temperature, with longer incubation in colder water. Fry may thus emerge from early spring to early summer (ODFW 2010). Hatching success depends on clean gravel that is not choked with sediment or subject to extensive scouring by floods (LCFRB 2010). Juveniles typically rear in freshwater for more than a year. After emergence, coho salmon fry move to shallow, low-velocity rearing areas, primarily along the stream edges and inside channels. Juvenile coho salmon favor pool habitat and often congregate in quiet backwaters, side channels, and small creeks with riparian cover and woody debris. Side-channel rearing areas are particularly critical for overwinter survival, which is a key regulator of freshwater productivity (LCFRB 2010).

Most juvenile coho salmon migrate seaward as smolts in April to June, typically during their second year. Salmon that have stream-type life histories, such as coho, typically do not linger for extended periods in the Columbia River estuary, but the estuary is a critical habitat used for feeding during the physiological adjustment to salt water. Juvenile coho salmon are present in the Columbia River estuary from March to August (LCFRB 2010).

LCR coho salmon typically range throughout the nearshore ocean over the continental shelf off of the Oregon and Washington coasts. Early-returning (Type S) coho salmon are typically found in ocean waters south of the Columbia River mouth. Late-returning (Type N) coho salmon are typically found in ocean waters north of the Columbia River mouth (LCFRB 2010). Coho salmon grow relatively quickly in the ocean, reaching up to 6 kilograms after about 16 months of ocean rearing (ODFW 2010). Most coho salmon sexually mature at age three, except for a small percentage of males (called "jacks") who return to natal waters at age two, after only 5 to 7 months in the ocean (LCFRB 2010). All coho salmon die after spawning. Weather-related upwelling patterns in the ocean and the short 3-year life cycle of this species cause highly variable population cycles (LCFRB 2010).

The recovery plan for LCR coho salmon notes restoration of tributary habitat (particularly overwintering habitat) as one of seven strategies necessary to recovery the species. Because the lack of complex overwintering habitat is a primary limiting factor for coho salmon, an immediate priority is to implement actions to increase off-channel, side-channel, and floodplain habitat in a network of high- and low-elevation tributary and Columbia River floodplain locations. Improving riparian cover recruitment of large wood to streams is also a priority.

Very large improvements are needed in the persistence probability of almost all chum salmon populations if the CR ESU is to achieve recovery: nine of the eleven historical populations in Washington have very low baseline persistence probabilities, as do all six historical Oregon populations; it is possible that some populations are extirpated. Of the 17 historical populations, nine are targeted for high or better persistence probability. Some level of recovery effort will be needed for every population to arrest or reverse continuing long-term declining trends; this is true for stabilizing populations, which are expected to remain at their baseline status, and for the ESU's two best-performing populations—the Grays/Chinook and Lower Gorge—which have baseline persistence probabilities of medium and high, respectively. For these two populations, meeting recovery objectives will require significant improvement in spatial structure. The Grays/Chinook will need improvements in diversity as well.

CR chum salmon continue to be affected by loss and degradation of spawning and rearing habitat, the impacts of mainstem hydropower dams on upstream access and downstream habitats, and the legacy effects of historical harvest; together, these factors have reduced the persistence probability of all populations. Under baseline conditions, constrained spatial structure at the ESU level (related to conversion, degradation, and inundation of habitat) contributes to very low abundance and low genetic diversity in most populations and increases risk to the ESU from local disturbances.

In the Coast stratum, five of seven populations are targeted for high or very high persistence probability. These include the Grays/Chinook and Elochoman/Skamakowa, which historically were among the most productive populations in the stratum. (The Grays/Chinook also is one of only two genetic legacy populations in the ESU.) However, two other Coast stratum populations that also historically were highly productive—Youngs Bay and Big Creek—are expected to remain at their baseline status of very low persistence probability to allow for incidental harvest of chum salmon that may occur in terminal fisheries that target hatchery coho and Chinook (ODFW 2010).

2.3 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).

In Oregon, particularly fast population growth is predicted in Clackamas, Clatsop, Columbia, Hood River, and Multnomah counties—areas that support Lower Columbia River salmon and steelhead. The population of these counties is expected to increase by 41 percent from 2003 to 2040 (OEDC 2004). Much of the land surrounding the action area is in agricultural, private forestry, or rural residential use and has been extensively modified via dikes, levees, bank stabilization, and tide gates. As a result, altered hydrology and sediment routing influence habitat-forming processes, the quantity and accessibility of habitats such as side channels and wetlands, and the estuarine food web. Channel structure issues, in the form of reduced habitat complexity and diversity, also are a primary limiting factor for juveniles from all populations.

Status of critical habitat in the action area

As previously noted, the action area is located within a 660 foot section of the Klaskanine River encompassing 1.10 acres of aquatic habitat and a 2.2-acre of terrestrial habitat that is owned by ODFW (Figure 1). This area is included as designated critical habitat for two species: LCR coho salmon and sDPS green sturgeon. Due to prior use of the parking areas by Clatsop County as a gravel storage area most of the area above the high water line is covered in gravel. The riverbank is sparsely vegetated, contains abundant coarse angular cobble fill, and appears heavily eroded from seasonal flooding (Archaeological Investigations Northwest, Inc. 2017). The property has approximately 300 feet of streambank. The eastern portion of the property line includes an off-channel backwater pool. The streambank is steep due to erosion from lack of woody debris and riparian vegetation. The off-channel backwater located around 300 feet upstream of the construction site is about 0.3 acres in size and is surrounded by abundant riparian vegetation. In general, the condition of PBFs at the construction site are poor and is demonstrated by the near complete lack of riparian vegetation and erosion on the streambank due to use of this site as a temporary gravel storage yard and unimproved boat launch site. The small wetland area adjacent to the construction site provides high-flow refuge and abundant shade.

Status of listed populations in the action area

Salmonids. The abundance and diversity of species reasonably certain to utilize the action area are heavily influenced by releases of fish from the Klaskanine Hatchery, located approximately 3 miles upstream. The management plan for the hatchery indicates the non ESA-listed species will be released annually after completion of the proposed boat ramp installation (ODFW 2019):

- 2.5 million tule stock fall Chinook salmon
- 0.5 million select-area bright stock fall Chinook salmon
- 1.4 million Big Creek stock coho salmon
- 40,000 Big Creek stock winter-run steelhead

LCR Chinook salmon. In the Coast strata, much of the gains in fall Chinook salmon viability are targeted to be achieved through reductions in harvest, hatchery, and habitat impacts. Impacts from multiple threat categories will need to be reduced for most populations if they are to achieve their target status. Exceptions are the Youngs Bay, Big Creek, Upper Cowlitz, and Salmon Creek populations. As stabilizing populations, the Youngs Bay, Upper Cowlitz, and

Salmon Creek populations are not targeted for reductions in any threat impacts. However, recovery actions will still be needed for these populations to remain at their baseline status of low for Youngs Bay or very low persistence probability. Both the Youngs Bay and Big Creek populations will be used to provide harvest opportunity through terminal fisheries targeting hatchery fish; consequently, the proportion of hatchery-origin spawners and harvest impacts in these populations are expected to remain high.

LCR coho salmon. The Youngs Bay is one of three subbasins designated as having no primary populations under the recovery scenario targeted for improvement because hatchery production is designed to support terminal fishing areas (NMFS 2013). This harvest strategy is designed to target non-listed coho salmon and Chinook salmon released from Klaskanine Hatchery (ODFW 2010).

CR chum salmon. The Youngs Bay population CR chum salmon was historically highly productive. The Youngs Bay CR chum salmon population is not projected to improve as a result of incidental harvest associated with maintaining terminal fisheries. This harvest strategy is designed to target non-listed coho salmon and Chinook salmon released from Klaskanine Hatchery (ODFW 2010).

sDPS green sturgeon. Green sturgeon are known to use the LCR estuary for rearing during the summer and early fall months at the adult and sub-adult life stages (Moser and Lindley 2007; Moser et al. 2016). Green sturgeon often frequent brackish water areas of the LCR that include waters in excess of 30 feet, as well as shallow water, and nearby Baker and Youngs bays (Hansel et al. 2017). Relatively little research has been conducted on habitat use by the species in tributaries of Youngs Bay (Hansel et al. 2017), but the species is known to occasionally occupy tidal tributary habitats characteristic of the action area. The sDPS green sturgeon recovery plan classifies the following ‘high-level’ threats to the species: loss of wetland function, barriers to migration, reduced prey base from non-native species, predation, altered water flow, sediment supply, and turbidity levels related to impoundments, contaminant exposure from chemical and oil spills. Two factors were identified as ‘very high level’ risk to the green sturgeon within coastal bay and estuary habitats: altered water temperature and prey base.

2.4 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.

The ODFW proposes to install rock riprap and impervious surface on the streambank of the Klaskanine River in addition to enhancing existing cleared surfaces for the public’s use by installing gravel, fencing, and lavatory facilities. The proposed boat ramp installation and use of the adjacent parking facilities will result in temporary effects to water quality during construction. Also, the proposed action will result in permanent modifications from the addition of impervious surfaces that extend from areas below OHW to the streambank and into the upland areas. The permanent effects include diminished riparian conditions, degraded floodplain habitat, loss of a measurable amount of bed and bank habitat, and modified site hydrology due to the impervious surfaces.

These actions are intended to provide the public with recreational boating access in Youngs Bay and the surrounding tributaries of the LCR. The NMFS identified two chronic effects associated with the interdependent recreational use: degraded water quality as a result of potential leaks of petrochemical contaminants and turbidity from launching boats into the river.

The ODFW proposes to improve existing habitat functions by: 1) installing large rocks to preclude vehicle access to an area adjacent to the boat ramp parking; 2) revegetating the area with native conifers (e.g., western red cedar and Sitka spruce); and 3) installing large and small woody debris pieces on the streambank where a small off-channel backwater pool is located. Effects from these activities are an improvement in overall riparian conditions upland of the riverbank, and a slight improvement in cover and habitat complexity below the OHWM on the riverbank.

2.4.1 Effects to Critical Habitat

At this location the physical and biological features (PBFs) of critical habitat support the following life stages for LCR coho salmon: egg and larval development, freshwater rearing areas for juveniles, and migration corridors for juveniles and adults. The attributes for these sites are:

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

- Freshwater rearing sites with: (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) Water quality and forage supporting juvenile development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks;

- Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;

- Estuarine areas free of obstruction and excessive predation with: (i) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and (iii) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

At this location the primary constituent elements, hereafter referred to as physical and biological features (PBFs) of critical habitat support adult and sub-adult life history stages for sDPS of green sturgeon in estuarine areas include:

- Food resources. Abundant prey items within estuarine habitats and substrates for juvenile, subadult, and adult life stages. Prey species for juvenile, subadult, and adult green sturgeon within bays and estuaries primarily consist of benthic invertebrates and fishes, including crangonid shrimp, burrowing thalassinidean shrimp (particularly the burrowing ghost shrimp), amphipods, isopods, clams, annelid worms, crabs, sand lances, and anchovies. These prey species are critical for the rearing, foraging, growth, and development of juvenile, subadult, and adult green sturgeon within the bays and estuaries.

- Water quality. Water quality, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages. Suitable water temperatures for juvenile green sturgeon should be below 24 °C. At temperatures above 24 °C, juvenile green sturgeon exhibit decreased swimming performance (Mayfield and Cech 2004) and increased cellular stress (Allen et al. 2006). Suitable salinities range from brackish water (10 parts per thousand) to salt water (33 parts per thousand). Juveniles transitioning from brackish to salt water can tolerate prolonged exposure to salt water salinities, but may exhibit decreased growth and activity levels and a restricted temperature tolerance range (Allen and Cech 2007; Sardella et al. 2008), whereas subadults and adults tolerate a wide range of salinities (Kelly et al. 2007). subadult and adult green sturgeon occupy a wide range of dissolved oxygen levels, but may need a minimum dissolved oxygen level of at least 6.54 milligrams oxygen per liter (Kelly et al. 2007; Moser and Lindley 2007). As described above, adequate levels of dissolved oxygen are also required to support oxygen consumption by juveniles (ranging from 61.78 to 76.06 milligrams oxygen per liter kg/1) (Allen and Cech 2007). Suitable water quality also includes water with acceptably low levels of contaminants (e.g., pesticides, polyaromatic hydrocarbons, elevated levels of heavy metals) that may disrupt the normal development of juvenile life stages, or the growth, survival, or reproduction of subadult or adult stages.

- Migratory corridor. A migratory pathway necessary for the safe and timely passage of green sturgeon within estuarine habitats and between estuarine and riverine or marine habitats. We define safe and timely passage to mean that human-induced impediments, either physical, chemical, or biological, do not alter the migratory behavior of the fish such that its survival or the overall viability of the species is compromised (e.g., an impediment that compromises the ability of fish to reach thermal refugia by the time they enter a particular life stage). Unimpeded passage is necessary for adult and subadult green sturgeon to access feeding areas, holding areas, and thermal refugia, and to ensure passage back out into the ocean.

- Water depth. A diversity of depths necessary for shelter, foraging, and migration of juvenile, subadult, and adult life stages. Subadult and adult green sturgeon occupy a diversity of depths within bays and estuaries for feeding and migration. Tagged adults and subadults within the San Francisco Bay estuary primarily occupied waters over shallow depths of less than 10 m, either swimming near the surface or foraging along the bottom (Kelly et al. 2007). In a study of juvenile green sturgeon in the Delta, relatively large numbers of juveniles were captured primarily in shallow waters from 1–3 meters deep, indicating juveniles may require even shallower depths for rearing and foraging (Radtke 1966). Thus, a diversity of depths is important to support different life stages and habitat uses for green sturgeon within estuarine areas.

- Sediment quality. Sediment quality (i.e., chemical characteristics) necessary for normal behavior, growth, and viability of all life stages. This includes sediments free of elevated levels of contaminants (e.g., selenium, polyaromatic hydrocarbons, and pesticides) that can cause adverse effects on all life stages of green sturgeon.

Suspended sediment. Excavation, fill, and grading necessary to install the boat ramp and stormwater retention area may temporarily increase turbidity that leading to degraded water quality conditions. High levels of suspended sediment may also be generated during construction in areas below OHW, but most suspended sediment will be contained by an inwater silt curtain. However, this level of containment is temporary, as water infiltrating into the work area will not be filtered before it is returned to the river. Thus, the silt curtain is designed to function primarily to isolate and contain water that mixes with freshly exposed benthic sediment in the construction area. Turbidity conditions adjacent to the construction site are expected remain elevated for a brief period after the silt curtain is removed until suspended sediments are thoroughly diluted.

Temporary effects from construction - Given the predominant fine-grain sediment composition at the construction site, NMFS estimates the turbidity plume may extend approximately 200 feet downstream from the construction area and may extend to areas upstream due to the tidal conditions. Thus, a total of 660 feet of aquatic habitat in the Klaskanine River may be degraded by distribution of the sediment plume. Suspended sediment is anticipated to be diluted within hours to background conditions each day, and may occur daily for up to 2 months. Sediment may continue to be dispersed after inwater construction activities for a period of a few hours each day after cessation of inwater construction activities. The water quality diminishment from this source is anticipated to peak and subside on a daily basis and may occur for up to 2 months (i.e., duration of inwater construction). Baseline conditions are anticipated to return and the overall conservation value of this PBF within a few hours after construction is completed.

Permanent effects from stormwater management and boat activity- Suspended sediment is likely to be delivered via sheet flow from parking surfaces. The delivery of suspended sediment to the stream is anticipated to occur periodically over the lifetime of the boat ramp and parking area facility. While the ODFW designed the parking surfaces to drain all stormwater to a retention and treatment system designed to capture suspended sediment and other contaminants delivered from the parking lot, the elevation of the stormwater depression (i.e., below OHW) and its proximity adjacent to the streambank may result in scouring of fine sediment and chemical contaminants during occasional storm events. This suggests occasional pulses of suspended sediments and chemical contaminants are likely to be dispersed for the duration the facility is operational. Thus, the installation of a properly-designed stormwater retention and treatment system is expected to minimize delivery of suspended sediment, however performance of the system is not completely effective at preventing discharges at levels that may adversely affect listed species.

Even though in its current state the construction site is occasionally used for boat access construction of the new boat ramp facility is reasonably certain to result in some increased boating activity and the associated indirect effects of boating activity. Asplund (2000) found that boat traffic caused propeller contact to shallow substrates, turbulence from the propulsion system, waves produced by movement that resulted in sediment resuspension, water pollution, disturbance of fish and wildlife, destruction of aquatic plants, and shoreline erosion. Nordstrom (1989) found that boat wakes may play a significant role in creating erosion in narrow creeks entering an estuary (areas extensively used by rearing juvenile salmonids). Kahler et al. (2000) indicate that wake erosion resulted in continuous low-level sediment input with episodic large inputs from bank failure. Other researchers noted that boat traffic increased turbidity and uprooted aquatic macrophytes in shallow waters (Warrington 1999, McConchie and Tolman 2003). Thus, we anticipate episodic and permanent habitat degradation to occur from episodic redistribution of sediment resuspension that will degrade water quality and streambank habitat features.

Chemical contaminants. Effects of activities interrelated to the action include degraded water quality from petroleum contaminants that may enter the Klaskanine River from boats, boat trailers, and marine engines. Such episodic releases of petroleum contaminants in the water are likely to occur at or near the boat ramp. Vehicles in the parking area may also be a source of contaminants to the Klaskanine River where runoff exceeds the stormwater retention capacity (see stormwater design discussion above). Because the majority of constructed area is not impervious surface, most chemical contaminants should be filtered through the soil, and therefore bind to soils, thus reducing the likelihood of contaminants entering the Klaskanine River. The most likely entry point to the River is at the concrete boat ramp where boats are launched and retrieved, and where contaminants maybe spilled or leached directly into the river from contact with the boat motors and exhaust. These releases are most likely to occur when contaminated bilge water, bearing grease, and brake and mechanical components are immersed in the river. As such, contaminants are likely released directly into the river in small amounts on a periodic basis. The delivery of episodic, small amounts of contaminants into the river will likely add to the contaminant load within the watershed, and incrementally but chronically degrade water quality as a PBF of critical habitat for LCR Chinook salmon, LCR coho salmon, and CR chum salmon.

Rearing and migratory habitat. ODFW’s proposed installation of rock riprap and impervious concrete surface will permanently degrade approximately 6,000 square feet of habitat below OHW over approximately 200 linear feet of streambank. This area will no longer support submerged and overhanging large wood, aquatic and overhanging vegetation, or have rounded rocks and boulder features. Riparian habitats are one of the most ecologically productive and diverse terrestrial environments and as such are often key targets for salmonid restoration activities (Kondolf et al. 1996, Naiman et al. 1993; NMFS 2013). Vegetation in riparian areas influences channel processes through stabilizing bank lines, and providing large wood terrestrial food sources rather than autochthonous food production, and regulating light and temperature regimes (Kondolf et al. 1996, Naiman et al. 1993). These habitat processes will be permanently degraded by the 200 lineal feet of riprap.

ODFW’s proposed rock riprap and impervious surface will permanently reduce the amount of forage, natural cover, and riparian features available to listed species in the action area, which are PBFs of rearing and migration habitat for salmonids. The presence of rock riprap at the toe of the streambank surrounding the concrete ramp will permanently alter contours of the streambed and the streambank. The streambank will no longer be capable to recruit wood or scour areas used by species for rearing and foraging habitat along the rip rap area.

As noted above, boating activity is known to degrade water quality, damage riparian vegetation, and create noise (Warrington 1999; Asplund 2000; Kahler et al. 2000; McConchie and Tolman 2003). Other researchers noted physical disruption to riparian and benthic communities and ecosystems (USEPA 1993; Carrasquero 2001; Mosisch and Arthington 1998). Given that the action area is already used to launch and retrieve boats it is reasonably certain that an increase in boating activity may occur as a result of the proposed boat ramp construction. However, because the current use of the site is anecdotal and undocumented it is likely that some additional level of boating activity may occur. Therefore, we are reasonably certain that some increase in boating activity in the action area will result in degradation to riparian vegetation. Boat hull generated waves are likely to dislodge or degrade woody debris causing a reduction in the abundance and quality of areas important for adult and juvenile salmonids to rear and migrate. And, as previously discussed, additional streambank erosion may occur that will increase fine sediment in the river channel. These effects will be continual and episodic throughout the lifespan of the boat ramp facility.

The proposed installation of riparian vegetation in 0.25 acres of upland habitat used as a temporary gravel storage area will increase the amount of shade and leaf litter while decreasing small quantities of suspended sediment. Installation of large wood and small wood in the adjacent streambank and off-channel alcove area will provide juvenile salmonids with additional areas for overwinter rearing that are particularly important to coho salmon (Giannico and Hinch 2003). New woody debris pieces will support recruitment of additional wood pieces in future years that are anticipated to increase the abundance of forage.

Reduced benthic forage. Installation of the concrete boat ramp and adjacent rock riprap scour apron will cover approximately 4,000 square feet of natural substrates on the bottom and banks of the Klaskanine River. These aquatic habitats are occupied by benthic invertebrates such as including flatworms (*Turbellaria*), annelid worms (*Oligocheata*), bivalve clams (*Corbicula fluminea*), and midges (*Chironomidae* and *Ceratopogonidae*) in addition to amphipods (*Corophium spp*.) that constitute the forage base for salmonids in tidal stream habitats (McCabe et al. 1997; 1998; Haskell and Tiffan 2011). Areas in which the ODFW proposes to install native sediment on top of the rock riprap scour apron will be recolonized. McCabe et al. (1997; 1998) found medium to coarse sand substrates in the mainstem Columbia River were recolonized by amphipods, an important prey species of juvenile salmon in tidal habitats, within 3 to 6 months. Williams and Hynes (1976) found freshwater streams were recolonized by in a period of weeks.

Overlaying riprap with native fine sediment will minimize long-term degradation of benthic forage by providing substrate for aquatic invertebrates to recolonize. However, as noted above, some temporary reduction in the abundance of aquatic invertebrates will occur until which point these substrates are fully recolonized. Fine sediments placed on the rock riprap will provide habitat for benthic invertebrates until they become eroded and the underlying riprap is exposed. The action area is likely to experience a delayed reduction in benthic forage items because riprap substrates are less suitable for aquatic invertebrates noted above (Carrasquero 2001). The time at which benthic forage will experience reduction in abundance is dependent on localized rates of erosion and may take years, or occur suddenly if the watershed experiences high rainfall and flood conditions.

2.4.2 Effects to the Species

Effects from the action on species are based on exposure to the effects experienced by fish as a result of habitat changes, as described above, or occurring directly to the fish themselves. In this case, LCR Chinook salmon, LCR coho salmon, CR chum salmon, and the sDPS of green sturgeon may pass through the action area at some point in their life cycle. Of these species, only LCR coho salmon and green sturgeon will be exposed to the permanent habitat effects and be present in the action area while construction is underway. These effects include degradation to critical habitat features from construction of the boat ramp and permanent, yet periodic reduction in the water quality resulting from use of the facility by the general public. The level of exposure to these effects varies by timing and location of activity and the densities and habitat use of the ESA-listed fishes. The ESA-listed fish species will experience to greater or lesser degrees:

1. Degraded water quality
2. Altered rearing habitat
3. Reduced forage
4. Inwater work isolation

Effects to salmon and steelhead

Exposure and response – degraded water quality. Good water quality is a PBF for critical habitat necessary for the species to recover. Good water quality is characterized by cool, clean water that is free of contaminants. Contaminants may include petroleum-based chemicals (such as fuel, oil, and some hydraulic fluids) contain polycyclic aromatic hydrocarbons (PAHs), which are acutely toxic to listed fish species and other aquatic organisms at high levels of exposure and cause sublethal adverse effects on aquatic organisms at lower concentrations (Heintz et al. 2000; Heintz et al. 1999; Incardona et al. 2005; Incardona et al. 2004; Incardona et al. 2006). The proposed action will likely degrade water quality by increasing suspended sediment and petroleum-based chemical contaminants within the Klaskanine River.

The use of a silt curtain helps minimize the potential harm or injury due to exposure to high levels of suspended sediment. However, if the silt curtain is not installed during completely dry conditions juvenile salmonids may become trapped and exposed to very high levels of suspended sediment for several hours. Despite the use of the silt curtain, salmonids are likely to be exposed to small amounts of fine sediments while construction is underway. Salmonid species reasonably likely to be exposed to temporary effects from construction are those that rear in the Klaskanine River during the summer months: LCR Chinook salmon and LCR coho salmon. These are the only species likely to be exposed to the single pulse of fine sediment that occurs upon removal of the silt curtain. CR chum salmon will not be exposed to suspended sediment because neither adults nor juveniles will be present when construction occurs.

Elevated levels of suspended sediment plume sufficient to result in avoidance behavior, coughing, gill abrasion may occur in a 660 section of the Klaskanine River (Newcombe and Jensen 1996). The duration and intensity of construction-related suspended sediment exposure is expected to cause only brief behavioral responses-primarily avoidance behavior. Juvenile salmonids exposed to low to moderate levels of turbidity include avoidance and/or alarm behaviors, elevated heart rate and cortisol levels (Newcombe and Jensen 1996; Bisson and Bilby 1982). Elevated cortisol, diminished predator detection, and increased competition as juveniles avoid areas with higher suspended sediment all ameliorate within minutes to hours after the turbid condition ceases, and we consider these responses insignificant at the individual scale.

Vessel operation at or near the boat ramp is also likely to re-suspend small amounts of sediment into the water column every time there is boating ingress or egress at the site, creating a more chronic disturbance regime that many fish will be exposed to over the life of the project. In each case the duration of exposure to elevated levels of suspended sediment is likely to range from seconds to minutes, assuming fish avoidance behavior is triggered. Due to the short duration and low-intensity effects of increased suspended sediment during construction and ongoing boating-related activity individual fish will respond by moving downstream that may temporarily reduce feeding rate for minutes to hours. Neither response is anticipated to occur for long enough to reduce the fitness or survival of individual fish. Disturbance associated with boat traffic will continue to be a source of intermittent interruption to normal behaviors of species in the action area.

Along with sediment, given the service capacity of the facility (e.g., about 20-30 vessels with vehicles and trailers) and planned installation of a stormwater containment and treatment basin, all three species of salmon with populations in the Youngs Bay (i.e., LCR Chinook salmon, LCR coho salmon, and CR chum salmon) will also regularly encounter chemical contaminants that the river when vessels are launched or retrieved, or when the stormwater detention design is exceeded.

Animals can acquire elevated levels of these metals indirectly through trophic transfer, and may exhibit toxic effects resulting in reduced growth, altered behavior and mortality that may reduce abundance, species richness, and diversity at the community level (Weis et al. 1998, Weis and Weis 2004). Effects are more severe in poorly flushed areas (Weis and Weis 2004). Chemicals such as copper, zinc, arsenic and chromium may directly affect salmon that spawn, rear, or migrate by contaminated areas, or indirectly when the salmon ingest contaminated prey (Poston 2001). Copper has been shown to impair the olfactory nervous system and olfactory mediated behaviors in salmonids (Hara et al. 1975, Winberg et al. 1992, Hansen et al. 1999a and 1999b, Baldwin et al. 2003). Salmon will actively avoid copper (Hansen et al. 1999a and 1999b), suggesting that low levels of copper present in distinct gradients, such as near point-source discharges, may act as migratory barriers to salmon. However, behavioral avoidance is not likely to be an adequate defense against non-point sources of copper in lakes, rivers and estuaries (Baldwin et al. 2003).

Even transient exposure lasting just a few minutes to copper at levels typical for surface waters from urban and agricultural watersheds, and within the U.S. Environmental Agency water quality criterion for copper, will cause greater than 50% loss of sensory capacity among resident coho in freshwater habitats (Baldwin et al. 2003). While that loss may be at least partially reversible, longer exposures lasting hours have caused cell death in the olfactory receptor neurons of other salmonid species (Julliard et al. 1996, Hansen et al. 1999b, Moran et al. 1992).

Therefore, olfactory function will be impaired if salmon are unable to avoid copper pollution within the first few minutes of exposure and, if copper levels subsequently exceed a threshold for sensory cell death, it may take weeks before the functional properties of the olfactory system recover (Baldwin et al. 2003). Because olfactory cues convey important information about habitat quality (e.g., pollution), predators, conspecifics, mates, and the animal's natal stream, substantial copper-induced loss of olfactory capacity is likely to impair behaviors essential for the survival or reproductive success of salmon and steelhead (Baldwin et al. 2003).

Exposure is more likely to occur from small spills that accumulate in benthic invertebrates near the boat ramp facility and subsequently into fish rearing or migrating through the area. Exposure is unlikely to occur at thresholds causing injury, but may harm olfactory function of juvenile salmonids rearing in the action area (Baldwin et al. 2003) that will manifest in decreased ability of fish to locate prey and spawning areas. This can decrease growth among juveniles, making them more vulnerable to predators, or less fit for survival in ocean conditions. The low frequency and small volumes of contaminants released is unlikely to alter abundance of future cohorts of fish in a discernible manner.

Exposure and response – altered rearing habitat. All future cohorts of rearing and migrating juvenile salmonids will experience less cover and riparian vegetation on the stream bank in the action area because installation of the boat ramp will preclude the recruitment of large wood and establishment of a diverse riparian community on the streambank. Large wood forms important habitat features of reduced flow and substrate for benthic invertebrates consumed by juvenile salmonids (Cederholm and Scarlett, 1982; Giannico and Hinch 2003). The long-term loss of riparian vegetation will further reduce the overall suitability of the site for juvenile rearing. Thus, simplifying the structure of the streambank and preventing LWD recruitment and vegetation establishment will result in a slight reduction in rearing capacity on about 200 feet of streambank where the concrete boat ramp will be installed.

The proposed installation of large and small woody debris pieces approximately 100 feet upstream of the boat ramp will enhance this small area for juveniles to forage and rear prior to outmigration. Vegetation to be planted in the adjacent streambank and upland areas will require several years until they mature to a height to provide shade and leaf litter input (Collins et al. 2013). Riparian plantings improve water quality and biological productivity that make take years to decades until achieving significant improvements (Davies-Colley et al. 2009; Jowett et al. 2009; Collins et al. 2013). Restoration of macroinvertebrate communities are particularly complex and lengthy because improvements in physical and chemical features that support these organisms often respond slowly (Smith 2009). Species-level responses to installation of woody debris on the streambank will be immediate as the installation of woody debris in off-channel habitat provides natural cover, complexity, and prey from wood infiltrating insects. This will provide greater benefits to the affected salmonid species because the lack of off-channel habitats is a factor limiting population recovery in small streams, especially for LCR coho salmon (NMFS 2013).

Exposure and response – loss of benthic forage. Salmonids will be exposed at the juvenile life stage to a permanent, but extremely small physical reduction in the abundance of benthic invertebrates. The loss of benthic forage equates to the amount of impervious surface from construction of the boat ramp and maneuvering area. Because adult salmonids cease feeding shortly after entering freshwater the loss of benthic prey will have no effect on the growth, survival, or reproductive success of individuals at this life stage. The loss of benthic invertebrate forage is most likely to adversely affect salmonids at the juvenile life stage, particularly those that spend months rearing in freshwater prior to saltwater migration. Both LCR Chinook salmon and LCR coho salmon are known to occupy freshwater habitats for months prior to initiating oceanward migration. The current population abundance status for all three species of salmonids is categorized as 'low' and the existing populations are dominated by non-listed groups of hatchery origin (NMFS 2013). The extremely small scale of the reduction in benthic forage, coupled with improvements in off-channel backwater habitat derived from woody debris placement will be biologically insignificant to the growth, survival, and fitness to ESA-listed salmonids.

Exposure and response – inwater work site isolation. As previously discussed, it is reasonably certain that the silt curtain may be deployed in such a manner as to surround submerged aquatic habitat. This may occur at any water elevation stage that may potentially entrap fish if completed during high tide. In these conditions juvenile salmonids may be unable to escape and subjected to high levels of suspended sediment and crushed or injured from contact with construction equipment. The potential for injury or death to salmonids during installation of the silt curtain can be substantially reduced by completing the following procedures: 1) isolate the minimum amount of area necessary; 2) deploy the silt curtain during low water conditions; 3) extend the silt curtain from the shore in a waterward direction to prevent entrapment of fish.

Effects to green sturgeon

Exposure and response – degraded water quality. Green sturgeon inhabit the LCR at the adult and sub-adult life stages (Moser and Lindley 2007; Moser et al. 2014). The species typically favors brackish, open water areas of the Columbia River estuary and the extent to which to green sturgeon use tidal tributaries is thought to be low (Hansel et al. 2017). Given the species presence in the CR estuary during the summer and fall months a small likelihood exists that individual fish may be present in the action area when inwater construction is underway. Green sturgeon are tolerant of high levels of suspended sediment concentrations (Newcombe 2003) and are often foraging in highly turbid conditions to access benthic prey items such as burrowing shrimp (Dumbauld et al. 2008). This conclusion is supported further by recent results in the closely related Atlantic sturgeon, wherein juveniles were experimentally exposed to 100, 250 or 500 milligrams per liter of suspended sediment for three consecutive days and found to exhibit no significant effects on survival or swimming performance (Wilkens et al. 2015). Given the low likelihood of presence in the action area and high tolerance to suspended sediment it is extremely unlikely that green sturgeon will be adversely affected.

Green sturgeon are more likely to be exposed to permanent and chronic effects associated with suspended sediment and petrochemical contaminants resulting from boating activity. These exposures are most likely to occur during the late summer and fall when green sturgeon abundance is at its peak. The overall effect of chemical contaminant exposure is likely to result from ingestion of contaminated prey items near the boat ramp. Given the infrequency of habitat use in the Klaskanine River and the repeated low intensity exposure to chemical contaminants green sturgeon are likely to experience temporary characterized by localized tissue damage resulting from direct toxicity (Baldwin et al. 2003). The large size of individual fish, low likelihood of presence in the action area, and low level contaminant exposure is may cause at most temporary effects green sturgeon that last for a few days.

Exposure and response – loss of benthic forage. Green sturgeon are most likely transient and infrequent occupants of the Youngs Bay (Hansel et al. 2017), and relatively unlikely to spend much time in the action area. Adult and sub-adult green sturgeon inhabiting Washington estuaries are typically 50-80 inches in length and have considerable energy reserves. The small, reduction in the abundance and diversity of benthic invertebrates caused by installation of the boat ramp is unlikely to decrease fitness or survival to these individuals.

2.5 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).

Human population growth is expected to occur throughout the Columbia River Basin, increasing conversion of uplands to more urbanized watersheds, which in turn create more sources of stormwater inputs, non-point pollution, and introduction of trash. Such effects can accrue within this action area. We also assume that future private and public actions will occur near the action area based on trends in development. As the human population in the action area increases the demand for agricultural, commercial, or residential development and supporting infrastructure is also likely increase as well. The majority of environmental effects related to future growth will likely occur as a result of land clearing, associated land-use changes (i.e., from forest to lawn or pasture) and increased impervious surface and related subbasin changes that contribute contaminants to area waters. Land use changes and development of the built environment that are detrimental to listed species and their habitats are likely to continue under existing zoning regulations (Baker et al. 2004). Though these existing regulations could decrease potential adverse effects on habitat function, as currently constructed and implemented, they still allow incremental degradation to occur.

In summary, while widespread degradation of aquatic habitat associated with intense natural resource extraction is no longer common, ongoing and future land management actions are likely to continue to have a depressive effect on aquatic habitat quality in the Klaskanine watershed. Considering that continued maintenance of diking, forestry, and grazing activities surround private land recovery of the PBFs necessary to improve listed species will likely be slow and uncertain as the effects of climate change put additional stress on the flow regime and summer temperatures. As a result, recovery of aquatic habitat is likely to be slow and cumulative effects from basin-wide activities are likely to have a slightly negative impact on population abundance trends and the quality of critical habitat PBFs into the future.

2.6 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 biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminishes the value of designated or proposed critical habitat for the conservation of the species.

The salmonid species considered in this opinion are all listed as threatened, based on declines in abundance, productivity, spatial structure and diversity. These declines are based in part on curtailed access to habitat, and systemically degraded habitat, including in the action area. In particular, lack of refugia habitat is a limiting factor to increasing abundance of LCR coho salmon. It is in this context we add the effects of the proposed action to evaluate their effect on species viability and critical habitat conservation value.

The proposed action will affect the Youngs bay populations of LCR Chinook, CR chum, and LCR coho salmon. The viability of these populations ranges from extirpated or nearly so to populations (NMFS 2013). This is particularly true for CR chum salmon and LCR coho salmon, whose populations in Youngs Bay are rated 'very low'. The population status of LCR Chinook salmon is somewhat better, but still rated 'low', with the current number of spawners at approximately 380 fish.

The projects construction effects, as described above, are temporary diminishments in water quality, and brief exposure of the listed populations. Given the limited scale, duration, and intensity of the habitat alteration, we consider the habitat conservation value not be impaired by the construction effects, and the response of the individual fish that encounter this effect is not expected to injure these fish or alter the population dynamics.

The proposed action cause a small, but long-term degradation in habitat quality by installation of impervious surfaces and persistent low-intensity erosion and introduction of chemical contaminants from boat use in the Klaskanine River watershed. The proposed riparian planting and woody debris placement will improve off-channel rearing. The permanent effects are a reduction in 6,000 square feet of in-water rearing and migration habitat, a permanent pattern of habitat disturbance from boating activity, and a permanent incremental degradation of water quality from boating and stormwater from the adjacent parking area. Foraging may also be temporarily diminished within a larger 1.10 acre area as a result of increased levels of suspended sediment. These are contemporaneous with the small improvement in the backwater streamside habitat where wood debris will be added to create location with increased habitat complexity. On the whole, the project has more habitat degradation than improvement in the action area.

All future cohorts of the Youngs Bay populations of the three listed species will experience the small loss of habitat, and the chronic addition of water quality degrading chemicals. It is difficult to discern the number of individuals from any of these cohorts/populations that will be injured via reduced prey, reduced rearing area, increased competition, disturbance reaction to boating activity, or latent effects of exposure to fuels and contaminants. It is likely though, that the carrying capacity of the action area is slightly diminished. Overall, it is important to note that none of the Youngs Bay populations of the three salmonid species are targeted for improvement in order to achieve recovery of the species (NMFS 2013).

The project will also affect the sDPS of green sturgeon. This species abundance has declined significantly and their numbers have not yet recovered due primarily to habitat modification, entrainment, poaching, bycatch in commercial ocean fisheries, and chemical contaminant exposure in California Central Valley and Sacramento River basin (NMFS 2018). However, sediment loading (both temporary and permanent) is does not create adverse conditions for green sturgeon, the site specific habitat changes are in locations that green sturgeon are unlikely to be present in due to their preference for deeper water areas, and thus only the chemical contamination associated with boating and stormwater are likely to be experienced by individuals of this species. As mentioned in the effects section, based on their benthic-dwelling habit and large size green sturgeon are less likely to result in latent mortality from behavioral effects exhibited as a result of chemical contaminant exposure. We expect no discernible population changes (reduction in abundance) of this species from the proposed action.

Overall, the effects of the proposed action on the listed species and designated critical habitats are too small-scale, infrequent, and low-intensity to alter the trajectory for any of the affected populations. Further, none of the affected populations is targeted for improvement, so even minimal degradation will have little effect on viability for any of the salmonids species. The slightly degraded conditions are too small within the context of other actions to be discernable. The duration, intensity, and scale of the effects related the proposed action will be too small to incur effects at the species level. The ODFW proposed to install riparian plantings and woody debris in particularly important areas that support actions identified in the species recovery plans (NMFS 2013; 2018). These actions should provide gradual and continued improvement in habitat conditions within the action area.

2.7 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' biological opinion that the proposed action is not likely to jeopardize the continued existence of CR chum salmon, LCR Chinook salmon, LCR coho salmon, the sDPS of green sturgeon, or destroy or adversely modify designated critical habitat for these species.

2.8 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.

The proposed action is likely to result in:

1. Harm or injury to LCR Chinook salmon and LCR coho salmon at the juvenile life stage resulting from loss of benthic invertebrate forage items and habitat for rearing and migration.
2. Harm, injury, or death to LCR Chinook salmon and LCR coho salmon resulting from exposure to chemical contaminants, suspended sediment, or inwater work site isolation.
3. Harm to green sturgeon at the adult/subadult life stages resulting from exposure to chemical contaminants and loss of foraging habitat.

2.8.1 Amount or Extent of Take

Take caused by the adverse effects to habitat or the species themselves listed above will include harm to a small number of juvenile salmon and adult/subadult green sturgeon. However, the number of fish likely to be harmed cannot be quantified due to the highly variable numbers of fish that will be present in the action area both at the time of the construction, and with each future cohort. Moreover, fish response to the effects of the proposed action can range and be influence by a number of other factors that are impossible to predict, such as anomalous weather. When an amount of take cannot be estimated, we provide a surrogate measure, called an extent of take. The extent of take must be both observable to serve as a re-initiation trigger, and causally related to the take that will occur.

1. Harm from exposure to suspended sediment during construction. Take caused by inwater and upland construction will resuspend sediment in the Klaskanine River. Exposure to LCR Chinook salmon and LCR coho salmon may occur inside or outside of the silt curtain and may result in harm, injury, or death to a small number of individuals at the juvenile life stage. Death may potentially occur if individual fish become stranded in the inwater isolation area and subjected to prolonged exposure to high levels of suspended sediment or crushed by construction equipment. We cannot quantify the number of fish likely to be harmed, injured, or killed because the number of individuals present at the time of construction can be highly variable and cannot be reliably predicted. Foraging conditions may be temporarily degraded

by increased suspended sediment within a 1.10 acre area. The reduction in foraging habitat is directly related to the length of streambank where construction will occur. NMFS will use a surrogate of 300 linear feet of streambank that will serve as the reinitiation trigger.

2. Harm from exposure to chemical contaminants will occur via stormwater and boating activity to individual fish caused by exposure to chemical contaminants will harm or injure a small number of CR chum salmon, LCR Chinook salmon, and LCR coho salmon at the juvenile life stage in addition to green sturgeon at the adult/subadult life stages. We cannot quantify the number of fish likely to be injured or harmed as a result of chemical contaminant exposure because of the inability to predict the frequency, duration, and intensity of the exposure. We will use the size of the parking area as a surrogate for the number of boats and vehicles likely to result in chemical contaminant releases. This is supported because the number of boats and vehicles that can use the facility is directly related to the size of the parking area. In this case the extent of take is limited to 30,000 square feet of parking area.

3. Harm from loss of benthic forage and rearing habitat will occur to CR chum salmon, LCR Chinook salmon, and LCR coho salmon at the juvenile life stage and green sturgeon at the adult/subadult life stages will occur when the area is modified by inwater construction. We will use the modified area as a surrogate because degradation of stream habitat is directly related to the loss incurred by benthic invertebrates. In this case the extent of take is limited to 6,000 square feet of area that will be permanently degraded by installation of the riprap and boat ramp.

2.8.2 Effect of the Take

In the biological 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.

2.8.3 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 FWS and ODFW shall:

1. Minimize take associated with suspended sediment;
2. Minimize take associated with loss of forage;
3. Minimize take during deployment of the silt curtain;
4. Conduct monitoring.

2.8.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the FWS or any applicant must comply with them in order to implement the RPMs (50 CFR 402.14). The FWS 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. To implement reasonable and prudent measure 1 (minimize suspended sediment) the FWS and ODFW shall:
    a. Ensure that the silt curtain is removed slowly to prevent an abrupt pulse of highly turbid water into the river.
    b. Temporarily cease construction if turbidity levels exceed 20 percent of background levels.
    c. Ensure the smallest amount of streambank possible is altered by construction.

2. To implement reasonable and prudent measure 2 (minimize loss of benthic forage) the FWS and ODFW shall limit the amount of area disturbed during the course of inwater construction to the smallest area possible.

3. To implement reasonable and prudent measure 3 (minimize take during deployment of the silt curtain) the FWS and ODFW shall deploy the inwater silt curtain according to the following procedures:
    a. Isolate the minimum amount of area necessary for construction.
    b. Deploy the silt curtain during low water conditions.
    c. Extend the silt curtain from the shore in a waterward direction to prevent entrapment of fish.

4. To implement all three reasonable and prudent measures the FWS and/or ODFW shall:
    a. Document the post-construction square footage of impervious surface, gravel parking area installed, linear distance of streambank altered by construction, and cubic yards of rock riprap placed.
    b. Document days of inwater construction.
    c. Visually monitor turbidity conditions downstream of the construction area while inwater construction is underway. Ensure turbidity does not exceed 20 percent of background conditions.
    d. The FWS shall submit the following documentation electronically to NMFS email inbox at projectreports.wcr@noaa.gov by April 30, 2020.

2.9 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 NMFS recommends that the ODFW and FWS:

1. Initiate a program to install signage at the site describing how boat use creates water quality impairments, and describes measures boaters can take to reduce water quality impacts.

2. Initiate a program to install boat wash stations with stormwater treatment facilities to minimize dispersal of invasive species and release of chemical contaminants degrade critical habitat function and harm or injure ESA-listed species.

2.10 Reinitiation of Consultation

This concludes formal consultation for the Klaskanine River Boat Ramp project.

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

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

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

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

3.1 Essential Fish Habitat Affected by the Project

As described above in the ESA effects analysis the action proposed by the FWS will adversely affect EFH designated for five species of LCR Chinook salmon and LCR coho salmon. The action area includes those designated as EFH for adult and juvenile life history stages of Chinook salmon and coho salmon (PFMC 2014). The effects of the proposed action on EFH are the same as those described above in the ESA portion of this document. As discussed above in the ESA effects analysis (section 2.5) in greater detail, the proposed action will adversely affect aquatic, floodplain, and upland habitat and Chinook salmon and coho salmon migrating through the action areas during construction and maintenance of the boat ramp and parking facility.

3.2 Adverse Effects on Essential Fish Habitat

Based on the information provided in the biological assessment and the analysis of effects presented in the ESA portion of this document, the NMFS concludes the proposed action will have adverse effects on EFH designated for Chinook salmon and coho salmon. These effects include:

1. Degraded water quality;
2. Altered rearing habitat;
3. Reduced forage.

3.3 Essential Fish Habitat Conservation Recommendations

The NMFS recommends the COE require the following actions to minimize effects on Pacific Coast salmon EFH:

1. Install a minimum of 15 pieces of large woody debris on the streambank in off-channel backwater pool identified in Figure 2 at elevations below ordinary high water to provide rearing and refugia habitat for juvenile salmonids.
2. Ensure that all large wood consists of pieces with rootwads intact, minimum length of 20 feet, and minimum diameter of 18-inches.

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in Section 3.2, above, approximately 0.5 acres of designated EFH for Pacific Coast salmon.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the COE must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and 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, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, 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 FWS must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are U.S. Fish and Wildlife Service. Other interested users could include the Columbia River Estuary Study Taskforce (CREST), Columbia Land Trust, North Coast Land Conservancy, and the Oregon Department of Fish and Wildlife. Individual copies of this opinion were provided to the FWS. The format and naming adheres to conventional standards for style.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan

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

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

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

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

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6. APPENDICES

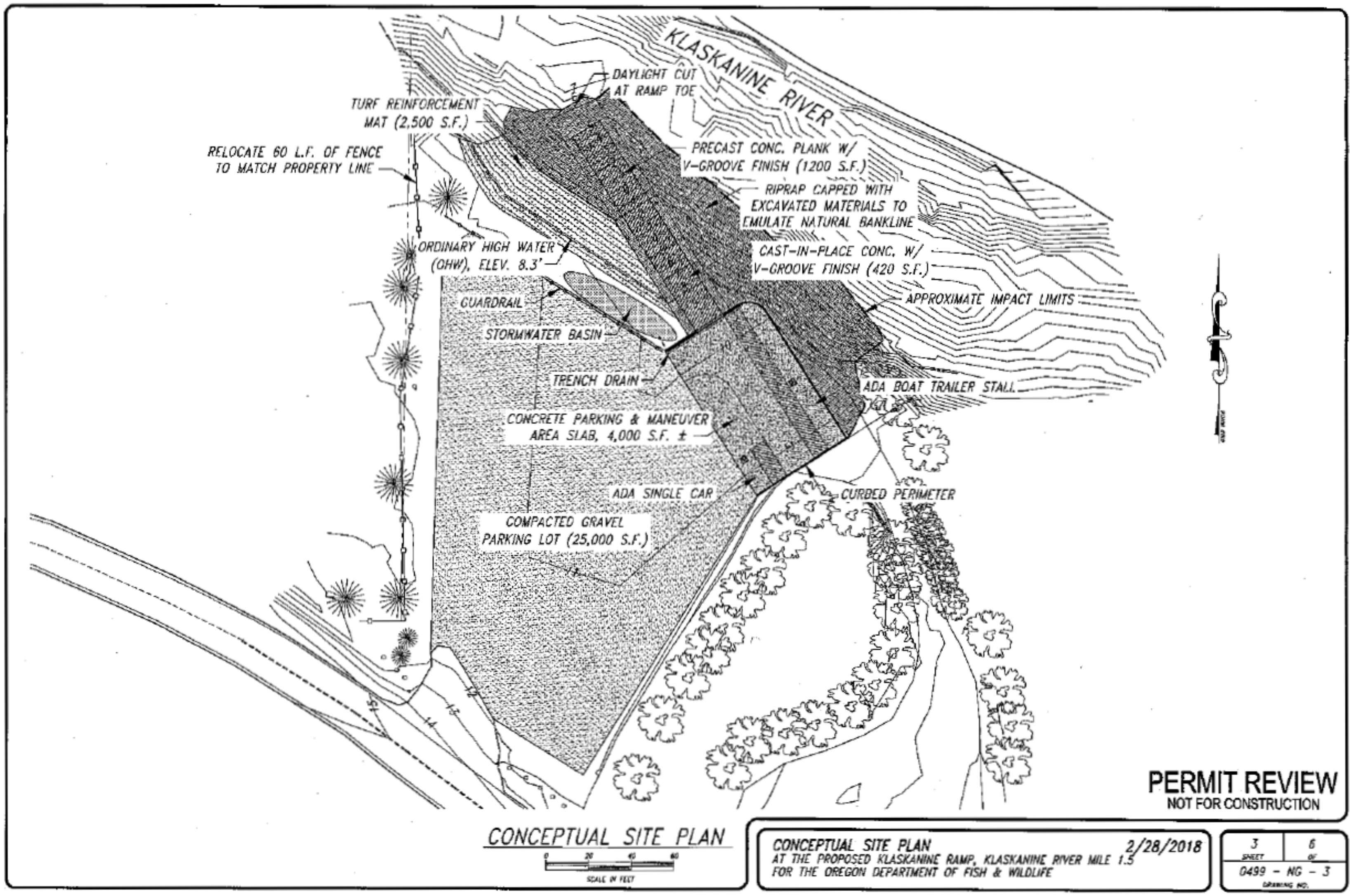

Figure 6-1. Conceptual site plan for boat ramp construction.

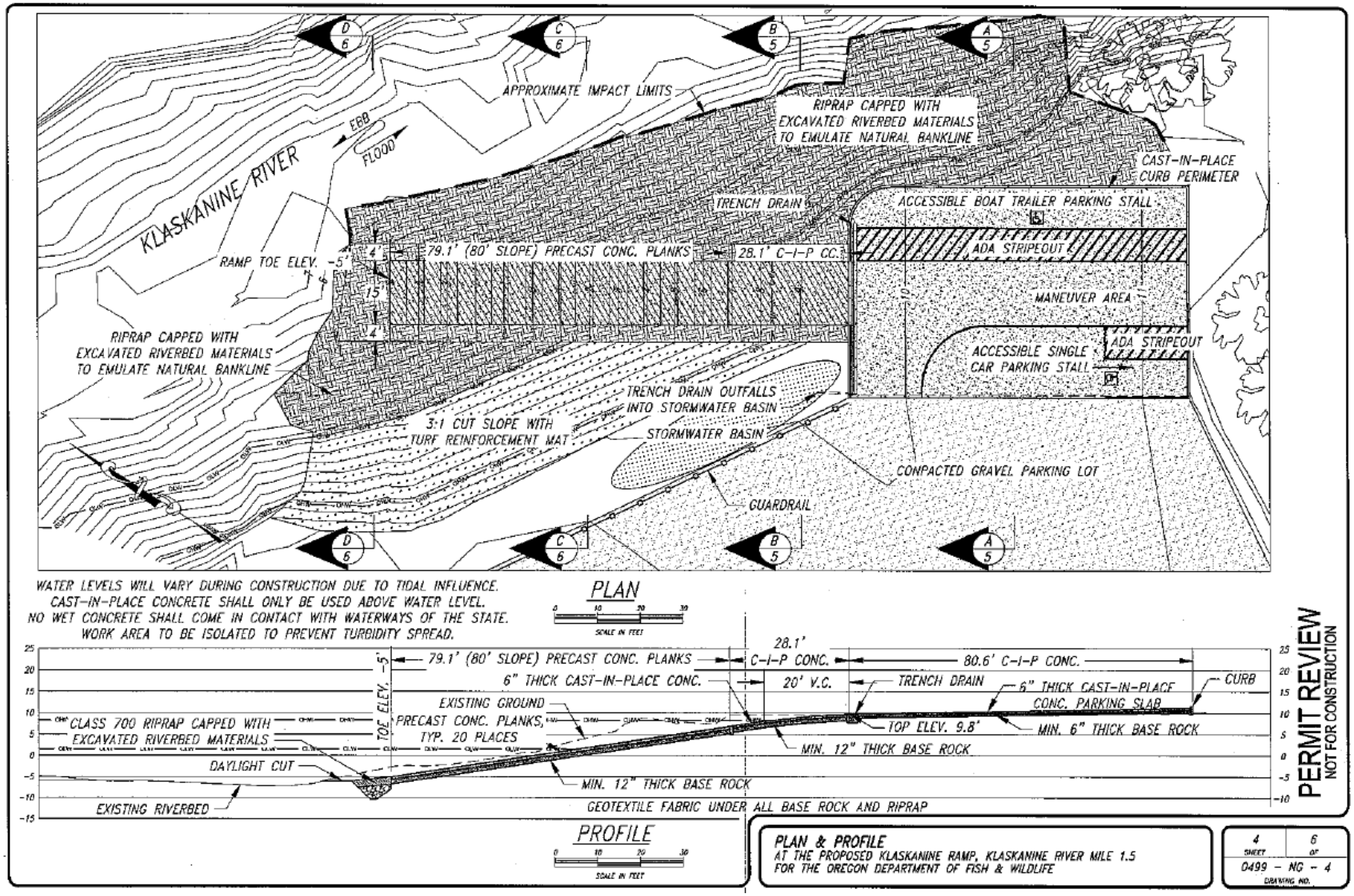

Figure 6-2. Site plan profile for boat ramp construction.

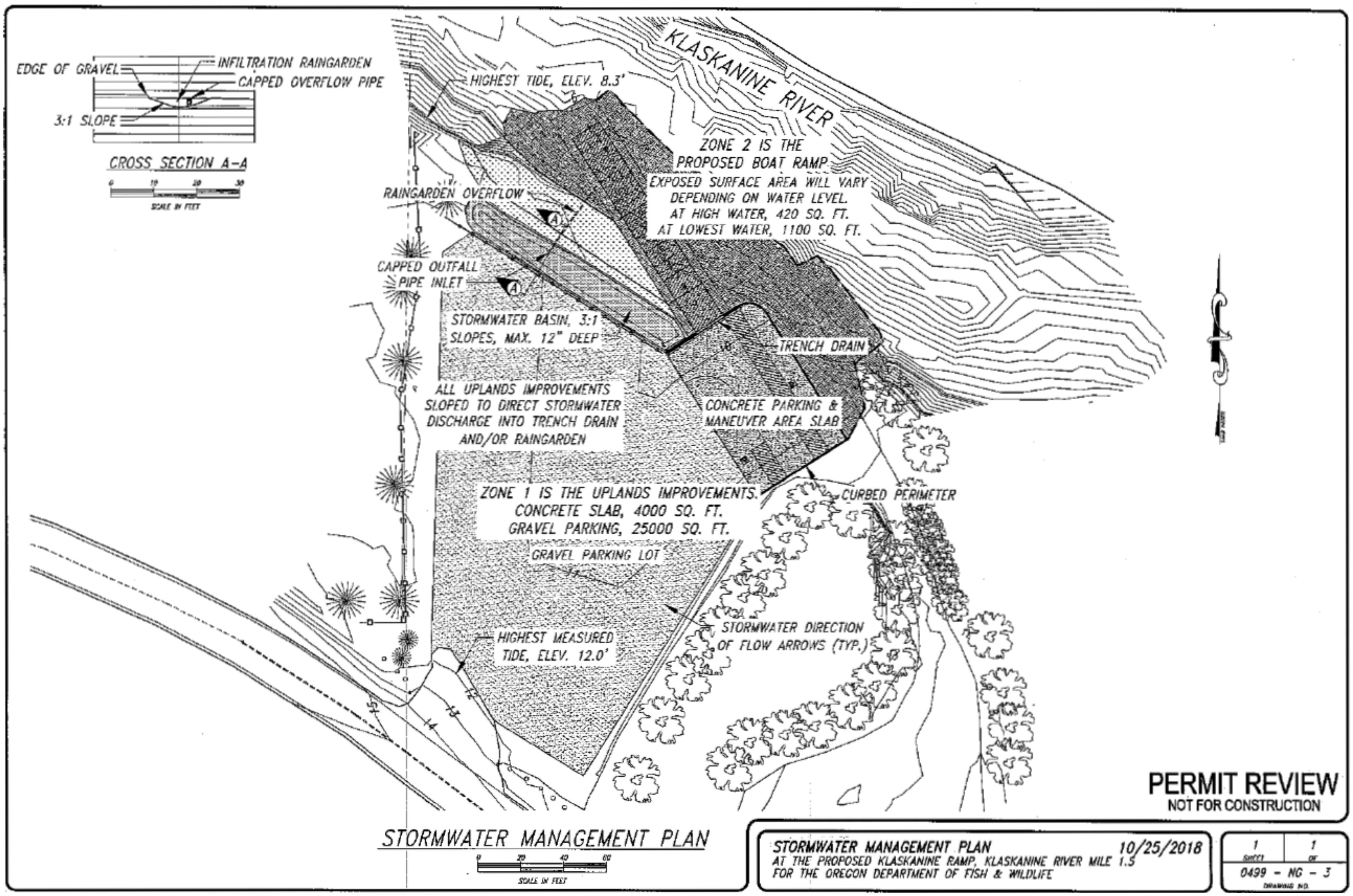

Figure 6-3. Proposed stormwater management plan.