FINDING OF NO SIGNIFICANT IMPACT (FONSI)

AND

CLEAN WATER ACT SECTION 404 STATEMENT OF FINDINGS

FY 2019 – FY 2034 Everett Harbor and Snohomish River Federal Navigation Channel Maintenance Dredging and Disposal

Snohomish County, Washington

1. Name of Waterway: Everett Harbor and Snohomish River Federal Navigation Channel

2. Background: The Seattle District, U.S. Army USACE of Engineers (USACE) is undertaking the maintenance dredging and disposal associated with the navigation channels and settling basins of the Everett Harbor and Snohomish River Project. This project as authorized by the Rivers and Harbors Act of 25 June 1910 (House document 1108, 60th Congress, 2nd session), consists of navigation channels, two settling basins, and dikes to serve navigation in Everett Harbor and Snohomish River. Subsequent authority for this project occurs in the Rivers and Harbors Acts of 1930, 1938, 1954, 1960, and 1968, which provided authority for modifications and additional improvements. The authorized features include:

a. A lower, one-mile channel from Puget Sound up the Snohomish River, 1 mile long, 150 to 425 feet wide, and - 15 feet mean lower low water (MLLW).

b. An upper channel extending to river mile (RM) 6.3, 150 feet wide (and wider at the turns), - 8 feet MLLW.

c. Two settling basins in the navigation channel:

(1) The downstream settling basin at 700 feet wide, 1,200 feet long, - 20 feet MLLW, with 500,000 cubic yards (CY) capacity, and;

(2) The upstream basin at 150 feet wide and 1,740 feet long, - 40 feet MLLW, with one million CY capacity.

The authorized project also includes the East waterway, but it will not be included within the scope of this proposed action. The East Waterway has not been dredged for many decades and the USACE does not anticipate dredging in the near future.

The Everett Harbor and Snohomish River Federal Navigation Channel provides safe navigation for ships while they traverse the lower Snohomish River from Puget Sound to the Port of Everett and local facilities near the City of Everett. Shoaling is occurring in

the channel and dredging is necessary to restore the area to its authorized depths with an allowance for an additional two feet of overdepth and two feet of advanced maintenance as necessary. This dredging maintains the ability of vessels to enter and leave the Port of Everett and other nearby facilities safely. Operations at the Port and City of Everett are critical to the local economy and furthers waterborne commerce.

3. Action: The USACE has determined that the preferred alternative is the "Dredge Navigation Channels and Settling Basins in Alternate Years (Alternative 3)". The action to be conducted is described in Section 2.3 of the accompanying Environmental Assessment (EA). The proposed work continues annual maintenance dredging by mechanical (clamshell) and hydraulic dredges of up to an estimated 500,000 CY from each settling basin and 200,000 CY from the navigation channel annually from the Everett Harbor and Snohomish River navigation project for a total of up to 1,200,000 CY, for fifteen years (FY 2019 – FY 2034) during the designated work window of 16 October through 14 February. All dredging will occur within the federally authorized footprint for the two channels and the associated settling basins.

Placement of the resulting material will be in the existing approved open-water Dredged Material Management Program (DMMP) Port Gardner disposal site, a nearshore nourishment site on Jetty Island, and one upland site at Site O. Dredged material placed in the open-water disposal site is typically mechanically (clamshell) dredged and transported via bottom dump barge where tugs move the bottom dump barges to and from the open-water disposal sites. A hydraulic dredge with pump-ashore capability may be utilized to place dredged material via pipeline in the upland and nearshore sites.

4. Coordination: The Federal action is described in the Final Environmental Assessment (EA): Everett Harbor and Snohomish River Federal Navigation Channel Maintenance Dredging and Disposal FY 2019 – FY 2034, dated August 2018, and is hereby incorporated by reference.

a. Letters of Comment and Responses: The Draft EA, the contents of which are consistent with a Clean Water Act (CWA) Section 404 Public Notice, and draft FONSI has undergone a public comment period from 15 June 2018 to 15 July 2018. No comments were received in response to the draft EA and FONSI.

b. Federal Agencies: The U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), and the U.S. Department of the Interior, U.S. Fish and Wildlife Service (USFWS) are responsible for the Endangered Species Act of 1973 (ESA) listed species in Snohomish County. The USACE determined that the proposed maintenance dredging and dredged material placement at Jetty Island and Site O sites may affect, but is not likely to adversely affect any ESA-listed species or designated critical habitat and prepared documentation of this determination for activities over 25 years (2017 – 2042; USACE 2016). The USFWS agreed with this determination and the USACE received a letter of concurrence 24 May 2017. NMFS agreed that the proposed action is not likely to adversely affect most ESA-listed species or designated critical habitat; however, NMFS concluded that Puget

Sound Chinook salmon and steelhead, with their critical habitat, are likely to be adversely affected by the proposed action and the USACE received a biological opinion 26 January 2018 (NMFS 2018).

The USACE has determined that maintenance dredging may adversely affect essential fish habitat (EFH) for the entire maintenance dredging program, including Everett Harbor and Snohomish River Federal navigation Channel, because removal or open-water disposal of dredged material would constitute a detectable effect to EFH. NMFS concurred with this determination 26 January 2018 and provided EFH conservation recommendations that would minimize and/or avoid adverse effects on EFH for Pacific Coast Salmon, Pacific Coast Groundfish, and Coastal Pelagic Species (NMFS 2018). The USACE determined that use of the multiuser open-water placement sites may adversely affect EFH (USACE 2015) and received concurrence from NMFS 17 December 2015 (NMFS 2015). The following conservation measures have been incorporated into the proposed action in order to reduce potential impacts to EFH:

- The project will comply with applicable provisions issued in Ecology's Section 401 water quality certification associated with the discharge of dredged material into the waters of the United States, to minimize turbidity and other water quality impacts

- Only previously disturbed areas will be affected by the proposed action; the dredging will only occur within the authorized footprint

- The Corps will limit work to the established in water work window of 16 October through 14 February

Use of the Port Gardner open-water disposal site (USACE 2015) has undergone separate ESA consultation for disposal through the 2040 calendar year. The USACE determined the proposed dredged material placement at the Port Gardner open-water sites is not likely to adversely affect any ESA-listed species or designated habitat and prepared documentation of this determination (USACE 2015). The USFWS provided a letter of concurrence 28 July 2015 (USFWS 2015) and NMFS provided a biological opinion for adverse effects to rockfish in the Puget Sound/Georgia Basin 17 December 2015 (NMFS 2015).

c. State and Local Agencies:

(1) The USACE requested and obtained a 401 Water Quality Certification (#15949) from the Washington Department of Ecology (Ecology) on 07 August 2018. The USACE will comply with applicable conditions associated with the discharge of dredged material into the waters of the U.S. Ecology provided in the Certification.

(2) The USACE has determined that the project is consistent to the maximum extent practicable with the enforceable policies of the approved Washington State Coastal Zone Management Program, in particular the Shoreline Management Plans of the City of Everett, and, therefore, is in compliance with the Coastal Zone Management

Act (CZMA). The USACE prepared a Coastal Zone Management Consistency Determination for maintenance dredging and submitted it to Ecology on 10 April 2018. Ecology requested a 30-day review extension 29 May 2018 and the USACE agreed to extend the review period until 30 June 2018. Concurrence has not been received from Ecology specifically concurring that consistency with CZMA is achieved. Because of lack of action within the prescribed 90-day time period, as extended, Ecology's concurrence that the project is consistent to the maximum extent practicable with the enforceable policies of Washington State Coastal Zone Management Program is presumed in accordance with 33 CFR 336.1(b)(9)(iv) and 15 CFR 930.41(a).

(3) The USACE has determined that there will be no historic properties affected by the Everett Harbor and Snohomish River Federal navigation Channel maintenance dredging. USACE consulted with the Washington SHPO and affected Tribes for this project. On 28 March 2018 the USACE sent a letter to the SHPO and the following Tribes: Muckleshoot Indian Tribe, Sauk-Suiattle Indian Tribe, the Snoqualmie Indian Tribe, the Stillaguamish Tribe of Indians, the Suquamish Indian Tribe, the Swinomish Indian Tribal Community, the Tulalip Tribes of Washington and the Yakama Nation. The letter described the project, the area of potential effects (APE), and that the USACE was proposing a determination of no historic properties affected. On 29 March 2018, the SHPO responded by letter concurring with the USACE APE. No response has been received from the Tribes. On 20 April 2018 the USACE sent a letter to the Washington SHPO documenting the USACE's determination of No Historic Properties Affected. The Washington SHPO responded by letter dated 23 April 2018 concurring with the USACE's determination.

d. Treaty Tribes: USACE has engaged in consultation and collaboration with the federally recognized Native American tribes that may be affected by the proposed action, which include the Muckleshoot Indian Tribe, Sauk-Suiattle Indian Tribe, Snoqualmie Indian Tribe, Stillaquamish Tribe of Indians, the Suquamish Tribe, Swinomish Indian Tribal Community, the Tulalip Tribes of Washington, and the Confederated Tribes and Bands of the Yakama Tribe. Of these tribes, the Tulalip Tribes of Washington has federally adjudicated off-reservation hunting and gathering rights to locations within the project area. Dredging and material placement may temporarily interfere with the movement of fishing vessels through the navigation channel as they transit to fishing locations; however, this would be a limited effect and will not affect navigation to more than a *de minimis* extent. Letters were sent to the federally recognized tribes to solicit their input prior to releasing the draft EA for public review. None of the tribes responded. The USACE has ongoing coordination with the Tulalip Tribes of Washington on matters involving maintain dredging of the channel and access to Puget Sound resources. Additionally, the USACE has consulted with tribal biologists regarding avoiding impacts to tribal fisheries resources. Maintenance dredging would keep the navigation channel open and navigable for fishing vessels to launch and access the lower Snohomish River for travel to Puget Sound, including access to Usual and Accustomed fishing and shellfishing locations. Thus, the federal action would further tribal fishing, an important economic and cultural activity for the

tribe. The USACE will continue to coordinate with federally recognized Tribes throughout the project in furtherance of meeting Tribal Treaty obligations.

5. Environmental Effects and Impacts:

a. Summary of Effects: The Final EA for the Everett Harbor and Snohomish River Federal Navigation Channel Maintenance Dredging and Disposal Project FY 2019-FY 2034, dated August 2018, describes the effects of the proposed project. Unavoidable adverse effects include disruption of benthic communities and minor and temporary water quality impacts through turbidity and depressed dissolved oxygen, as well as some emissions of air pollutants and greenhouse gases. However, these effects will be temporary and localized and are not expected to be significant.

b. Compliance with Applicable Environmental Laws: The environmental laws listed below are applicable to the proposed action. An evaluation of environmental impacts under each of these regimes, as well as compliance with each of these laws, is documented in the Final EA.

- National Environmental Policy Act
- Endangered Species Act
- Marine Mammal Protection Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Clean Water Act, Sections 404 and 401
- Coastal Zone Management Act
- National Historic Preservation Act
- Clean Air Act
- Native American Tribal Treaty Rights
- Migratory Bird Treaty Act and Executive Order 13186 Migratory Bird Habitat Protection
- Executive Order 13175 Consultation and Coordination with Indian Tribal Governments
- Executive Order 12898 Environmental Justice
- Executive Order 11990 Protection of Wetlands
- Executive Order 11988, Flood Plain Management

6. Determination:

a. Alternatives: The USACE considered three alternatives in the Final EA for the Everett Harbor and Snohomish River Federal Navigation Channel Maintenance Dredging Project: (1) no action, (2) dredging the navigation channel and settling basins to channel depth, (3) the preferred alternative of typically alternating dredging each year between the upstream and downstream settling basins and adjacent navigation channel.

The USACE rejected Alternative 1 because it would not meet the project purpose and need. Alternative 2 does not dredge the settling basins to their full depth and therefore may require "emergency" dredging or maintenance dredging intervals that are longer or more frequent to maintain safe navigation within the channel. Alternative 3 is the least-cost and environmentally responsible alternative that meets the project purpose. Alternative 3 is therefore the alternative that most fully implements the Federal standard.

b. Individual and Cumulative Environmental Effects: Based on the analysis provided in the Final EA, the additional incremental effect of the preferred alternative to conduct proposed episodes of maintenance dredging and placement would cause a temporary effect to biological functions and minor, temporary loss of benthic invertebrates, but would maintain navigability to a greater extent than the no action alternative. The additional incremental effect of the preferred alternative beyond the already accumulated degradation of the harbor is insignificant. Site O is a former log yard and placement of dredged material on Jetty Island is beneficial to maintain the structure of the island and suppresses nonnative plants. No significant adverse effects are anticipated. In consideration of past developments still in existence in the lower Snohomish River, and the limited amount of anticipated future alterations within the estuary itself, the proposed routine maintenance dredging of the Federal navigation channel with associated disposal is not a significant addition to cumulative impacts in Everett Harbor and the Snohomish River. Placement of dredged material at the nearshore zone of Jetty Island creates essential salmonid habitat. The short-term disruption of dredging is outweighed by the assumed long-term benefit of providing material to Jetty Island to help reinforce against erosive forces and avoiding further introduction of non-native rock material into the natural beach environment, as well as provide material for the nearshore littoral zone. The USACE therefore concludes that there would be no significant contribution to individual or cumulative effects associated with the proposed maintenance dredging and placement actions.

c. Conditions in the Water Quality Certification: The USACE requested and obtained a 401 Water Quality Certification (#15949) from the Washington Department of Ecology (Ecology) on 07 August 2018 for the USACE to dredge a total volume of dredge material no more than 800,000 cubic yards (cy) per dredge cycle from the Snohomish River. The USACE will comply with applicable conditions associated with

the discharge of dredged material into the waters of the U.S. Ecology provided in the Certification. For the duration of the current CWA 401 Water Quality Certificate which is in effect until 14 February 2029, if the total volume of dredge material from a particular dredging event is planned to exceed 800,000 cubic yards, the USACE will seek a revised Section 401 Water Quality Certification from the Washington Department of Ecology, and the USACE would reopen this Environmental Assessment and its conclusion and reevaluate the FONSI as necessary. A new certification will be sought to address dredging from FY 2029 – 2034.

d. Conditions in the CZMA Consistency Concurrence: The USACE determined that this project is consistent to the maximum extent practicable with the enforceable policies of the approved Washington coastal management plans. Ecology requested a 30-day review extension 29 May 2018 and the USACE agreed to extend the review period until 30 June 2018. Concurrence has not been received from Ecology specifically concurring that general consistency with CZMA is achieved. Because of lack of action within the prescribed 90-day time period, as extended, Ecology's concurrence that the project is consistent to the maximum extent practicable with the enforceable policies of Washington State Coastal Zone Management Program is presumed in accordance with 33 CFR 336.1(b)(9)(iv) and 15 CFR 930.41(a). There are no applicable conditions under the CZMA.

e. Summary of Impacts and Compliance: Impacts of the work will be minor and temporary, and will have a small spatial scale compared to the similar habitat area of the entire lower river and adjacent ocean. This project complies with the ESA: a BA addressing the dredging activity has been prepared and was transmitted to NMFS and USFWS; a concurrence letter was received from USFWS and NMFS provided a biological opinion. Impacts to ESA-listed fish and their prey will be minimized by dredging and disposal during the approved in-water work windows. The NMFS and USFWS have provided concurrence letters for the proposed transportation of dredge material to, and placement at, the Port Gardner open-water disposal site, as well as at upland sites, including the Parcel O site, and at Jetty Island. The USACE has determined that it is not necessary to pursue a permit under the Marine Mammal Protection Act (MMPA) for noise impacts to marine mammals. This project will comply with Sections 401 and 404 of the CWA. A 404(b)(1) analysis was prepared, and the USACE received a Water Quality Certification from Ecology on 07 August 2018. Concurrence has not been received from Ecology specifically concurring that general consistency with CZMA is achieved. Ecology requested a 30-day review extension 29 May 2018 and the USACE agreed to extend the review period until 30 June 2018. WDOE's concurrence that the project is consistent to the maximum extent practicable with the enforceable policies of Washington State Coastal Zone Management Program is presumed in accordance with 33 CFR 336.1(b)(9)(iv) and 15 CFR 930.41(a). The project will comply with the National Historic Preservation Act (NHPA) and the USACE is coordinating the work with the SHPO and the Tulalip Tribes of Washington.

7. District Engineer's Findings and Conclusions: I have evaluated the dredging and disposal activity in light of the public interest factors prescribed in 33 CFR 336.1(c).

The following factors were evaluated as considerations potentially impacting the quality of the human environment in the accompanying draft EA and coastal zone consistency evaluation: navigation and the Federal standard, water quality, coastal zone consistency, wetlands, endangered species, historic resources, scenic values, recreational values, fish and wildlife, and application of non-Federal land use policies. No additional impacts to state/regional/local land use classifications, determinations, and/or policies are anticipated as the project will maintain a federally authorized channel that is already used for vessel transit and moorage. In accordance with 33 CFR 337.1(a)(14) and 325.3(c)(1), the following additional relevant factors were also considered: conservation, economics, shoreline erosion and accretion, safety, and property ownership.

The selected alternative represents the least costly alternative, constituting the discharge of dredged or fill material into waters of the U.S. in the least costly manner and at the least costly and most practicable location, is consistent with sound engineering practices, and meets the environmental standards established by the CWA Section 404(b)(1) evaluation process. Execution of the selected alternative, following considerations of all applicable evaluation factors, is in the public interest.

The Everett Harbor and Snohomish River navigation channel sediment is ranked "low-moderate" by the Dredged Material Management Program (DMMP) agencies for concern for potential contamination in sediments and therefore are subject to a six-year frequency determination for characterization of sediments. At the expiration of the current suitability determinations, subsequent sampling and testing of material will be required to determine suitability. In light of a long-standing record of determinations that material to be dredged from the authorized navigation channel was suitable, the USACE expects that future testing will result in a determination of suitability for unconfined aquatic discharge. If the sediments to be dredged were not included in the characterization (e.g., if the upper settling basin is dredged below -22 ft MLLW), or the sediments are not determined to be suitable, further evaluation by the DMMP agencies will occur; the accompanying EA will be re-evaluated and this FONSI amended as necessary prior to any subsequent maintenance dredging episodes involving the disposal of dredged material into waters of the United States.

If the sediment volumes to be deposited at the upland disposal sites (Parcel O and Jetty Island) are planned for either annual or cumulative placement in excess of the volumes identified in the EA (cumulatively up to 190,000 cubic yards for both sites per year; up to 150,000 cubic yards of annual placement at Parcel O, and up to 40,000 cubic yards per year at Jetty Island), the USACE would reinitiate ESA §7 consultation for the disposal, reopen this Environmental Assessment and its conclusion and reevaluate the FONSI as necessary. For the duration of the current CWA 401 Water Quality Certificate which is in effect until February 14, 2029, if the proposed total volume of dredge material from a particular dredging event is planned to exceed 800,000 cubic yards, the USACE will seek a revised Section 401 Water Quality Certification from the Washington Department of Ecology, and the USACE would reopen this Environmental Assessment and its conclusion and reevaluate the FONSI as necessary.

Furthermore, based on the attached EA, I have determined that the selected action will not have significant effects on the quality of the human environment and does not require preparation of an environmental impact statement.

23 Aug 18
Date

MARK A. GERALDI
COL, EN
Commanding

FINAL Environmental Assessment

and Clean Water Act, Section 404 Public Interest Review

Snohomish River Federal Navigation Channel

Maintenance Dredging and Disposal FY 2019 – FY 2034

Everett, Washington

Jetty Island photo courtesy of Washington State Department of Ecology

US Army Corps
of Engineers®
Seattle District

August 2018

Final Environmental Assessment and Clean Water Act Section 404 Public Interest Review

Everett Harbor and Snohomish River Federal Navigation Channel Maintenance Dredging and Disposal FY 2019 - FY 2034

Responsible Agency: The responsible agency for this navigation project is the U.S. Army Corps of Engineers, Seattle District.

Abstract

In accordance with the National Environmental Policy Act (NEPA), this Environmental Assessment (EA) evaluates the potential environmental impacts of the proposed maintenance of the Federal navigation channel in the Snohomish River during fiscal years (FY) 2019 – FY 2034. In accordance with Section 404 of the Clean Water Act, this integrated document also evaluates whether it is in the public interest to undertake the Federal action. The Everett Harbor and Snohomish River navigation channel is located in northwest Washington on the eastern shore of Possession Sound near Everett, Snohomish County, Washington. Without annual maintenance dredging, shoaling would lead to a reduction of depths in the navigation channel limiting the capacity of vessel traffic to enter and leave the various water dependent facilities associated with the project. Maintenance dredging of the two settling basins reduces sedimentation rates in the navigation channel, limiting the quantity and frequency of dredging. To maintain navigability in the project, the Snohomish River navigation channel (navigation channel) would be dredged annually to maintain the lower channel at the authorized depth of -15 feet (ft) mean lower low water (MLLW) plus 2-ft overdepth, and the upper channel would be maintained to the authorized depth of -8 ft MLLW plus 2-ft overdepth. The settling basins would also be dredged annually to maintain the authorized depths; -20 ft MLLW plus 2-ft overdepth in the lower settling basin, and the upstream settling basin would be maintained to 32 feet (although the authorized depth is of- 40 ft) MLLW, plus 2-ft overdepth. Routine maintenance dredging may include an additional two feet of advanced maintenance. The preferred alternative for this project is dredging using a mechanical or hydraulic dredge to remove up to an estimated 500,000 cubic yards (CY) from each settling basin and 200,000 CY from the navigation channel annually for a total of up to 1,200,000 CY, over fifteen years. The dredged material may be deposited at several approved disposal sites including the Port Gardner PSDDA (Puget Sound Dredged Disposal Analysis) disposal site, Jetty Island, and Parcel O. The dredging and disposal activities will be conducted between 16 October and 14 February of each fiscal year (i.e., the U.S. government's fiscal year runs from October 1-September 30), within the approved in-water work window. The estimated volume of dredged material, the types of equipment used, and the proposed use or disposal of the dredged sediment are determined based on annual condition surveys that are conducted prior to the dredging event. The duration of each upstream and downstream dredging episode would be approximately 90 days. Based on the analysis in this EA, the U.S. Army Corps of Engineers (USACE) has determined the proposed project would not constitute a major Federal action significantly affecting the quality of the human environment and has prepared a Finding of No Significant Impact (FONSI). The Draft EA and Draft FONSI were available for a 30-day public review 15 June 2018 through 15 July 2018. No comments were received.

This document is available online as "Everett Harbor and Snohomish River Maintenance Dredging and Disposal FY 2019 - FY 2034" at:
http://www.nws.usace.army.mil/Missions/Environmental/Environmental-Documents/

August 2018

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1 Proposal for Federal Action

Under the Council on Environmental Quality regulations, 40 CFR § 1500.1(c) and 40 CFR § 1508.9(a)(1), implementing the National Environmental Policy Act (NEPA) of 1969 (as amended), the purpose of an Environmental Assessment (EA) is to "provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact" on actions authorized, funded, or carried out by the Federal government, and to assist agency officials to make decisions that are based on understanding of "environmental consequences, and take actions that protect, restore, and enhance the environment."

This EA evaluates environmental effects of proposed maintenance dredging beginning in FY 2019 through FY 2034 at the Everett Harbor and Snohomish River Federal Navigation Channel in Snohomish, WA (Figure 1).

This document also integrates a review of factors underlying a determination of whether executing the project would be in the public interest, pursuant to Clean Water Act Section 404 and rules and regulations published as 33 CFR Part 335, "Operation and Maintenance of Army Corps of Engineers Civil Works Projects Involving the Discharge of Dredged or Fill Material into Waters of the U.S. or Ocean Waters"; 33 CFR Part 336, "Factors to be Considered in Evaluation of Army Corps of Engineers Dredging Projects Involving the Discharge of Dredged Material into Waters of the U.S. and Ocean Waters"; 33 CFR Part 337, "Practice and Procedure", and 33 CFR Part 338, "Other Corps Activities Involving the Discharge of Dredged Material or Fill into Waters of the U.S."

Dredging practices and disposal options were originally evaluated in the Final Environmental Statement for Everett Harbor and Snohomish River Navigation Project (1975) and in an assessment of environmental degradation in Everett Harbor that was evaluated in the Everett Harbor Action Program (USACE 1974; EPA 1989). These documents are incorporated by reference.

Transportation and disposal of sediments at the Port Gardner and other Puget Sound disposal sites have undergone NEPA review in the 1988 and 1989 Environmental Impact Statements (EISs) (USACE 1988; 1989). ESA consultation for the Port Gardner and other Puget Sound disposal sites was most recently completed in 2015 (USACE 2015, NMFS 2015, USFWS 2015); these documents are incorporated by reference. Therefore, the scope of the activities analyzed for environmental effects in this document are the routine maintenance dredging and disposal at the nearshore and upland sites, and this analysis of the federal action builds upon the prior general evaluation of effects in those referenced documents with additional specific analysis.

1.1 Project Location

The Snohomish River navigation channel is located on the east side of Possession Sound in north-central Puget Sound, at the City of Everett, in Snohomish County, Washington (Figures 1 and 2). The navigation channel provides safe transit to the Port of Everett shipping and moorage facilities, and nearby industries. The navigation channel comprises the downstream reach of the Snohomish River System, which has four main branches: Ebey Slough, Steamboat Slough, Union Slough, and the main channel, which carries the majority of the river's flow and discharges into the eastern portion of Port Gardner.

The area of analysis includes the Everett Harbor and Snohomish River navigation channel and waterfront areas including nearshore and upland material placement sites.

Figure 1. Vicinity of the Everett Harbor and Snohomish River Navigation Channel Project within Washington State.

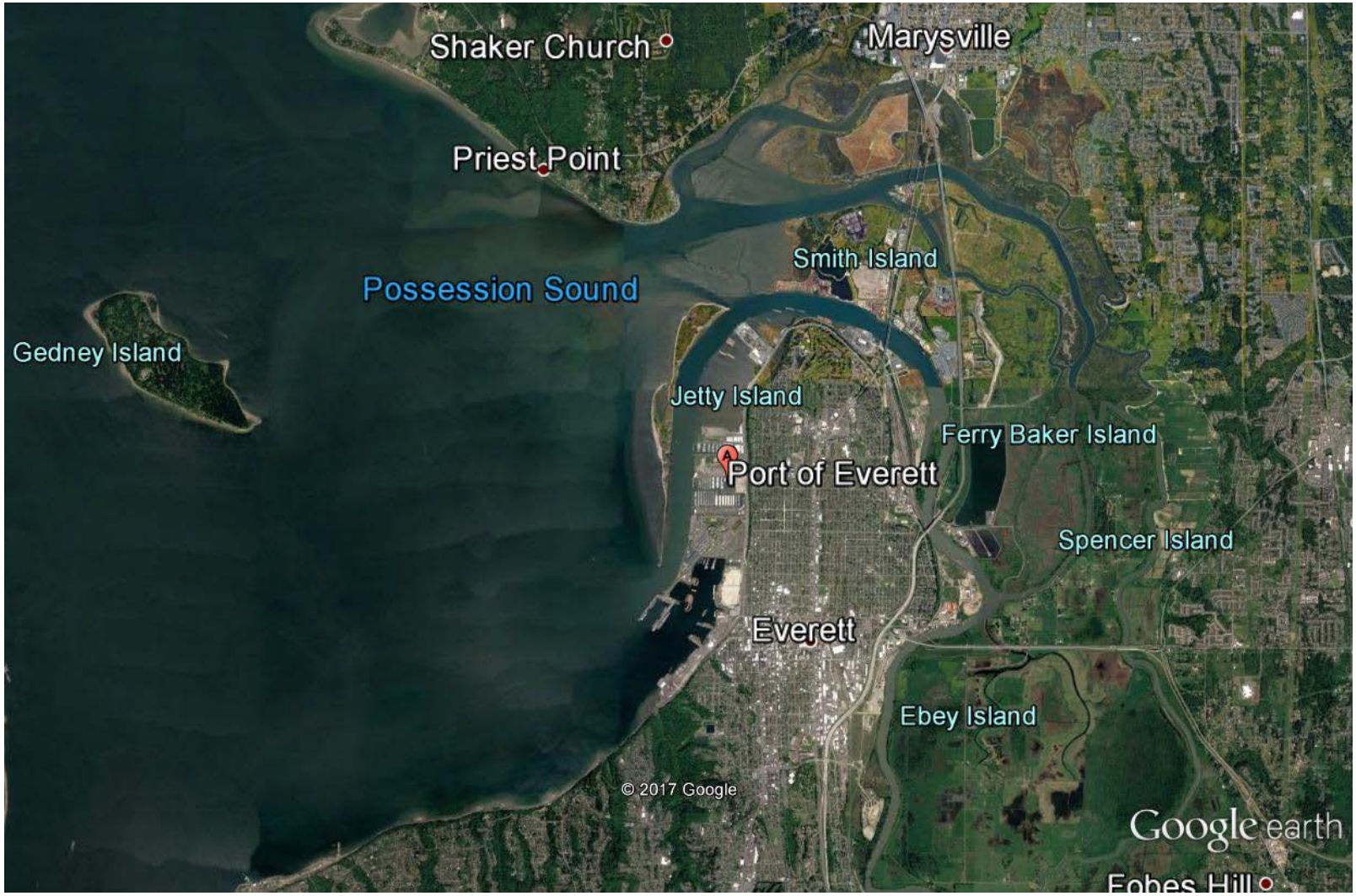

Figure 2. Vicinity map of the Port of Everett and other landmarks such as the City of Everett, Possession Sound, and Priest Point around the Snohomish River navigation channel.

1.2 Authority

The Everett Harbor and Snohomish River Project, of which the Snohomish River navigation channel is a component, was authorized by the Rivers and Harbors Act of 25 June 1910 (House document 1108, 60th Congress, 2nd session). Subsequent Acts of 1930, 1938, 1954, 1960, and 1968 provided modifications and additional improvements (USACE 1975). The Everett Harbor and Snohomish River Project consists of navigation channels, two settling basins, and dikes to serve navigation in Everett Harbor and the Snohomish River. The authorized project features include (Figure 3 and **Error! Reference source not found.**):

- A lower, one-mile channel that extends from Puget Sound up the Snohomish River, -15 feet mean lower low water (MLLW), and 150 to 425 feet wide.
- An upper channel extending to river mile (RM) 6.3, -8 feet MLLW, and 150 feet wide (and wider at the turns).
- Two settling basins in the navigation channel:
    - the downstream settling basin at 700 feet wide, 1,200 feet long, - 20 feet MLLW, with 500,000 CY capacity, and
    - the upstream basin at 150 feet wide and 1,740 feet long, - 40 feet MLLW, with one million CY capacity.
- The authorized project also includes the East waterway, but it will not be included within the scope of this proposed action. The East Waterway has not been dredged for many decades and the U.S. Army Corps of Engineers (USACE) does not anticipate dredging in the near future.

Due to the imprecise nature of dredging equipment, up to two feet of allowable overdepth may occur and this amount is factored into the total material to be removed. Two additional feet of advanced maintenance may occur depending on need and funding.

1.3 Purpose and Need

The purpose of the project is to maintain authorized depths of the navigation channel and settling basins in the Everett Harbor and Snohomish River Channel Project for the safe transit of vessels. Maintenance of these waterways is important because commercial and recreational vessels access the Port of Everett, the City of Everett, marinas and boat launches, and other maritime businesses. Naval Station Everett is currently home base for five Naval Destroyers a U.S. Coast Guard (USCG) Search and Rescue Cutter, and a USCG coastal patrol boat. Continuous sediment accumulation from the Snohomish River in the navigation channel can pose a hazard to transiting vessels and can make some areas of the channel inaccessible at low tides. Shoaling disrupts vessel traffic at port shipping and moorage facilities, industries dependent on waterborne commerce, and would substantially impact the regional economy.

The Port of Everett is the third largest container port in the state, specializing in deep-draft ocean-going vessels such as oversized aircraft component containers and ships up to 200 meters in length that require deep berths (e.g., up to 40 feet MLLW) (Port of Everett 2013; 2015). The largest public marina on the West Coast is located at the Port of Everett (Port of Everett 2013).

The Snohomish navigation channel consists of lower (Sta. 0+00 to 78+00) and upper (Sta. 90+00 to 335+50 and Sta. 355+79 to 381+79) navigation channels, with a downstream settling basin (Sta. 78+00 to 90+00) and an upstream settling basin (Sta. 335+50 to 355+79). The lower channel extends from the

entrance at Possession Sound up the lower Snohomish River for one mile, and varies in width from 150 to 425 feet wide. The authorized depth of the lower navigation channel is -15 feet at MLLW. The authorized depth of the lower settling basin is -20 feet at MLLW and has a capacity of 500,000 CY. The upper channel extends from the lower settling basin to RM 6.3 and is 150 feet wide. The authorized depth is -8 feet at MLLW. The authorized depth of the upper settling basin is -40 feet; however, the upstream settling basin is maintained to a depth of up to -32 feet at MLLW and has a capacity of 1,000,000 CY.

The lower channel was most recently mechanically dredged in FY 2015, and the upstream and downstream settling basins were most recently hydraulically dredged in FY 2017. As of the most recent bathymetric survey of the waterway in June 2016, the accreted volume above the authorized depth in all areas (except the upstream settling basin, which was calculated above -20 feet MLLW instead of the authorized depth of -40 feet MLLW) was 653,211 CY. Additional sediment is expected to have accumulated since June 2016.

Details regarding the quantity of sediment to be dredged, the types of equipment to be used, and the proposed use or disposal of the dredged sediment are determined based on an annual condition survey conducted in the spring prior to each proposed dredging event. Shoaling rates and depths depend on river flows and sedimentation rates that are driven by seasonal rainfall. The volume of sediment to be removed for a particular maintenance dredging event is determined by available funding and disposal site capacity/availability.

Figure 3. Overview of the Snohomish River Navigation Channel and two beneficial re-use sites, Jetty Island and Parcel O. The deep-draft navigation channel is also known as the lower navigation channel, and the shallow-draft navigation channel is also known as the upper navigation channel.

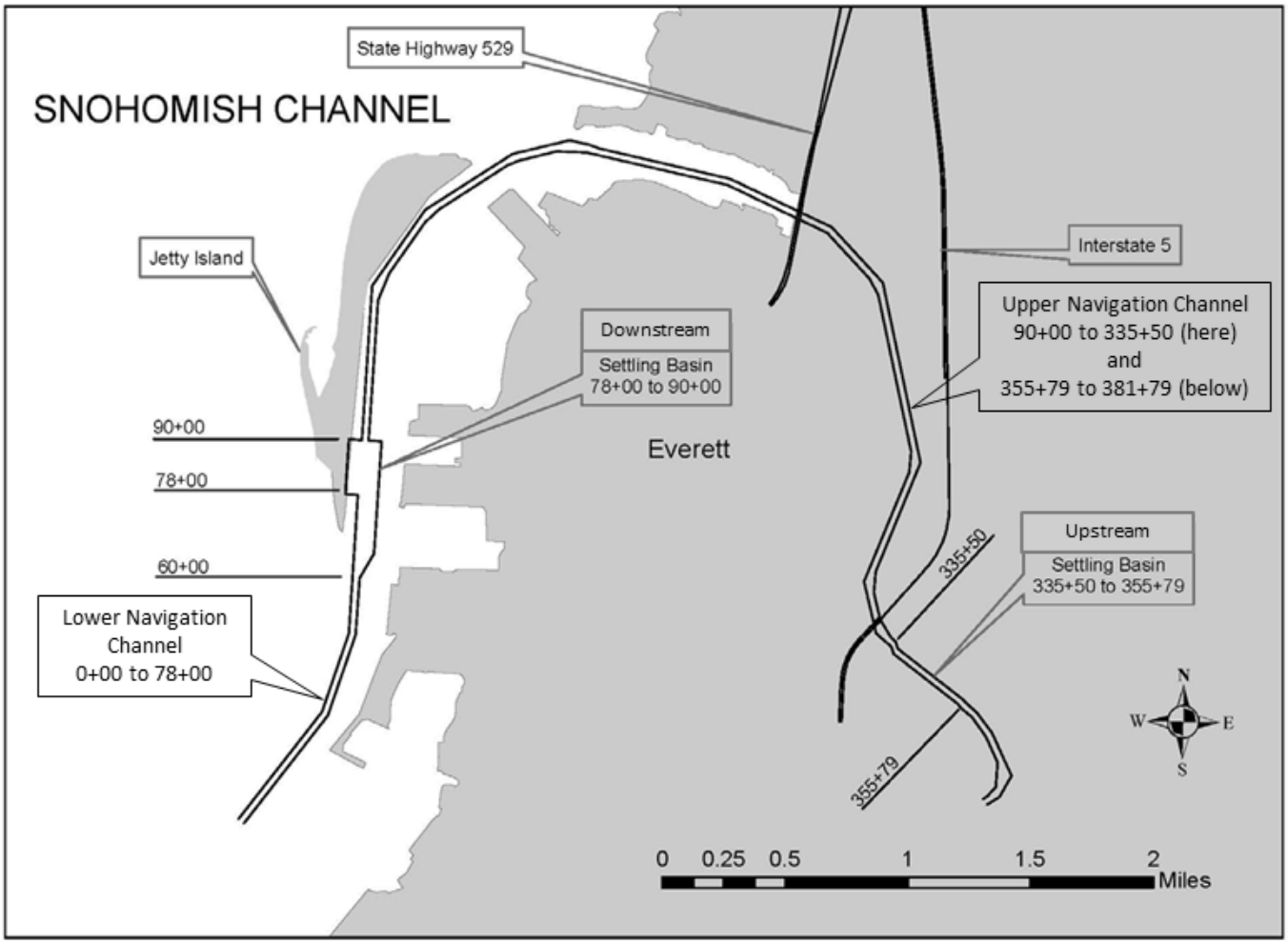

Figure 4. Snohomish River overview with stationing.

2 Proposed Action and Alternatives

2.1 Alternative 1 – No-Action

Under this alternative, the USACE would not dredge the Everett Harbor and Snohomish River Navigation Channel Maintenance Project. The No-Action Alternative is analyzed as the future without-project conditions to compare with the proposed action alternatives. Due to natural sediment bedload, the upstream and downstream settling basins would eventually fill and no longer have capacity to store sediment, which would increase shoaling in the navigation channel. This would pose a risk to deeper-draft vessels (which the Port of Everett specializes in) that may run aground in project areas with accumulated sediment above the authorized depth, may be unable to load and unload cargo at the pier and may be delayed entering and leaving the port. Access to the Naval Station Everett on the East Waterway and the Port of Everett for Navy personnel and vessels would be limited as shoaling accumulates. Eventually, the port and other nearby industries would become inaccessible, which would have economic impacts to the Port of Everett, local businesses and communities, and could negatively affect the ability of vessels stationed at Naval Station Everett to perform their duties. This alternative

would not meet the project purpose and need, but is carried forward for the sole purpose of comparative evaluation against the other alternatives.

2.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

The USACE proposes to annually conduct routine maintenance dredging of accumulated sediments to the authorized depths for the entire length of the Snohomish River navigation channel (Figure 2 and Figure 3). Dredging would remove navigation channel material to -15 feet in the lower channel and -8 feet in the upper channel, and would include dredging in the settling basins only to the depth of the adjacent navigation channel. Maintenance dredging occurs with hydraulic pipeline dredge when placing material for beneficial use (such as Parcel O or Jetty Island), or clamshell dredge when placing material in an aquatic open-water disposal site (Port Gardener).

The USACE would perform maintenance dredging and disposal operations annually in the upstream settling basin (Sta. 335+50 to 355+79) and upper channel (90+00 to 335+50 and 355+79 to 381+79) and downstream settling basin (Sta. 78+00 to 90+00) and lower channel (0+00 to 78+00). Based on past experience, the USACE would dredge up to 300,000 CY total from the navigation channel and settling basins per dredge episode under this alternative. Quantities have been estimated conservatively for environmental impacts analysis and would include the amount dredged for two feet of overdepth and, if authorized and funded, two feet of advance maintenance. This alternative does not fully meet the project purpose and need, but does provide a reduced level of maintenance to provide navigation; however, deeper draft vessels may not be able to access the area, which would limit the number and type of vessels that are able to use the navigation channel and could increase the risk of grounded vessels.

Table 1. Characteristics of the Channel and Settling Basins under Alternative 2.

Location	Stations	Authorized Depth (ft MLLW)	Alternative 2 Depth (ft MLLW)
Upstream settling basin	335+50 to 355+79	-40	-8
Upper channel	90+00 to 335+50 and 355+79 to 381+79	-8	-8
Downstream settling basin	78+00 to 90+00	-20	-15
Lower channel	0+00 to 78+00	-15	-15

Dredging would be conducted annually between 16 October and 14 February during the approved in-water work window. Work would occur 24 hours per day except for periods of machinery maintenance and crew changes. Each dredging episode of a navigation channel section with corresponding settling basin (e.g., upper navigation channel with upstream settling basin), would typically take 60 days, depending on quantity of material removed, mechanical breakdowns, and poor weather conditions.

The settling basins intercept and retain a large quantity of sediment. If the dredging effort is reduced to only the depth of the adjacent navigation channel, the remaining space in the settling basins would fill more quickly with sediments. If the settling basins were to fill, this would increase the rate of shoaling

within the navigation channel. To maintain safe navigation within the channel, “emergency” dredging or maintenance dredging intervals that are longer or more frequent may be required.

For Alternative 2, because shoaling rates vary from year to year, the USACE estimates up to approximately 190,000 CY could be transported to two beneficial use upland disposal sites: Parcel O and Jetty Island (Figure 5; USFWS 2017; NMFS 2018). The remainder, at least approximately 110,000 CY, would be transported to the Dredged Material Management Program (DMMP) Port Gardner open-water disposal site (Figure 6). The total amount of dredged material placed at each site will depend on site capacity, dredging location, cost, equipment, weather, and other factors. The sediment volumes placed at Parcel O and Jetty Island would be the same between Alternatives 2 and 3, and have undergone ESA consultation (USFWS 2017; NMFS 2018). If greater volumes than what are described below are planned for either annual or cumulative placement, then reinitiating consultation and additional environmental review may be necessary.

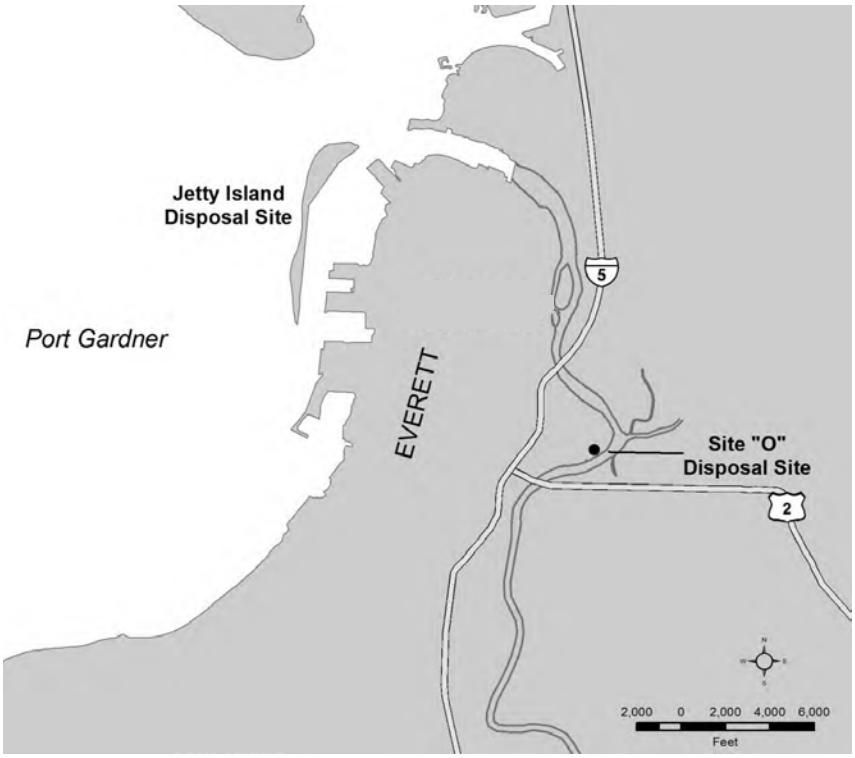

Figure 5. Everett Harbor and Snohomish River beneficial use disposal site locations at Parcel O and Jetty Island disposal sites. The Jetty Island disposal site is generally the southern half of the island.

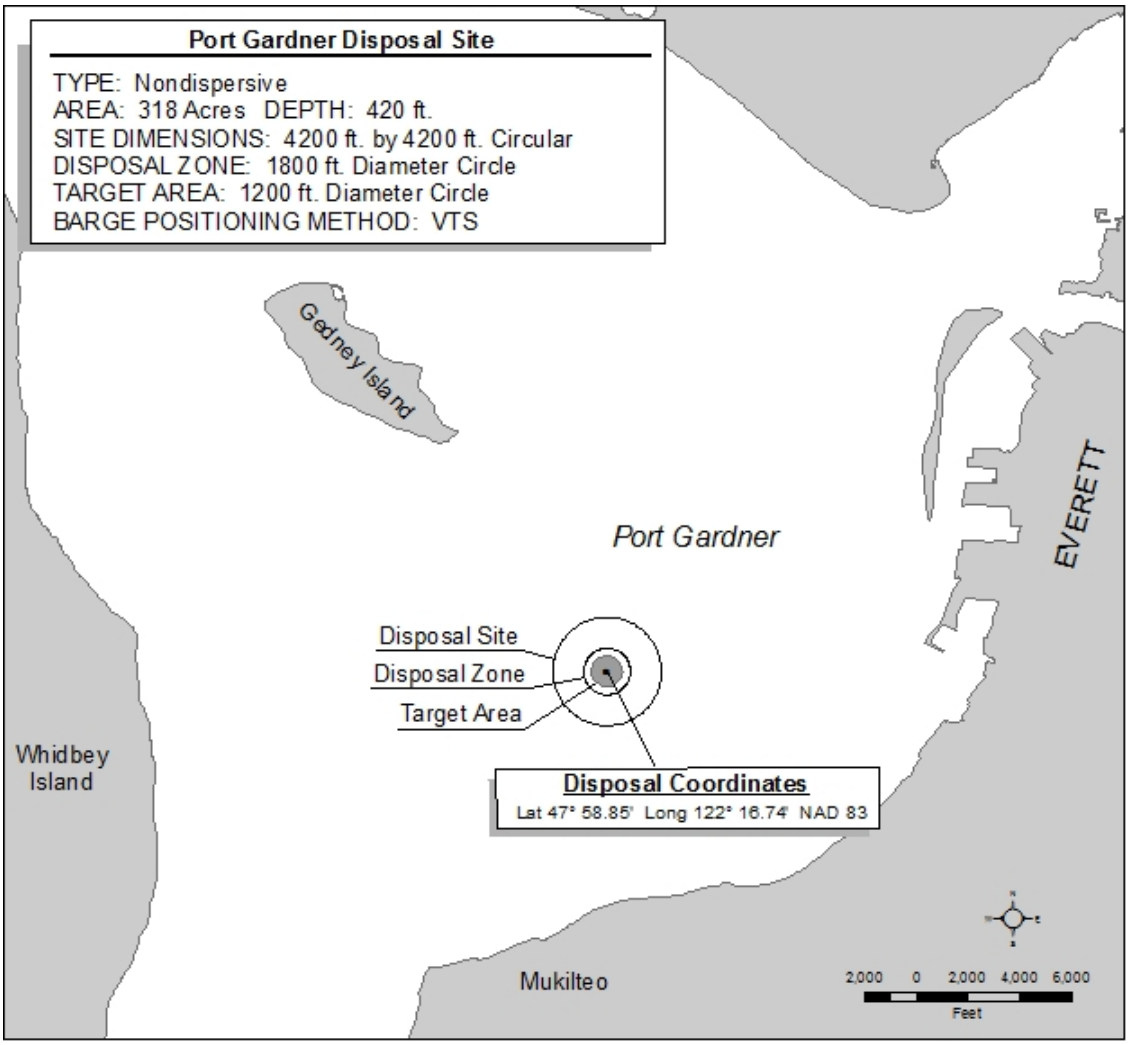

Figure 6. Port Gardner PSDDA (Puget Sound Dredged Disposal Analysis) Program Disposal Site.

Port Gardner

Typically, the downstream settling basin would be dredged using a mechanical dredge (clamshell). The dredged sediment would then be loaded onto a bottom-dump barge for disposal at the Puget Sound Dredged Disposal Analysis Program (PSDDA) Port Gardner open-water site (Figure 6). Each barge transports approximately 1,500 CY of material each trip. Once arriving at the disposal site, the bottom-dump barge drops the material into its intended location. Dredged material disposal at the non-dispersive sites is designed to maintain dispersion within a 600-foot radius target zone at each site. The barges doing the disposal are towed at the minimum speed necessary to maintain control. In most instances, material is released from the bottom of the barge which is about 10 feet down in the water column. All disposal tugs are required to record and report when and where sediment is released within the target zone. The disposal sites were originally sized so that a barge being towed at an average speed of three knots can unload completely in a few minutes.

Parcel O Disposal Site

Parcel O is an upland 9-acre area in the former Kimberly Clark log yard, located on the left bank of the Snohomish River at about RM 4 (Figure 5). Hydraulically dredged sediments from the upstream settling basin and adjacent channel would be directly discharged and disposed of at this site. A small work vessel tows a plastic pipeline to the site during high tide. A wire rope or strap attached to the pipe allows a dozer to pull the pipe up and over the containment berm, which has been constructed with on-site materials. The hydraulic pipeline extends from the dredge positioned in the upper settling basin, runs along the left bank river channel, over the berm, and into the site.

Berms of sand surrounding the basin separate the dredged material from the riparian edge of the river by containing the water/sediment slurry. The disposal site is devoid of vegetation except for upland grasses, slopes gradually downward to the north. The slurry slowly flows downgradient toward the outlet weirs. As the sediment settles out, the water continues flowing until the water flows through a system of weirs and returns to the river. Dredged material composed of a slurry of sediment and water is pumped from the dredge to the site. Turbidity levels of discharged decant water are monitored and managed in accordance with the applicable conditions of the CWA Section 401 water quality certification (Order #15949) issued by the Washington Department of Ecology (Ecology; Appendix C).

The material would be subsequently collected and moved via truck by the City or Port for use at other regional sites in need of fill material. Under this alternative, it is estimated that up to 150,000 CY of sediment could be disposed at the site every-other year, but the frequency could vary. Over the next 15 years, about 400,000 CY of dredged sediments would be disposed of at the site.

Jetty Island Disposal Site

Jetty Island began as a wood pile jetty that was installed in 1901 to protect the Port of Everett from the open-waters of Port Gardner (Figure 7). Since about 1903, the USACE has disposed dredged material from the navigation channel along the west side of the wood and rock jetty. All but the southern end of the jetty is now buried, and the size of the island is now maintained by a balance between periodic disposal of dredged sediments and natural erosion. Typically, up to 40,000 CY of sediment is disposed at Jetty Island every-other year, but the frequency varies. Under this alternative, over the next 15 years, about 750,000 CY of dredged sediments would be disposed at Jetty Island. Disposal at the site is done via a hydraulic pipeline that is placed across the island, along a route that limits impacts on vegetation, and avoids a high salt marsh located at the north end of the island. Sediments are discharged at the top of the existing beach at elevations of +1 to +15 feet MLLW, to form a 10:1 slope that ties into the grade of the adjacent beach. Materials are allowed to naturally disperse in the nearshore zone between the shoreline and out to -30 feet MLLW.

Placement of material on Jetty Island is considered beneficial use of dredged material. The primary purposes for placing material on Jetty Island are for stabilization of the jetty and for suppression of the nonnative, invasive Scot's broom (*Cytisus scoparius*). Additionally, the sediment is beneficial for salmon habitat. Nearshore habitat has been identified as a limiting factor for salmon recovery in this basin; therefore, material is occasionally placed at Jetty Island as beneficial use in the nearshore zone. Dredged material (typically sand) is placed on the island via a hydraulic pipeline dredge. The USACE and the Port of Everett placed approximately 323,000 CY of clean sediment along the western portion of the island in 1989 as a 1,500-foot long berm to balance erosion losses from the west side of the island and to create

protected intertidal marsh and mudflat habitat as well as a lagoon to enhance species diversity and provide salmon habitat. Monitoring has shown the berm has created valuable mudflat habitat for benthic invertebrates that improved the food supply and habitat value of Jetty Island for juvenile salmon, forage fish, and shore birds (Pentec 2000). However, since there is no natural source of sediment to nourish the berm, continued nourishment of the berm will be necessary to prevent its gradual erosion and to maintain the habitats created by the berm and adjacent areas of Jetty Island. Placement of dredged material is unconfined in the nearshore zone and materials are allowed to settle out and naturally disperse.

The pipeline placed across Jetty Island normally runs along a public path to minimize effects to vegetation. The pipeline route avoids the high salt marsh located several hundred feet to the north. Dredged material is placed only on uplands dominated by grasses, as well as the supratidal and upper intertidal zones, and the grasses typically regrow following placement of the dredged material. However, the path is often flooded under several feet of water and requires placing the pipe farther north through the uplands dominated by Scot's broom. No impacts to aquatic vegetation or other habitats in the nearshore zone will result from placement of dredged material on Jetty Island.

The cost of Alternative 2 could increase over time if the navigation channel requires more frequent dredging or dredging for longer intervals to maintain the authorized depths. If dredging efforts are conducted throughout the length of the channel this would require frequent relocation of the dredge to dispose of sediment. A relocation event may take an hour or all day depending on the distance to the disposal site and would require planning to maintain dredging efficiency. During hydraulic dredging, the further the dredge is from the upland disposal area the greater the quantity of water that must be pumped through the pipeline, and increasing pump distance can increase costs as productivity drops with distance. If too much water is pumped into the pipeline it could prevent the formation of berms at the sediment retention area and placement of sediment could become more difficult, and would also increase settling times for the sediment slurry, which could delay placement. There is a limit on how long the pipeline can extend through the navigation channel due to river curvature and frequent vessel traffic. In the Snohomish River channel the pipeline can extend approximately 3,000 ft from an upland disposal area.

Figure 7. Dredged material placement area on Jetty Island.

2.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years (Preferred Alternative)

The USACE proposes to conduct routine maintenance dredging of accumulated sediments in the Snohomish River navigation channels in alternating years. Alternative 3 would remove more sediment per dredging episode than Alternative 2, and assumes the same sediment volumes placed at Parcel O and Jetty Island as indicated for Alternative 2, but greater sediment volumes would be placed at the Port Gardner disposal site than under Alternative 2. Maintenance dredging occurs with hydraulic pipeline dredge when placing material for beneficial use, or clamshell dredge when placing material in an aquatic disposal site. First the downstream settling basin (Sta. 78+00 to 90+00) and lower channel (0+00 to 78+00) would be dredged, and the following year the upstream settling basin (Sta. 335+50 to 355+79) and upper channel (90+00 to 335+50 and 355+79 to 381+79) would be dredged. The order of dredging (i.e., upstream/upper settling basin then downstream/lower settling basin) could be reversed depending on need and previous maintenance timing. Dredging would remove material to -15 ft in the lower channel and -20 ft in the lower settling basin, and to -8 ft in the upper channel and down to as far as -32 ft in the upper settling basin.

Table 2. Characteristics of the Channel and Settling Basins under Alternative 3.

Location	Stations	Authorized Depth (ft MLLW)	Alternative 3 Depth (ft MLLW)
Upstream settling basin	335+50 to 355+79	-40	-32
Upper channel	90+00 to 335+50 and 355+79 to 381+79	-8	-8
Downstream settling basin	78+00 to 90+00	-20	-20
Lower channel	0+00 to 78+00	-15	-15

Based on dredging history at this project, the USACE may dredge up to 500,000 CY from each settling basin and 200,000 CY from the navigation channel for 1,200,000 CY as a maximum per dredging episode. Quantities have been estimated conservatively for environmental impacts analysis and would include the amount dredged for two feet of overdepth and two feet of advance maintenance, if needed, in any dredging episode. Removing sediments that build up in the settling basins reduces the dredging effort in the navigation channel outside the settling basins. Dredged material disposal and placement locations will be the same as Alternative 2 (Section 2.2). Up to 40,000 CY at Jetty Island and up to 150,000 CY at Parcel O would be placed annually, with the remainder going to Port Gardner open-water disposal site. The sediment volumes placed at Parcel O and Jetty Island would be the same between Alternatives 2 and 3, and have undergone ESA consultation (USFWS 2017; NMFS 2018). If greater volumes than what are described are planned for either annual or cumulative placement, then reinitiating consultation and additional environmental review may be necessary.

Alternating the dredging areas under Alternative 3 each year between the Downstream settling basin and the adjacent navigation channel one year; and then the Upstream settling basin and the adjacent navigation channel the following year is the default; however, if dredging in prior years was limited or not conducted due to funding, bad weather, or other limitations, dredging both the upstream and

downstream navigation channels and basins could be accomplished within the approved work window. (16 October through 14 February). Each dredging episode may take about 90 days, depending on quantity of material removed, mechanical breakdowns, and poor weather conditions. Dredging will occur 24 hours per day except for periods of machinery maintenance and crew changes.

3 Affected Environment and Effects of the Alternatives

This section provides information on the existing conditions of the project area and issues relevant to the decision process for selecting the preferred alternative. Existing conditions are the physical, chemical, biological, and socioeconomic characteristics of the project area. Factors for selecting the preferred alternative include considering which of the alternatives would be the least costly, environmentally acceptable, consistent with engineering practices, and meets the purpose and need of the project.

3.1 Hydrology and Geomorphology

The Snohomish River basin is located in King and Snohomish counties in Washington State and is the second largest watershed that drains into Puget Sound; only the Skagit River basin is larger. The Snohomish River basin drains 1,978 square miles of land from the Cascade Mountains to the Puget Sound and encompasses a variety of land uses including commercial and industrial, urban and rural residential, agricultural, forestry, and vast areas of wilderness (Snohomish County 2015).

The Snohomish River is formed by the convergence the Skykomish and Snoqualmie Rivers, near the City of Monroe; the Pilchuck River joins the Snohomish River downstream at the City of Snohomish. The river discharges into Possession Sound between the cities of Everett and Marysville (Figure 2). The river has a mean annual flow of 9,976 cubic feet per second (cfs) based on the average annual flow from 1964 through 2016 at the USGS gauge near Monroe (USGS 2017).

The lower Snohomish River estuary is approximately 9 miles long and three to four and a half miles broad at its widest point. It is an area of very low gradient with a sinuous, meandering main channel and three main distributary channels (Steamboat, Union, and Ebey Sloughs) that begin about 5 miles upstream of Everett and spread over the broad delta floodplain (Port Gardner NRTC 2016). Lower reaches of the Snohomish River, as well as Ebey, Steamboat, and Union sloughs, and their associated complex of wetlands are estuarine areas under saltwater influence. These sloughs create islands within the river delta that are generally undeveloped, publicly owned, and are managed for the benefit of fish and wildlife. Tidal saltwater intrusion extends several miles upstream from Smith Island, located northeast of the City of Everett (Tetra Tech 2013).

Over the last century human activities have contributed to altered watershed processes, and historical flow patterns and volumes are shifting as a result of changing land uses and climate change (Ecology 2017). Prior to industrial development, intertidal wetlands and tidal flats existed at the mouth of the Snohomish River, including Ebey, Steamboat, and Union sloughs. Much of the historic intertidal and freshwater wetlands were converted to uplands by diking, draining, and filling, primarily for agricultural use. Following the authorization of federal dredging in the early 20th century, intertidal areas were converted to uplands using dredged material as fill on which to build wharves, buildings, factories and streets. Currently, land use in the Snohomish River basin is predominantly forestry, agricultural, rural

residential, urban, commercial, and urban residential (Snohomish County 2005). The area in the project vicinity is used for industrial, commercial, residential, or agricultural purposes, and agricultural diking, wetland loss, and the reduction of large woody debris supply to the lower river have been implicated in the decline of the basin's salmon stocks.

3.1.1 Alternative 1 – No-Action

Under the No-Action alternative, sediment would continue to accumulate in the navigation channel and settling basins. Once the settling basins have filled, shoaling in the channel would increase and would likely change the current patterns in the river. The channel would become more difficult to navigate and would begin to affect vessel passage to and from the Port, and nearby businesses and industries. Continued shoaling in the navigation channel would lead to a shallower channel depth, and if allowed to continue unimpeded would likely reduce or eliminate vessel traffic. Eventually, enough sediment would accumulate that the channel would no longer be navigable.

The Port Gardner open-water disposal site would continue to be used for approved open-water disposal of appropriate sediment, but would not receive sediments dredged from the Snohomish River navigation channel, and would not reach capacity as quickly (which would not happen for decades in any event). Filling Parcel O along the lower Snohomish River, and replenishing the Jetty Island site would be delayed, eliminating an available source of material that could be utilized by the Port and City for beneficial uses.

3.1.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

Maintenance dredging would continue over the next 15 years to remove shoaled material to -15 ft in the lower channel and -8 ft in the upper channel in the navigation channel, and would include dredging in the settling basins only to the depth of the adjacent navigation channel, and dredged material would be placed among three placement sites. Dredging may include two additional feet for overdepth, and, when needed, two feet of advance maintenance. Dredging would maintain the modified estuary as it is to provide safe access through the navigation channel to the Port of Everett and facilities around the City of Everett.

The removal of the sediments would not directly change the physical characteristics of the river in areas outside of the authorized navigation channel and settling basins and would not alter the intertidal areas adjacent to the navigation channel and settling basins. The amount of sediment that would otherwise eventually settle onto portions of the intertidal areas outside the navigation channel would be removed. If maintenance dredging did not occur, flood flows will probably remove most of these intertidally-placed sediments. The settling basins would be dredged to the channel depths, which would increase shoaling and sedimentation in the navigation channel compared to Alternative 3 because the settling basins would not collect sediment as it moves through the lower Snohomish River. The river thalweg (main channel) would have a less meandering appearance over time with repeated maintenance dredging to the authorized channel depths than compared to the no action alternative.

Dredged material would be placed at Jetty Island and/or Parcel O when a hydraulic dredge is used, typically when beneficial uses would be requested by local interests in response to a particular dredging episode. There would be no effect on geomorphology at Parcel O. At Jetty Island, dredged material

would be utilized to rebuild portions of the island lost to erosion, especially the small spit that protects the lagoon on the west side of the island. Renourishment of Jetty Island would sustain this physical feature. This alternative would not cause a measurable change to the hydrology or geomorphology of the project area.

3.1.3 Alternative 3 – Dredge Navigation Channel and Settling Basins in Alternate Years

Effects of Alternative 2 on the hydrology and geomorphology of the Snohomish River would be similar for Alternative 3, except the settling basins would be dredged deeper, with the upstream setline basin being dredged to a depth of -32 feet (authorized depth -40ft) and the downstream settling basin being dredged to a depth of -20 feet. Dredging may include two additional feet for overdepth, and, when needed, two feet of advance maintenance. Deeper settling basins would collect more sediment as it moves down the Snohomish River and prevent it from accumulating in the downstream intertidal area, but as described in Section 3.1.2, flood flows would probably remove some of this material from the intertidal areas eventually. This alternative is not expected to cause a measureable change to the hydrology or geomorphology of the project area.

3.2 Sediments

The navigation channel receives sediment input from its largest tributaries: the Pilchuck, Skykomish, and Snoqualmie Rivers. Sediment sampling occurred within the navigation channel in 2017 to determine suitability of sediments for aquatic disposal (DMMP 2018). Based on results from the most recent sediment sampling and suitability determination, 778,221 CY of dredged material from the Federal navigation project in the Snohomish River is suitable for unconfined open-water disposal at the Port Gardner non-dispersive site (DMMP 2018). If additional material not included in the suitability determination needs to be dredged, the DMMP agencies would be consulted to evaluate any additional material. Sediment from the navigaton channel has been characterized under the DMMP six times, including four full characterization and a dedicated characterization for dioxins, and has been determined suitable for open-water disposal since 1992. The navigation channel is ranked “low-moderate” by the DMMP and is characterized every six years (DMMP 2018).

Sediments within the navigation channel and settling basins overall are mostly (> 50%) sand (DMMP 2018). The lower channel had the most silt (36%) and the silt content decreased from 33% to 6% in the upstream direction within the downstream settling basin (DMMP 2018). The upper channel and upstream settling basin contained mostly sand (> 92%) and the highest gravel content (4.5%) was in the uppermost reach of the upper channel (DMMP 2018).

Discharges and releases of hazardous substances into Port Gardner Bay have resulted from industrial and municipal processes since the early 1900s. Around the lower Snohomish River, clean-up efforts have occurred at several sites for past contamination events. Facilities released materials into the lower Snohomish through permitted and non-permitted discharges, spills during cargo transfer and refueling, stormwater runoff through contaminated soils at upland facilities, and discharge of contaminated groundwater (WDOH 2011). Other releases into the area are a result of maritime industries and lumber operations, such as boat building, sawmills, and pulp and paper mills (WDOH 2011). According to the Ecology online database, there are 12 contamination sites awaiting cleanup, 33 sites where cleanup has

started, 52 sites where no further action is necessary, and 3 sites that are being monitored within 1.5 miles of the Snohomish River navigation channel (Figure 8).

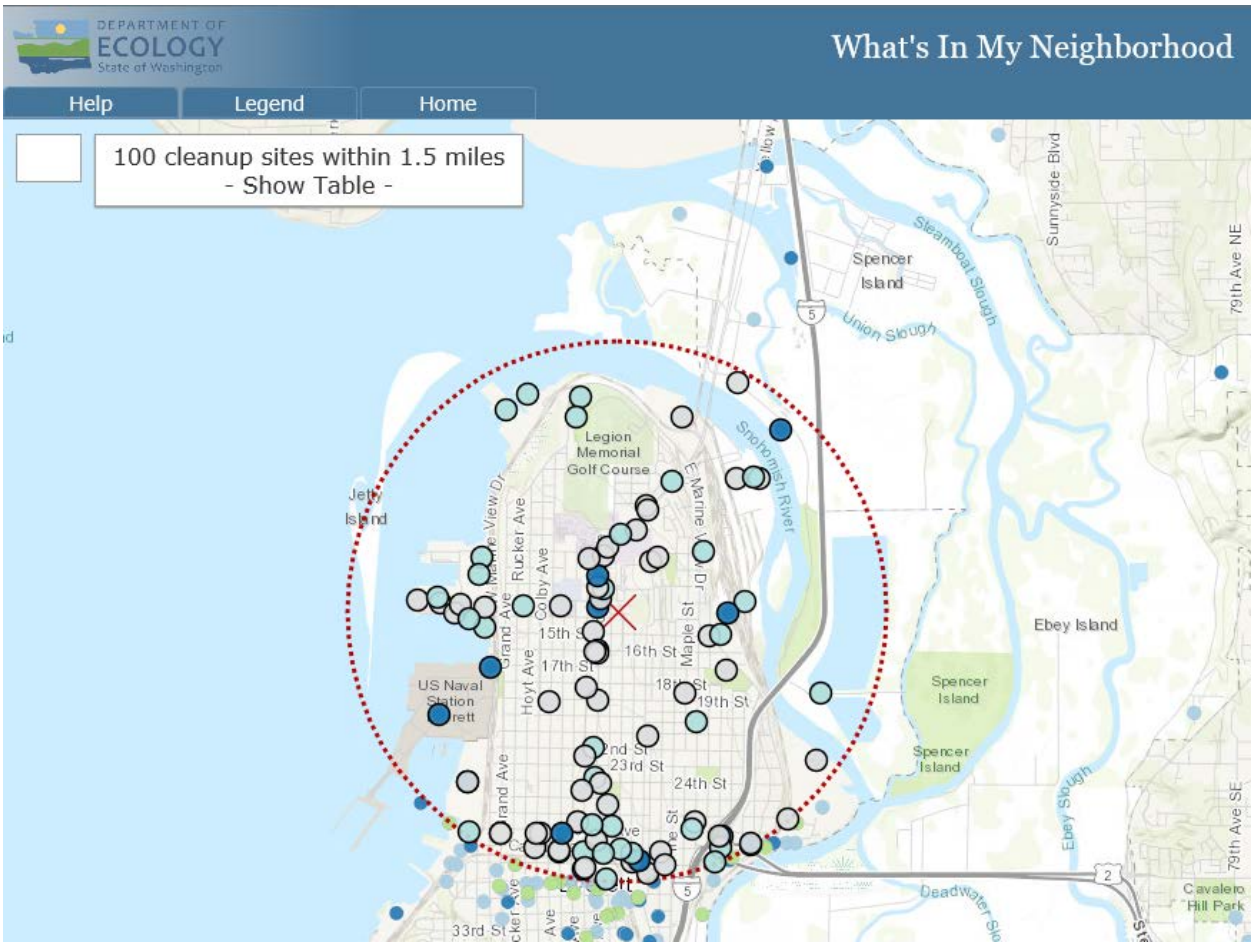

Figure 8. Cleanup sites within 1.5 miles of the Snohomish River navigation channel (Ecology 2018a).

3.2.1 Alternative 1 – No-Action

The No-Action Alternative would have no effect on the sediments in the Snohomish River or surrounding nearshore zone. This alternative would allow sediment to continue accumulating, which would eventually jeopardize the ability for safe navigation through the channel. This alternative would not meet the project purpose and need because the Everett Harbor and Snohomish River Navigation Channel would not maintain its authorized depth; therefore, safety of navigation of marine vessels would decrease as the depth to substrate decreases.

3.2.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

This alternative would return the navigation channel to its authorized depth. The direct effect of this alternative on sediments would be removal of accumulated surface sediments and exposure of underlying sediments to the water and currents of the channel. Characterization of sediment to be exposed by dredging found concentrations of all DMMP chemicals of concern below the DMMP screening levels (SLs), so the proposed project would be in compliance with the State of Washington anti-degradation standard and would not uncover contaminated sediment (DMMP 2018). The sediment

was characterized to the authorized depths (except for the upstream settling basin which was characterized to a depth -20 ft MLLW) plus two feet of overdepth (DMMP 2018; Appendix C). If two feet of advanced maintenance were needed, the DMMP agencies would be consulted for further evaluation prior to dredging the additional two feet. The disposal sites were selected to minimize impacts to commercial invertebrate and fish resources, and would continue to provide material for beneficial re-use by the Port and City of Everett. Any exposure to contaminants would be either avoided by fish moving through the disposal site, or of a very short duration in the water column following disposal. This alternative would have no effect on the sediment character or grain size distribution provided by the Snohomish River.

3.2.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years

The effects to sediments in the Snohomish River navigation channel would be the same as those described for Alternative 2. The sediment was characterized to the authorized depths (except for the upstream settling basin, which was characterized to a depth -20 ft MLLW) plus two feet of overdepth (DMMP 2018). If two feet of advanced maintenance were needed, the DMMP agencies would be consulted for further evaluation prior to dredging the additional two feet. Removal of sediments biennially rather than from the entire channel annually would not change the effects of dredging or exposing sediment below; however, the removal of sediments to a deeper depth under Alternative 3 would occur in the upstream and downstream settling basins (Table 3). Sediment in the navigation channel has been characterized as homogenous and ranked as low-moderate that only requires characterization every six years (DMMP 2018).

Table 3. Comparison of sediment removal in each Alternative compared to the authorized and characterized depths (DMMP 2018; Appendix C).

Location	Location (DMMP 2018)[1]	Stations	Authorized Depth (ft MLLW)[2]	Alternative 2 Depth (ft MLLW) [2]	Alternative 3 Depth (ft MLLW) [2]	Characterized Depth (ft MLLW) [2]
Upstream settling basin	Same	335+50 to 355+79	-40	-8	-32	-20
Upper channel	Shallow-draft channel	90+00 to 335+50 and 355+79 to 381+79	-8	-8	-8	-8
Downstream settling basin	Same	78+00 to 90+00	-20	-15	-20	-20
Lower channel	Deep-draft channel	0+00 to 78+00	-15	-15	-15	-15

[1]The suitability determination (DMMP 2018) with sediment characterization results used different terminology to distinguish portions of the navigation project.

[2]Depths do not include 2 feet of overdepth.

Sediment in the lower and upper navigation channels and the lower settling basin were characterized to their authorized depths plus two feet of overdepth, which are the deepest sediment depths considered in this EA. The upstream settling basin was only characterized to -20 ft MLLW with two feet of overdepth for a total depth of -22 ft MLLW because the upper settling basin is rarely dredged to its full authorized depth of -40 ft MLLW (DMMP 2018). However, Alternative 3 considers the effects of dredging the

upstream settling basin to -32 ft MLLW; therefore, the DMMP agencies would be consulted for further evaluation prior to dredging material below -22 ft MLLW in the upper settling basin. This alternative would have no effect on the sediment character or grain size distribution provided by the Snohomish River.

3.3 Water Quality

Ecology classified the marine waters of Everett Harbor, inner, northeast of a line bearing 121° true from approximately 47°59'5"N and 122°13'44"W (southwest corner of the pier) as good and suitable for secondary contact recreational uses, wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics (WAC 173-201A-612). The areas around the Snohomish navigation channel are heavily developed.

Since the early 1900s, the lower Snohomish River has been used for commercial and industrial purposes, often related to timber and maritime industries (saw mills, paper production, boat building, and waste disposal; WDOH 2011). The majority of land in the Snohomish Estuary is currently used for agriculture, and about 10% is used for industry, municipal sewage treatment, waste disposal, and infrastructure (Marshburn 2015), but water quality could still be affected by past uses.

As reported in the Water Quality Atlas for Washington State (Figure 9; Ecology 2018b), Ecology provides an assessment of water quality and a 303(d) list of impaired waterbodies for fresh and marine waters in Washington State. Surface water and sediment quality in Everett Harbor and the lower Snohomish are limited with several areas appearing on the State of Washington's 303(d) list (Ecology 2018b). The Snohomish River is on the 303(d) list (category 5) for dioxin in tissue and for sediment bioassay, butyl benzyl phthalate, and fluoranthenein sediment in some marinas; no dredging occurs here and active or anticipated cleanup plans are in place (Ecology 2018b).

The highest sources of turbidity within the navigation channel and the settling basins are periodic pulses of sediment moving downstream within the Snohomish River from seasonal rainfall events and the natural mixing of fine-grained sediments suspended during the tidal cycle. Temporary pulses can result from prop-wash within the marina and Everett Naval Station. The data (gauge # 07A090) indicate that the Snohomish River has variable suspended sediment levels within the proposed dredging period, reaching maximum levels in conjunction with maximum flows resulting from winter rainstorms. Average river flow within the time period of the proposed dredging (16 October through 14 February) has been 11,554 cfs, with maximum flows of 41,800 cfs, recorded on 17 October 1988. Suspended sediment levels generally reach their maximum between November and January, with pulses of high turbidity during February and early March storms.

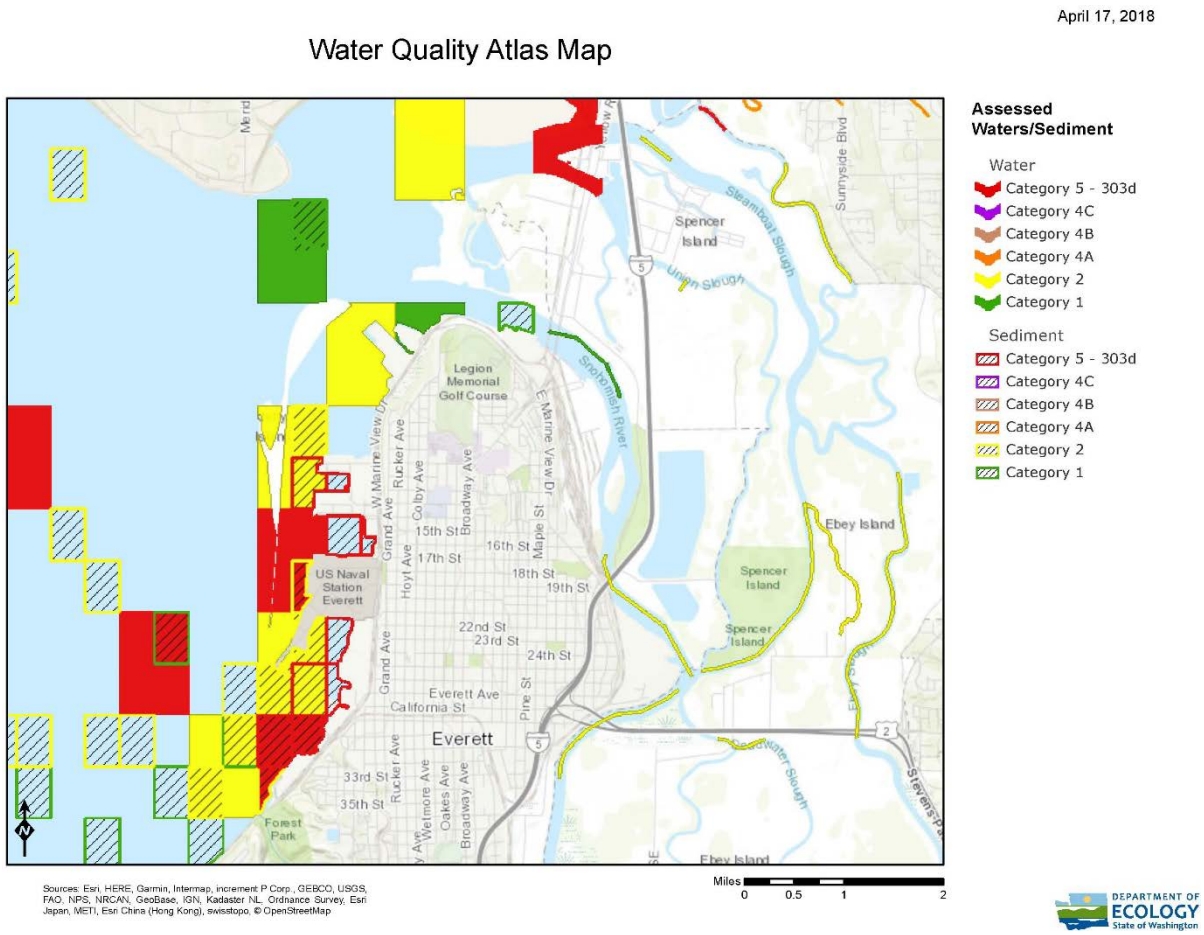

Figure 9. Water Quality Assessment Map for Snohomish River and surrounding areas (Ecology 2018b). Impairment categories range from Category 1 (meets tested standards for clean waters) to Category 5 (polluted waters that require a water improvement project).

3.3.1 Alternative 1 – No-Action

The No-Action Alternative would have no effect to water quality for Everett Harbor, the Snohomish River, or Port Gardner Bay.

3.3.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

This alternative would have a minor, short-term degradation of water quality related to turbidity and dissolved oxygen (DO) in a small area immediately down-current from the active dredging operations. Dredging operations would cause turbidity due to short-term resuspension of sediments in the water column; the amount of resuspended sediment would decrease with distance from the dredging. The area affected by turbidity would be only slightly wider than the dredging equipment as currents move suspended sediments. Mechanical (clamshell) dredges produce more turbidity than hydraulic suction dredges because the dredge buckets create turbidity when the bucket encounters the substrate and is retracted up through the water column. With hydraulic suction dredging, turbidity occurs at the bottom of the channel during dredging.

Turbidity is generated during the disposal phase. Bottom-dump barges release material directly over the disposal site causing a vertical plume at Port Gardner. Dredges that produce a slurry at their outfall, such as when material is pumped to the disposal location at Jetty Island, may result in releases to water column. Runoff from the upland Parcel O would be controlled by setting up a sand berm/perimeter dike to separate the discharge area from the Snohomish River. The slurry of water and sand temporarily ponds in the placement site, and clean water is conveyed to the Snohomish River via a series of weirs. Turbidity is monitored and steps are taken to keep turbidity within levels identified by Clean Water Act Section 401 water quality certifications issued by Ecology. The USACE expects that turbidity during disposal will be kept within the levels identified by Ecology's water quality certifications.

Sediment suspension during dredging and material placement can result in localized and temporary reduction of DO, primarily due to fine-grained anaerobic sediments that create an oxygen demand when suspended. Short-term effects of decreases in DO could include avoidance of the dredging area by mobile aquatic organisms, and reduced foraging opportunity during and immediately after dredging as fish avoid areas of depressed DO. Fine-grained sediment is more likely to be found in the lower channel (DMMP 2018) but previous monitoring has not found mechanical (clamshell) dredging this reach to result in reduced DO (Pentec 2010). The resuspension of sediment would decrease with distance from the mouth of the Snohomish River because fine sediment is pushed downstream by the river current as larger sediment settles out farther upstream. Given the amount of tidal exchange and flow in the project area and low likelihood for substantial amounts of anoxic sediments, it is unlikely that DO levels would measurably change from existing conditions due to dredging and material placement, and would therefore not cause new or different effects to aquatic organisms.

These water quality characteristics are of low concern for the aquatic biota in the project area because the water quality effects are confined in space and time and most mobile organisms in the affected area that could be affected by turbidity or minor reductions in DO would be able to avoid or escape the affected area without measurable harm. Effects to benthic invertebrates are discussed further in Section 3.7). These effects would occur in each of the approximately annual dredging episodes over the next 15 years, and would be both temporary and localized.

There will be a minor increase in turbidity during, and for a short time after disposal, especially near the substrate of the nearshore aquatic site at Jetty Island. Placement is unconfined in the nearshore zone and materials are allowed to settle out and naturally disperse. Based on past monitoring, the USACE expects that disposal will produce only a minor amount of turbidity and the dredged material will disperse, and perhaps cause increased turbidity in the lower reaches of the water column for a short time; this is consistent with parameters described in prior water quality certifications issued by Ecology. However, the material will be dispersed over a large area and will likely be undetectable or in a thin layer. As material erodes from beach placement, natural turbidity is expected to match background, baseline levels.

Dredged material with anaerobic sediment placed in aquatic disposal sites will be exposed to oxygenated water and the biological oxygen demand will be quickly eliminated as the material disperses. The USACE anticipates that any subsequent reduction in ambient DO will not be sufficient to cause detrimental effects on the demersal and infaunal communities in disposal sites or nearby areas

because the material will be dispersed over a large area reducing the effects to any given location. Material placed at the intertidal beach placement sites will have no effect to DO levels as the sediment disperses with tidal currents and wave action.

No release of contaminants is expected due to the clean nature of the dredged material and, while there would be some short-term, minor effects to water quality, this alternative would not cause a significant impact to the water quality of the Snohomish River or Port Gardner Bay.

3.3.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years

Compared to No-Action, effects to water quality would have minor and temporary negative effects to aquatic life, but would not constitute a significant impact. The effects to water quality parameters would be similar as those described for Alternative 2 and would occur over a longer time period (90 days as opposed to 60 days), but dredging would be limited to half of Alternative 2's total project area in a single dredging episode. Additionally, based on the greater percentage of fine sediment material in the lower channel and downstream settling basin (DMMP 2018; Appendix C), during the biennial dredging schedule more turbidity may be generated. Turbidity plumes from dredging and material placement are expected to be localized and short-lived, and the USACE has obtained a CWA Section 401 Water Quality Certification (Order #15949) from Ecology and will implement water quality monitoring to ensure that the dredging and disposal activities are within the identified limits (Appendix C). Due to the clean nature of the dredged material and the temporary and limited effects to water quality, this alternative would not cause a significant impact to the water quality of the Snohomish River or Port Gardner Bay.

3.4 Vegetation

Prior to the mid-19th century, approximately two-thirds of the Snohomish River estuary was composed of forested wetland (Marshburn 2015). Currently, greater than 80 percent of the riparian zone has been cleared or is in an early successional stage. Eighty-five percent of historic tidal marsh is no longer intact (Marshburn 2015). Approximately 44 miles of dikes isolate the river from its riparian floodplain (Snohomish County 2005).

Due to the degree of development along the shoreline of Port Gardner Bay, there are very few areas of native intertidal vegetation along the downstream settling basin or adjacent portions of the navigation channel. Intertidal marshes along the lower Snohomish River channel are dominated by typical native estuarine emergent species including: Lyngby's sedge (*Carex lyngbyei*), pickleweed (*Salicornia virginica*), fleshy jaumea (*Jaumea carnosa*), tufted hairgrass (*Deschampsia caespitosa*), hard-stem bulrush (*Scirpus acutus*), and Pacific silverweed (*Potentilla pacifica*) with generally forested and scrub-shrub riparian wetland and upland buffers (City of Everett 1997; USACE 2011). Spencer Island is located just upstream of the upstream settling basin at the confluence of Union and Steamboat Sloughs with the mainstem of the Snohomish River. Spencer Island supports larger areas of native intertidal vegetation, much of it within the recently restored southern section of the island. This portion of the island was diked for agricultural use, but was breached in the mid-1990s to restore tidal connectivity and intertidal vegetation to the island.

Similar to the distribution of intertidal vegetation, the quality and distribution of wetland and riparian vegetation differs between the upstream settling basin and the downstream settling basin due to the

degree of shoreline development. The riparian zone adjacent to the downstream settling basin is dominated by scattered trees, predominantly red alder (*Alnus rubra*), with an understory dominated by invasive shrubs such as Himalayan blackberry (*Rubus armeniacus*). The freshwater riparian zone adjacent to the upstream settling basin is denser and more diverse, but still limited and somewhat degraded by the adjacent City of Everett sewage treatment ponds. Riparian areas in the vicinity of the upstream settling basin are dominated by Sitka spruce (*Picea sitchensis*), Pacific willow (*Salix lucida*), Scouler's willow (*Salix scouleriana*), western red cedar (*Thuja plicata*) and black cottonwood (*Populus balsamifera*) trees with an understory of salmonberry (*Rubus spectabilis*), red elderberry (*Sambucus racemosa*), red-osier dogwood (*Cornus sericea*), Nootka rose (*Rosa nutkana*), Douglas spirea (*Spirea douglasii*), and western crabapple (*Malus fusca*; city of Everett 1997). Common invasive species include reed canarygrass (*Phalaris arundinacea*), Himalayan blackberry, and evergreen blackberry (*Rubus laciniatus*).

A majority of the Parcel O shoreline has been altered as a result of past industrial activities. The shoreline is steep and partially armored with riprap. Dominant vegetation consists of Himalayan blackberry, reed canarygrass, red elderberry, and a variety of weedy herbaceous species (USACE 2011). Small patches of black cottonwoods are present. There are no wetlands within the Parcel O disposal site footprint. Except for some areas around the perimeter of the site, Parcel O is largely devoid of vegetation as a result of the frequent and ongoing disposal and rehandling operations.

The vegetation of Jetty Island is composed of mostly non-native grasses and shrubs and is essentially tree-less, with the exception of a few red alders. The upland vegetation is dominated by Scots broom and Himalayan blackberry, while the remainder of the island consists of native dune habitat and a portion of saltwater marsh on the north end (Port of Everett 2006; Ecology 2017). Eelgrass (*Zostera marina*) grows in the intertidal area to the west of the island (Figure 10).

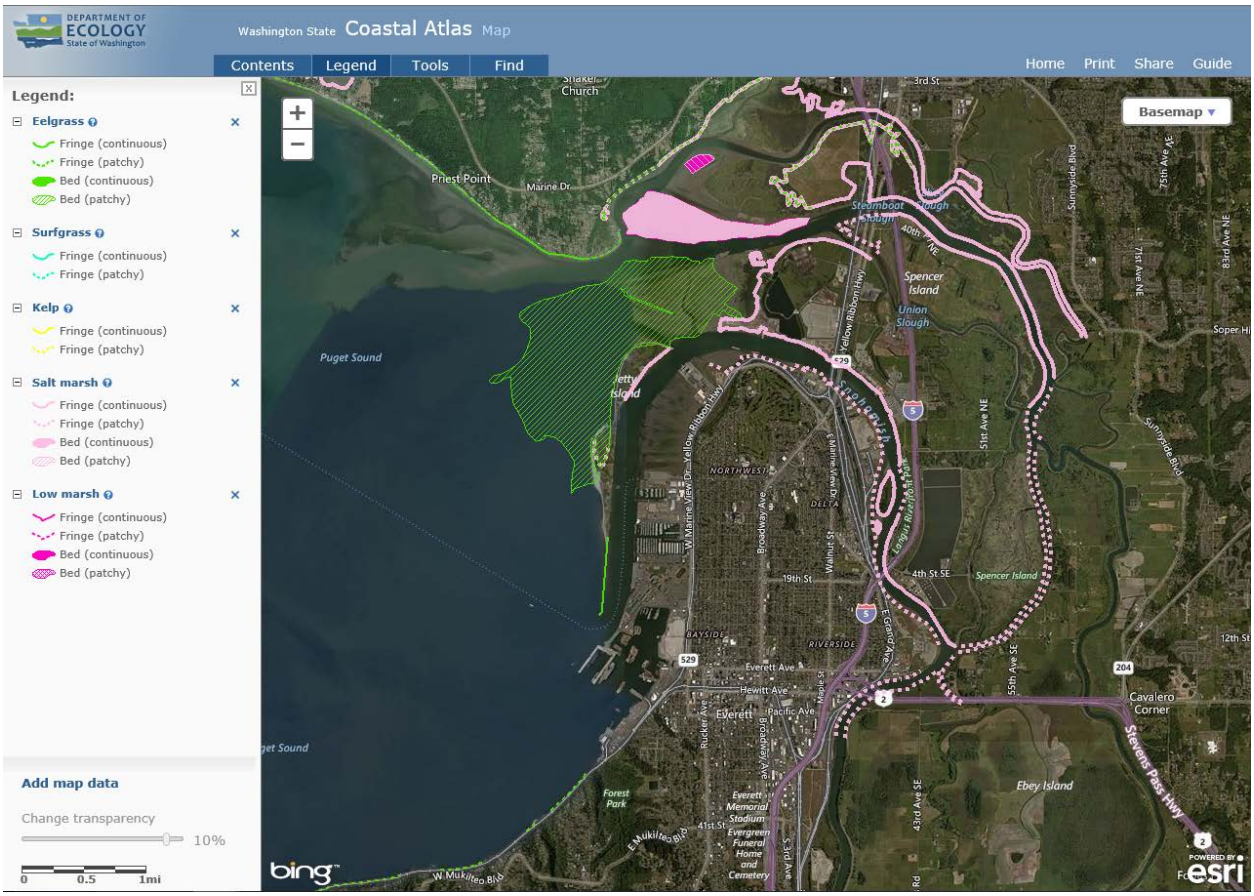

Figure 10. Marine vegetation from the Washington State Coastal Atlas (Ecology 2017).

3.4.1 Alternative 1 – No-Action

Dredging would not occur for 15 years under the No-Action Alternative. As a result of not conducting the proposed dredging, gradual successional changes in subtidal and intertidal vegetation along the lower river may occur as sediments gradually accumulate within the center and edges of the navigation channel and the settling basins. It is unknown if the rate of sediment accumulation would be sufficient to allow the expansion of the scattered areas of intertidal marsh along the edges of the navigation channel and settling basins. Much depends on how much sediment would accrete along the edges of the existing intertidal areas. However, some expansion of intertidal areas would be expected if dredging did not occur for 15 years. Due to the degree of shoreline development along Port Gardner Bay, it is expected that little change in the extent of subtidal or intertidal vegetation would be expected along the edges of the downstream settling basin in the absence of dredging. There are no subtidal or intertidal vegetation communities at Parcel O, the Jetty Island site, or the Port Gardner open-water disposal site (due to their elevation/depths) that could be affected by not conducting the proposed maintenance dredging and disposal operations.

Without placement of dredged sediments onto Jetty Island or Parcel O, it is likely the placement sites would slowly be colonized by weedy, early successional herbaceous upland species typical of the surrounding area, and continue throughout the 15-year timeframe without dredging and subsequent

material placement. Typical successional development of the wetland, riparian, and upland plant communities would similarly be expected under the No-Action Alternative.

3.4.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

Dredging of the lower navigation channel and the downstream settling basin would not affect the extent or condition of intertidal marshes or shoreline vegetation in this area. An approximately 400-foot wide intertidal area along both banks of the navigation channel upstream of the downstream settling basin would be unaffected. This area extends between the outer edge of the dredged channel and Jetty Island to the west of the navigation channel and between the more developed shorelines of the Everett Marina, the 12th Street Channel, and the Everett Naval Station on to the east of the outer edge of the navigation channel. Similarly, approximately 100 feet of intertidal area along the outer-most (western) edge of the widest portion of the downstream settling basin would be unaffected and approximately 200 feet of intertidal area along the outer-most edges of the narrowing portion of the downstream settling basin would be unaffected.

Dredging of the navigation channel and the upstream settling basin will not directly affect the extent or condition of intertidal marshes or shoreline vegetation in this area. The intertidal area along both banks of the upstream settling basin and navigation channel varies between 50 and 150 feet wide; this area will be retained during and after dredging. However, through regular maintenance dredging, natural meandering of the river channel is prevented; thus the shape and distribution of the intertidal areas along the channel edges might be somewhat altered in the long term compared to the No-Action alternative. By maintaining the navigable depth of the waterway, the proposed dredging will help prevent vessels from stranding on intertidal marshes along the navigation channel. Vessel stranding and salvage has the potential to cause long-term disturbance to salt marshes.

At Parcel O, some vegetation near the perimeter of the site will be disturbed; this vegetation has grown since the 2009 placement event and is typical of disturbed sites. Therefore, any changes to the distribution, character, or abundance of upland vegetation as a result of dredging and disposal activities are expected to be insignificant and discountable and are not expected to result in long-term degradation of upland communities within the action area.

The pipeline placed across Jetty Island is placed along a public path and thus minimizes effects to vegetation. The pipeline route avoids the high salt marsh located several hundred feet to the north. Dredged material is placed only on uplands dominated by grasses, and the grasses typically regrow following placement of the dredged material. Sometimes the dredged material is placed to suppress Scot's broom, an invasive non-native species. No impacts to aquatic vegetation in the intertidal zone will result from placement of dredged material on Jetty Island. Pentec (2006) completed surveys before and following berm renourishment adjacent to the berm and at a reference station near the south end of the island. No significant sedimentation was observed in eelgrass beds or on eelgrass blades themselves. The study concluded that the sediment runoff during renourishment had no measurable effects on eelgrass.

This alternative would have minimal to no effect to aquatic vegetation because dredging and disposal does not take place in areas with eelgrass or kelp. There would be no direct or indirect impact to salt marshes or macroalgae because they are not found within or near the navigation channel or material

placement sites. For these reasons, this Alternative would not cause a significant impact to the aquatic vegetation of the Snohomish River or Port Gardner Bay.

3.4.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years

The effects to vegetation would be the same as described for Alternative 2. The placement sites would be able to accommodate the additional material from Alternative 3 and would not affect additional area beyond the previously described placement site footprints.

3.5 Fish

Salmonids

The use of Port Gardner Bay near the PSDDA disposal site by adult anadromous salmonids is predominantly as a migration corridor from the Pacific Ocean and Puget Sound into the main stem of the Snohomish River. Adult salmon use deeper areas of Port Gardner Bay prior to moving into the rivers during the fall. The following spring, juvenile salmonids out-migrate from the river through Port Gardner Bay, using the estuarine intertidal areas for foraging and transitioning to salt water.

The Snohomish River and its estuary support nine salmonid species: Chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), chum (O. keta), sockeye (*O. nerka*) and pink salmon (*O. gorbuscha*), as well as steelhead (*O. mykiss*), sea-run cutthroat trout (*O. clarkii*), and native char: dolly varden (*Salvelinus malma*), and bull trout (*S. confluentus*; WDFW 2018). All of these species spawn in freshwater upstream of the estuary, and adult use of the estuary (and therefore of the proposed dredging areas) is largely limited to a migration corridor and as a physiological transition area from salt to fresh water. In contrast, juvenile salmonids depend on estuarine environments for migration, physiological transition from fresh to salt water, feeding, and refuge from predation during migration. There is considerable variation by species in juvenile residence periods in the estuary, with coho, chum, and Chinook juveniles being relatively more dependent on the estuarine environment than pink, steelhead, sea-run cutthroat, and native char, which quickly move through the estuary to marine waters.

Snohomish River coho spawn between late October and January and use almost all of the accessible tributaries draining into the Snohomish system. Juvenile coho salmon may spend a year in fresh water before moving into the estuary between March and May to feed in intertidal marshes and mudflats. Chum salmon spawn between October and December, with the peak around early to mid-November. Juveniles are generally present within the Snohomish River estuary from April through June where they feed in intertidal marshes and mudflats on a variety of insects, amphipods, and harpacticoid copepods.

Pink salmon present in the Snohomish basin are divided into two stocks: Snohomish odd year and Snohomish even year (WDFW 2018). In odd-numbered years most spawning takes place in the mainstem Snohomish, Skykomish, and Snoqualmie rivers and in larger tributaries such as Wallace, Sultan, Pilchuck, Beckler, and Tolt rivers. In even-numbered years most spawning takes place in September in the mainstem Snohomish and lower Skykomish Rivers and possibly in the Snoqualmie River.

Two stocks of Chinook salmon are present within the Snohomish River drainage: Snoqualmie and Skykomish (WDFW 2018). Snoqualmie Chinook salmon spawn throughout the mainstem Snoqualmie River and its major tributaries including the Raging and Tolt Rivers from mid-September through

October. Skykomish Chinook spawn throughout the mainstem Snohomish and Skykomish rivers from September through October. Habitat degradation in the mainstem river due to agricultural diking, industrial pollution, a lack of large woody debris, and gravel removal are believed to negatively affect production of the Snohomish River Chinook salmon (Snohomish County 2005).

There are six stocks of steelhead in the Snohomish Basin: Snohomish/Skykomish winter steelhead, Pilchuck winter steelhead, North Fork Skykomish steelhead, South Fork Skykomish summer steelhead, Snoqualmie winter steelhead, and Tolt summer steelhead (Snohomish Basin Recovery Technical Team 2008). Steelhead can be present in the system throughout the year at varying life stages. Spawning occurs throughout the Snohomish Basin in March through June for Snohomish/Skykomish winter, Pilchuck winter steelhead, and Snoqualmie winter steelhead. Spawn timing for the other three stocks is unknown (Snohomish Basin Recovery Technical Team 2008). Wild winter-run fish migrate predominantly in the late winter through spring (February through May) (Snohomish Basin Recovery Technical Team 2008).

Bull trout and dolly varden are present in the Snohomish River drainage and Puget Sound. The Snohomish and Skykomish Rivers make up one of eight core areas in Puget Sound (NMFS 2015). Anadromous bull trout juveniles generally migrate to Puget Sound as age-2 fish (Snohomish County 2005). The seasonal timing of entry extends from mid-February to early September. Upon entry, the juvenile fish may elect to rear in the tidally influenced delta within intertidal marsh, distributary channels, or along mainstem habitat areas, or may pass through into nearshore marine areas. Larger juveniles may elect to migrate substantial distances through the nearshore marine environment from the natal river basin to adjacent areas (Snohomish County 2005).

Forage Fish

Forage fish are a critical prey item for many fish and wildlife species. Adult forage fish generally spawn on beaches and submerged vegetation in Pacific Northwest estuaries while the larval and juvenile forage fish rear along the shoreline and nearshore habitat (Pentilla 2007). Several species of forage fish are present in Puget Sound during during different times of the year; the three most common are Pacific herring (*Clupea harengus pallasi*), surf smelt (*Hypomesus pretiosus*), and Pacific sand lance (*Ammodytes hexapterus;* Pentilla 2007), and northern anchovy (*Engraulis mordax*), longfin smelt (*Spirinchus thaleichthys*), and eulachon (*Thaleichthys pacificus*) also use nearshore habitats during parts of their life (Pentilla 2007).

Based on coastal shoreline surveys for beach spawning fish, the Washington Department of Fish and Wildlife (WDFW) has mapped known spawning locations of forage fish within Puget Sound (Figure 11). South of the project area along the Mukilteo shoreline has been documented as a spawning location for sand lance and surf smelt (WDFW 2014). There are 18 Washington herring stocks that are assessed annually (Stick et al. 2014). A pre-spawner herring holding location for the depressed Port Susan herring stock is located to the north of the project location; in recent years all observed spawn deposition has been in or near Tulalip Bay (Stick et al. 2014).

Juvenile surf smelt and sand lance have been captured during seining within the lagoon formed by the berm on Jetty Island (Pentec 1996, as cited in USACE 2011), and are abundant in the shallow waters of the Snohomish River estuary and the nearshore marine waters of Possession Sound and Port Gardner

Bay. Sand lance use Jetty Island for burrowing; however, use for spawning is not documented. None of these forage fish species have been documented spawning at the Port Gardner disposal sites or within the upstream or downstream settling basins or the navigation channel due to the modified shoreline and lack of intertidal gravel and sandy beaches (WDFW 2014).

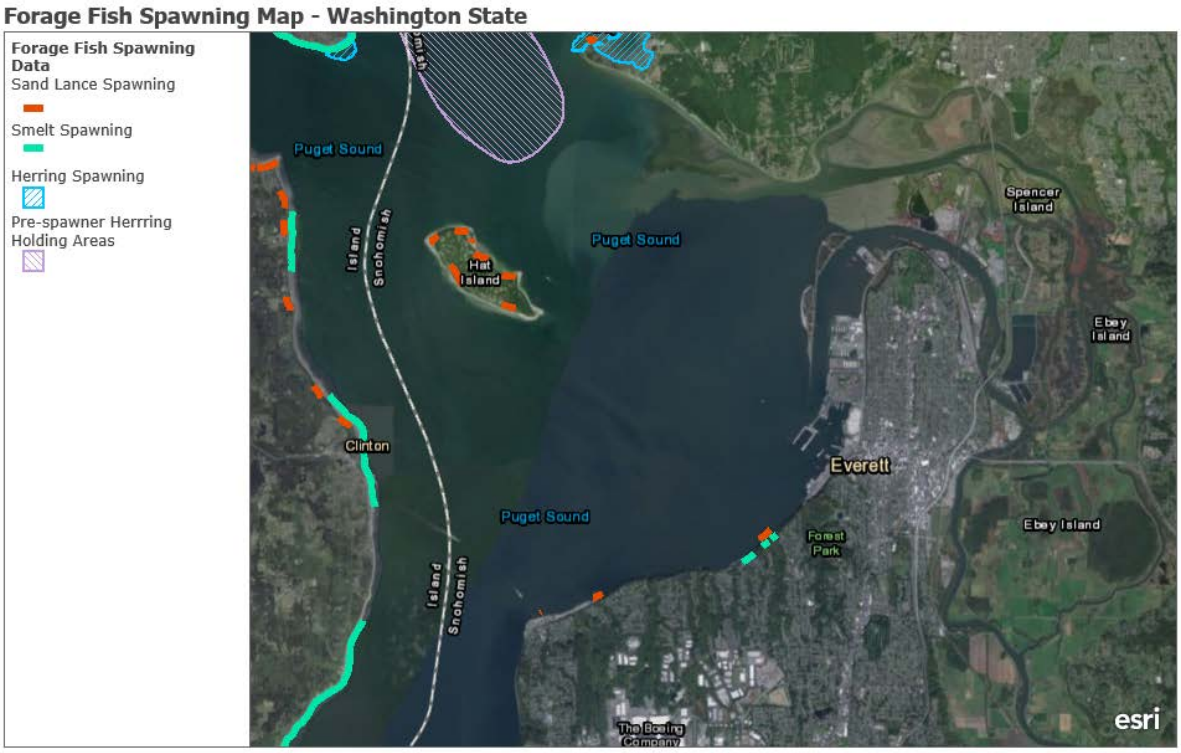

Figure 11. Map of forage fish spawning areas around the lower Snohomish River and estuary near Everett, Washington (WDFW 2014).

Other Fish

Other fish that may be found in the estuary include various species of flatfish and sculpin, sticklebacks, pricklebacks, gunnels, and surf perch (Pietsch and Orr 2015). The freshwater portions of the river hosts sculpin, pikeminnows, sticklebacks, Salish and largescale suckers, peamouth, largescale dace, redside shiners, and non-anadromous salmonids such as cutthroat and rainbow trout (Pietsch and Orr 2015).

3.5.1 Alternative 1 – No-Action

The No-Action Alternative would have no negative effects to fish species.

3.5.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

This Alternative may cause temporary effects to water quality including increased suspended solids and small decreases in DO in the immediate dredging area. The temporary increases in suspended solids could affect juvenile salmon in the immediate dredging area through decreased visibility for foraging activities and impaired oxygen exchange due to clogged or lacerated gills. However, the available

evidence indicates that total suspended solids (TSS) levels sufficient to cause such effects would be limited in extent. LeGore and Des Voigne (1973) conducted 96-hour bioassays on juvenile coho salmon using re-suspended Duwamish River sediments from five locations. Up to 5% sediment in suspension (28,800 mg/l dry weight), well above levels expected to be suspended during dredging, had no acute effects. Salo et al. (1979) reported a maximum of only 94 mg/l of sediment in solution in the immediate vicinity of a working dredge in Hood Canal. This indicates that turbidity would be elevated on a temporary and localized basis by dredging, but that TSS levels sufficient to cause adverse effects on salmon would be very limited in extent. Any turbidity would primarily be at the bottom of the water column at 8 to 32 feet deep in the center of the channel and settling basins, and juvenile salmon are surface-oriented in shallow water at the margins of the river. Also, dredging timing avoids the periods of peak abundance of juvenile salmonids, which substantially reduces the chance that they would encounter elevated turbidity.

Adult salmonids are expected to avoid areas of increased turbidity, while juveniles would be less able to avoid such areas. Juvenile salmon are unlikely to frequent areas of dredging as they stay close to the shorelines during migration and feeding; however, fish that transit dredged material placement areas may be susceptible to disturbance by material placement. Dredging would only occur during the in-water work window, which protects the sensitive life stage of out-migrating juvenile salmonids as well as forage fish spawning to avoid exposure to increased suspended sediments.

Most forage fish species are highly mobile and can avoid dredging and dredged material placement as it descends through the water column. Some forage fish may be entrained. Sand lance burrow into sandy substrate at dusk where they remain until dawn; therefore, they are at risk of burial during nighttime disposal on Jetty Island. It is assumed that any sand lance in a disposal site would flee the area if disturbed at night, or would likely not choose to burrow into an active disposal zone. These activities may result in temporary elevated turbidity and suspended sediment levels but will not result in the long-term destruction or permanent removal of documented forage fish spawning habitat.

Fish entrainment is a risk during dredging projects. A hydraulic pipeline dredge and a mechanical (clamshell) dredge will be used to remove sediments from the settling basins and navigation channel. It is generally accepted that clamshell buckets do not have the potential to entrain fish because the bucket is totally open during its descent and thus cannot trap or contain a mobile organism during its descent through the water column. Hydraulic dredging has been studied extensively due to its potential to entrain fish. Typically, hydraulic dredges have been found to entrain few or no salmonids (McGraw and Armstrong 1988, Larson and Mohl 1988, Reine et al. 1998). Based on the operation of the clamshell dredge bucket, and the ability of salmonids and other mobile fishes to avoid entrainment in hydraulic dredges, the proposed dredging is not likely to entrain juvenile or adult salmonids, or other mobile fishes.

Temporary increases in noise during dredging is expected. The Port of Everett conducted a study to measure the noise generated by an operating clamshell dredge in the Snohomish River in 2009 (Pentec Environmental 2010). The USACE conducted a study to measure the sound of an operating hydraulic dredge in the Snohomish River in 2010 (SAIC 2010). Noise from mechanical (clamshell) dredging in the Snohomish River were as high as 164 dB RMS when the bucket hit the bottom, which exceeds the

thresholds for harassment (150 dB RMS for fish of all sizes; Hastings 2002) and temporary threshold shift or complete recovery of hearing loss (158 dB RMS for 12 hours; Popper et al. 2014), but not injury thresholds. It is extremely unlikely that individual fish would remain close enough to the source of the noise to accumulate an injurious level of sound energy (NMFS 2018). At most, within the area around a source where noise exceeds 150 dB RMS, exposed individuals may experience low levels of behavioral disturbance, including avoidance of area, with no impact on the fitness of the exposed individual. During maintenance dredging, the farthest distance to effective quiet would be 177 feet (54 m) around the episodic placement of spuds for mechanical (clamshell dredging), but would otherwise be limited to about 72 feet (22 m) around the tug boat moving the barge loaded with dredged material, followed by 46 feet (14 m) around the clamshell bucket dredge and 33 feet (10 m) around the hydraulic dredge (NMFS 2018). Because the Snohomish River is greater than 300 feet wide in the project area, it is unlikely that areal avoidance would prevent fish from moving past the work or from accessing desirable habitat resources, including reaching upstream spawning areas. Thus, the noise from dredging operations is not expected to disturb marine mammals or fish that may be in the vicinity at the time of dredging.

Dredging and disposal activities are not expected to significantly affect other freshwater and marine fish that may be present. Although some benthic oriented fish, such as sculpin and flatfish, may become entrained in either a clamshell or hydraulic dredge, or be smothered by open-water disposal, it is likely that most will avoid and/or flee the area due to the noise and vibrations created by the dredging and dumping of sediment. None of these fishes are known to spawn in the Snohomish River, so there presence in the navigation channel is most likely composed of juveniles and non-breeding adults.

Based on the expectation that sediment suspension during dredging and material placement would be temporary and localized, the avoidance of overlap between the in-water work window and salmon outmigration, and mobility of forage fish, effects of the proposed action are expected to be insignificant and discountable to the fish in the project area.

3.5.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years

Alternative 3 would have the same effects as those described for Alternative 2 with the exception of small differences with the spatial and temporal extent of dredging. Alternative 3 would dredge half the project area biennially, to deeper depths in the upstream and downstream settling basins, and would last about 90 days instead of 60 days.

3.6 Wildlife

Birds

The Snohomish River estuary is recognized as regionally important during spring migrations of shorebirds and fall migrations of raptors and waterfowl. The abundant waterfowl, marine birds, and shorebirds within the lower Snohomish River provide an avian prey base for bald eagles, peregrine falcons, merlins, and other raptors. Common species include ring-necked ducks, American wigeons, Canada geese, mallards, pintail, scoters, mergansers, and bufflehead. Other common species include double-crested cormorants, western grebes, American coots, brant, pigeon guillemots, and several gull species (Snohomish County 1999). During winter migrations, the flooded agricultural fields along the lower Snohomish River attract snow geese, trumpeter swans, snowy owls, merlins, great-horned owls,

and gyrfalcons. Shorebirds are commonly observed along the lower river in the tidal mudflats and marshes or along sandy shorelines. Common species include dunlins, western sandpipers, dowitchers, black-bellied plovers, and yellowlegs (Snohomish County 1999).

Marine Mammals

Steller sea lions migrate into Puget Sound and have been sporadically seen in inland water areas, including the San Juan Islands, rock outcroppings along the Strait of Juan de Fuca, near Everett, in Shilshole Bay, off the Ballard Locks, and occasionally in south Puget Sound (WDFW 2000). They are not considered common residents of the action area, because of no breeding rookeries identified in Washington, and haul-out areas generally confined to the Columbia River, the western and northern coasts of the Olympic Peninsula, the San Juan Islands, the coast of Vancouver Island, and the Gulf Islands in British Columbia (WDFW 2000). Harbor seals and California sea lions are common year-round residents near the lower Snohomish River where they forage for fish. Everett Harbor buoys are documented haulouts for California sea lions, and large numbers (100-500) of California sea lions and harbor seals have been documented using log boom areas at the Port of Everett as a haulout (WDFW 2000).

Juvenile California gray whales occasionally stray into Puget Sound and forage in the mud and sandflats of the Snohomish estuary. Similarly, Southern Resident Killer Whale (SRKW), Harbor porpoise, and Dall's porpoise are fairly common within Puget Sound (Gaydos and Pearson 2011).

Terrestrial Species

The undeveloped habitats of the Snohomish River estuary serve as migratory corridors, linking urban and rural open spaces from the Cascade foothills to Puget Sound lowlands and waters. Various terrestrial mammals inhabit the area including beavers, river otters, muskrats, black-tailed deer, rabbits, coyotes, raccoons, and a variety of small rodents including mice, rats, moles, and voles. Resident amphibians likely inhabit the shoreline area include red-legged frogs, Pacific chorus frogs, rough skinned newts, and non-native bullfrogs. Resident reptiles include garter snake and northern alligator lizard.

3.6.1 Alternative 1 – No-Action

The No-Action Alternative would have no effect on marine mammals, birds, or terrestrial wildlife.

3.6.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

Routine annual maintenance dredging of the Federal navigation channel with its associated placement sites would have a low level of disturbance to wildlife due to noise and presence of humans on the dredge vessel. This may temporarily displace a small number of birds and marine mammals including bald eagle, osprey, peregrine falcon, great blue heron, purple martin, and the variety of songbirds, shorebirds, waterfowl, sea lions, and harbor seals that commonly use the estuary. Most resident populations of birds that use the lower Snohomish River are believed to be acclimated to the highly urbanized area surrounding the downstream settling basin and navigation channel. Resident terrestrial mammals such as beavers, river otters, muskrats, deer, rabbits, coyotes, raccoon, and small rodents, as well as red-legged frogs, Pacific chorus frogs, rough skinned newts, and garter snakes may be temporarily disturbed during dredging operations. Migratory and resident birds, and terrestrial

mammals are expected to immediately return to their usual foraging and resting areas and typical behaviors after the dredging and disposal activities stop or move out of their immediate vicinity.

Harbor seals and California sea lions are frequently present in the estuary and typically avoid vessels, so the presence of the dredge may cause similar avoidance behavior. Due to the heavily trafficked nature of the navigation channel by numerous commercial and recreational vessels, maintenance dredging is not expected to cause more than the usual amount of disturbance to birds or marine mammals; however, the constant noise from the operating dredge (clamshell or hydraulic) may cause marine mammals to avoid the immediate area around the dredge during dredging and prefer areas with only ambient noise.

The behavioral disturbance threshold for marine mammals is estimated at 120 root mean square decibels (dB RMS) for continuous noise and 160 dB RMS for pulsed noise. Operation of clamshell dredge machinery is categorized as non-impulsive (continuous) sound and has been measured at 142 dB RMS (Clarke et al. 2002). Operation of hydraulic dredge machinery is categorized as non-impulsive (continuous) and has been measured at 100 to 110 dB RMS with frequencies in the range of 70 to 1,000 Hz range 40 meters from the dredging activity (Clarke et al. 2002).

Based on the technical guidance for assessing the effects of underwater anthropogenic sound on marine mammals, dredging at Everett Harbor and the Snohomish River would be below the sound exposure level (SEL) that causes a temporary threshold shift in hearing ability of seals and sea lions; the SEL for non-impulsive sound is 181 dB and 199 dB for sea lions and seals, respectively (NMFS 2016). At most, whale-detectable levels of dredging-related noise (above 120 dB_{RMS}) may radiate up to 1.4 miles (2,200 m) from dredging in these channels (NMFS 2018). The actual range of acoustic effect would likely be much less than predicted because the high levels of ambient noise that are typically present in the Puget Sound would act to quickly mask project-related noise. Ambient noise levels in Everett Harbor in particular are typically high, and sound would attenuate quickly with distance from the dredge and would not cause any greater harm than avoidance of the immediate dredging area. Should any whales approach close enough to hear project related noise, the exposure would, at most, cause brief periods of low-level acoustic masking (virtually undetectable against the ambient noise in the area), and temporary avoidance of the area immediately around the channel entrances. The areal avoidance would not hinder migration through the action area, or limit access to important habitat resources. Therefore, the exposure would cause no meaningful effect on the exposed individuals.

Based on the expected short-term disturbance to wildlife and likely immeasurable effect to the populations, the USACE expects the proposed dredging and disposal activities will have insignificant and discountable effects on birds and resident or migratory marine mammals in the action area.

3.6.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years

The effects of Alternative 3 would be the same for wildlife as those described for Alternative 2. Maintenance dredging and disposal would occur annually, with dredging to only half of the navigation channel and one settling basin in each year, and to deeper depths in the upstream and downstream settling basins, and would last about 90 days instead of 60 days.

3.7 Benthic Invertebrates

Pentec Environmental has documented invertebrate species assemblages within the lower Snohomish River (mainly downstream of the upstream settling basin) as part of their work for the Port (1992). Common invertebrate species (which are typically preyed upon by salmonids) include: snails (*Littorina spp.*), polychaetes (*Nereis spp, Notomastus spp., Nephtys spp., Glyceria spp.*), shore crabs (*Hemigrapsus spp.*), isopods (*Gnorimosphaeroma oregonensis*), ghost shrimp (*Callianassa spp.*), Dungeness crab (*Cancer magister*), and red crab (*Cancer productus*; Pentec 1992, as cited in USACE 2011). Juvenile salmonids prey preferentially on certain species of tiny crustaceans including amphipods (e.g. *Corophium spp., Anisogammarus, Eogammarus*), some species of harpacticoid copepods (e.g. *Harpacticus uniremis, Tisbe sp.*), cumaceans, opossum shrimp, and midges (Chironomidae larvae) which are common in the intertidal mudflats and marshes of the lower estuary. These species likely occur within the salt marshes and mudflats that fringe the shoreline of Parcel O and Jetty Island.

The types of benthic invertebrates characteristic of intertidal habitats within the estuary and associated with Jetty Island have been studied and documented over the past five years; however, benthic assemblages within the deeper, subtidal portions of the settling basins and dredged portions of the navigation channel are not well documented. The deeper areas are expected to be of much lower biodiversity than the adjacent intertidal marshes and mudflats due to their depth and regular pattern of disturbance by accumulation of fine sediments and periodic maintenance dredging. Because of their occurrence in the middle of the channel at deeper depths, the assemblages within the center of the basins and navigation channel are likely of lower functional value to foraging juvenile salmonids that tend to forage in the intertidal areas closer to the shoreline.

3.7.1 Alternative 1 – No-Action

The No-Action Alternative would not have negative effects to benthic invertebrates. The navigation channel has been dredged annually in most reaches so there is likely a lack of long-lived invertebrates in the channel. Therefore, ceasing a maintenance dredging program for fifteen years may allow greater biodiversity to develop into a more stable community in the channel within a few years after the last dredging event. Additionally, placement of material on Jetty Island would cease and limit the amount of habitat for juvenile salmonids.

3.7.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

Dredging will temporarily reduce the populations of the benthic and epibenthic invertebrates through removal of the benthic substrate, entrainment of organisms unable to avoid the dredging operation, and smothering as suspended sediments settle out of the water column. Rate of entrainment depends on the density of benthic organisms in the dredging and material placement footprint. This would occur over the entire navigation channel and settling basins annually over 15 years. Invertebrate prey for juvenile salmonids and bottom fish would be temporarily reduced along the center-line of the dredged portions of the navigation channel and within the upstream and downstream settling basins. Total organic carbon could be slightly lower in the newly exposed sediments after dredging so the amount of food (in the form of organic matter) available for benthic invertebrates in these areas will be slightly reduced on a temporary basis.

Several studies have demonstrated that benthic organisms rapidly recolonize habitats disturbed by dredging and dredged materials placement and return these habitats to reference conditions (Wilber and Clarke 2007; Ponti et al. 2009). However, little post-dredging recovery would occur during the first seven months after dredging, after which early successional fauna would begin to dominate over the next six months (Newell et al. 1998). This suggests that full recovery of a site may take years, and that periodic maintenance dredging of the navigation channels will likely maintain habitats at lower functional levels with altered and reduced population structures compared to undisturbed areas. The community in the channel is likely adapted to the dredging cycle and populated with short-lived species with an overall lower biodiversity compared to natural conditions in estuaries that are not regularly dredged (McCauley et al. 1977). Therefore, continued maintenance dredging and sediment disposal is likely to prevent full recovery of the affected areas but this also means that continued maintenance dredging would occur in altered habitats that are already functioning at reduced levels.

While benthic and epibenthic prey species will be temporarily displaced, populations are expected to recover shortly (within one year) after dredging activities are completed. Because the dredging will occur only in a portion of the navigation channel and within the settling basins, adjacent undisturbed intertidal habitat along the edges of the dredged areas will continue to provide an established source of benthic and epibenthic invertebrates to colonize the newly disturbed subtidal substrate. New invertebrate communities will recolonize the dredging area, measurable loss of biological productivity or prey base for juvenile salmonids or bottom fish is expected. Therefore, although there will be temporary decreases in benthic and epibenthic prey within the immediate dredging and disposal areas, this decrease is expected to cause a discountable effect on the overall local invertebrate populations .

3.7.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years

The effects to benthic invertebrates would be the similar as for Alternative 2. Dredging of each navigation channel section and corresponding settling basin occurs on a biennial schedule, so the recolonization period for benthic invertebrates would be over two years rather than over one year. In a relatively short period, organisms would reestablish in the dredging and placement areas due to recruitment from adjacent non-disturbed areas. Based on these factors, effects to benthic invertebrate populations and their habitat due to dredging and material placement would be minor and insignificant.

3.8 Threatened and Endangered Species

Everett Harbor, the lower Snohomish River, and the Port Gardner disposal site potentially host 7 species that are listed under the Endangered Species Act (ESA); these appear in Table 4 with their designated critical habitat status. Other ESA-listed threatened or endangered species that may occur in Puget Sound include the humpback whale (*Megaptera novaengliae*) and leatherback sea turtle (*Dermochelys coriacea*); however, these species are extremely unlikely to occur within the lower Snohomish River, Port Gardner Bay, or Jetty Island during maintenance dredging or disposal based on infrequent historic occurrences and a lack of typically utilized and appropriate habitat within the action area. The proposed dredging and disposal activities will have no effect on these two species. Three salmon species are commonly occurring or well-documented in the project area, while SRKW, rockfish, and marbled murrelet are less common.

Table 4. Species listed under the Endangered Species Act with their status, critical habitat, and potential for occurrence in the project area during dredging and/or disposal.

Common Name	Scientific Name	Designated Critical Habitat
Dredging		
Coastal/Puget Sound Bull Trout	*Salvelinus confluentus*	Yes
Puget Sound steelhead	*Oncorhynchus mykiss*	Yes
Puget Sound Chinook salmon	*Oncorhynchus tshawytscha*	Yes
Disposal		
Coastal/Puget Sound Bull Trout	*Salvelinus confluentus*	Yes (All disposal sites)
Puget Sound steelhead	*Oncorhynchus mykiss*	Yes (All disposal sites)
Puget Sound Chinook salmon	*Oncorhynchus tshawytscha*	Yes (All disposal sites)
Bocaccio rockfish	*Sebastes paucispinis*	Yes (Jetty Island only)
Yelloweye rockfish	*Sebastes ruberrimus*	Yes (Jetty Island only)
Southern Resident Killer Whale	*Orcinus orca*	Yes* (Jetty Island only)
Marbled Murrelet	*Brachyramphus marmoratus*	Yes* (Jetty Island only)

* Critical habitat is designated for this species, but does not occur in the project area.

Puget Sound (PS) Chinook salmon and PS steelhead utilize the Everett Harbor and lower Snohomish River, and their critical habitat is designated within the project area (NMFS 2018). Adults use the Snohomish River to migrate to upstream freshwater spawning habitat while juveniles use it to outmigrate to Puget Sound and for some rearing. Adult PS Chinook typically enter these channels when they return to freshwater between mid-June and November. Chinook smolts are likely to be present between early-March and mid-July as they migrate to marine waters. Returning adult PS steelhead may be present year-round, whereas steelhead smolt outmigration typically occurs April through June, but they may be present year-round in both river systems (NMFS 2018).

Adult and subadult bull trout foraging, migration, and overwintering habitat is found in the project area and bull trout could be present at any time. The Snohomish River is one of eight core areas in the Puget Sound Region, which supports anadromous populations of bull trout (USFWS 2015). Foraging for benthic invertebrates occurs in nearshore areas. The in-water work window is limited to October to February to avoid bull trout.

Adult bocaccio are most common between 160 and 820 feet depth and adult yelloweye rockfish are found between 80 and 1,560 feet depth; both have strong associations to rocky bottoms and outcrops. Adult bocaccio and yelloweye rockfish have been documented within one mile of the Port Gardner open-water disposal site, although the site itself lacks the steepness and structural complexity they prefer (NMFS 2015). Larval young are passively dispersed by currents and are pelagic until early June when they move toward the shore (Love et al. 2002). Juveniles and subadults of bocaccio may be more common in shallower waters and are associated with reefs, kelp beds, and

artificial structures such as piers (NMFS 2013a). Juvenile boccacio settlement habitats located in the nearshore with substrates such as sand, rock and/or cobble compositions that support kelp enable forage opportunities and refuge from predators and enable behavioral and physiological changes needed for juveniles to occupy deeper adult habitats (79 FR 68041). Juvenile yelloweye rockfish are not typically found in intertidal areas, instead settling in waters deeper than 98 feet (NMFS 2013b).

SRKW spend much of the year around the San Juan Islands and move into Puget Sound in early autumn, although they could be present at any time and have been observed in the vicinity of all eight open-water disposal sites in Puget Sound. Designated critical habitat for SRKW slightly overlaps with the southern end of the navigation channel.

Marbled murrelets are permanent, though not common, residents of Puget Sound in the vicinity of the open-water disposal sites and the lower Snohomish River. Murrelets could be found foraging on small fish such as sand lance in the marine waters adjacent to the action area, though they are likely to be very transient. In the Pacific Northwest, they forage almost exclusively in the nearshore marine environment (mainly within a few miles of shore), but nest in old growth forests as much as 50 miles from marine waters. Marbled murrelet nests do not occur within the action area, but murrelets may forage within the water of Possession Sound, particularly during the winter. The Seattle Audubon Society recorded 26 sightings between 2008 and 2018 at Howarth State Park south of Everett (Audubon 2018).

3.8.1 Alternative 1 – No-Action

This alternative would have no effect on ESA-listed species or their designated critical habitat because dredging and disposal would not occur. There would be no disturbance to species in the project area from maintenance dredging and disposal, which would beneficially reduce the overall anthropogenic effects to ESA-listed species and their designated critical habitat, although current vessel traffic and dredging practices by the Port of Everett in nearby locations would continue.

3.8.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

This alternative represents the standard maintenance dredging program that has been underway at the Everett Harbor and Snohomish River Navigation Channel for many years. The effects of maintenance dredging and material placement will be intermittent and limited in physical effect and duration, and will result in largely maintaining existing conditions. Potential effects of maintenance dredging with clamshell or hydraulic dredges include entrainment, bucket strike, vessel collision, elevated noise, degraded water quality, and altered benthic habitat.

Potential effects of maintenance dredging with clamshell or hydraulic dredges include entrainment, bucket strike, vessel collision, elevated noise, degraded water quality, and altered benthic habitat. Entrainment refers to the uptake of aquatic organisms by dredge equipment, as well as the transport of organisms by the downward motion of sediments during in-water disposal. Mechanical dredges entrain organisms that are captured within the clamshell bucket. Hydraulic dredges entrain organisms by suction. In-water or nearshore disposal of sediments, such as material placement at Jetty Island, entrains organisms that are caught by the currents that are created within or very close alongside discharge plumes as they descend through the water column.

There is little evidence of mechanical dredge (i.e., clamshell) entrainment, bucket strike, or direct collision of mobile organisms such as fish, sea turtles, and whales (NMFS 2018). The small size of the bucket, compared against the distribution of the organisms across the available habitat make this situation is very unlikely, and that likelihood decreases after the first few bucket cycles because mobile organisms are most likely to move away from the disturbance. Further, mechanical dredges move very slowly during dredging operations, with the barge typically staying in one location for many minutes to several hours, while the bucket is repeatedly lowered and raised within an area limited to the range of the crane arm. Mobile organisms such as fish, marine mammals, and sea turtles in the vicinity of the clamshell dredge at the start of the operation would likely swim away to avoid the noise and activity (NMFS 2018). The use of in-water work windows and location of dredging away from nearshore habitat further reduces the chances of entrainment. Small fish such as juvenile salmonids are typically vulnerable to entrainment by hydraulic dredge operation. Juvenile salmonids are typically found in the nearshore areas so entrainment in a dredge is extremely unlikely because the dredges operate offshore. Due to their specialized habitat preferences, it is unlikely any bocaccio or yelloweye rockfish would be exposed to any dredging effects that would have a measurable effect. Entrainment during the proposed maintenance dredging is highly unlikely bull trout, Chinook salmon, and steelhead because they are not likely to be present during dredging. The risk of clamshell bucket strike, entrainment by clamshell dredge, and vessel collision is discountable due to the ability of mobile organisms to move away from the threat.

In-water dredged material placement could cause entrainment; upland placement is not expected to entrain fish. The likelihood of injury or mortality would increase with an organism's proximity to the center of the discharge field where depth and weight of the sediments would be greatest. Fish that are below a discharge plume are likely to initially dive and then initiate horizontal evasion, or to simply move away if already on or near the bottom. The determining factor in avoiding entrainment will be whether the fish can swim fast enough to move out of the discharge field once the fish detects the threat. The risk of entrainment would increase with proximity to the center of the plume and/or to the seafloor. A limited number of very small fish and larvae (e.g., juvenile salmonids) directly under or immediately next to the plume may be entrained and killed, but compared to the total fish community and populations in Puget Sound this would not be a measurable or significant effect.

Dredge noise will be below thresholds of injury for ESA-listed fish and marine mammals (Section 3.6.2), which are likely to move out of the area and avoid injury, a short distance from dredging operations. Section 3.6.2 evaluates the effects of noise produced by dredging operations on marine mammals. The noise expected to be produced by dredging is above the threshold for harassment for salmonids (150 dB), but is not above the injury threshold and is unlikely to significantly impact fish (Section 3.5.2). Fish behavior studies have shown that fish will avoid the area of noise and resume normal behaviors just beyond range of harassment noise levels, indicating discountable levels of effect would be occurring near dredging operations. Elevated noise is not likely to cause detectable or significant effects to ESA-listed species.

Exposure to water of degraded quality may harm ESA-listed fish species. Degraded water quality would occur temporarily through dredging and in-water disposal of sediments. Further discussion of effects to

water quality are in Section 3.3. Generally, mechanical dredging could create more turbidity than hydraulic dredging because the mechanical buckets are not water tight and mobilize sediments across the full depth of the water column. The salmonids that may be exposed to action-related suspended sediments would most likely be moving past the dredging sites. Therefore, the duration of their exposure to turbidity above background levels would likely be measured in minutes, and at most a low number of hours. Salmonids would be briefly exposed to sediment concentration that are expected to elicit no more than low-level behavioral effects such as avoidance of the plume, and temporary minor physiological effects such as gill flaring (coughing), temporarily reduced feeding rates and success, and moderate levels of stress that would not affect the fitness of the exposed individuals. Turbidity plumes from dredging and material placement are expected to be localized and short-lived, and the USACE has obtained a CWA Section 401 Water Quality Certification from Ecology and will implement water quality monitoring to ensure that the dredging and disposal activities are within the identified limits (Appendix C). The overwhelming majority of the sediments that would be dredged as part of this action are expected to be free of contamination, and the presence of any detectable turbidity or reduction in DO in the water column are expected to be so infrequent, localized, and short-lived. (NMFS 2018).

Alteration of benthic habitats may harm the prey base of salmonids. Dredging and in-water disposal of sediments alters benthic habitats, and these effects are discussed in Section 3.7. Dredging generally reduces the abundance and alters the population structure of infaunal and epifaunal invertebrate organisms within the affected area and simplifies the character of the substrate. Maintenance dredging would continue the reduced abundance and altered population structures as compared to what would occur in the absence of dredging. Disposal of dredged sediments at the Port Gardner in-water disposal sites will bury benthic organisms. The small size of the affected areas as compared to the rest of the benthic habitat in Puget Sound, combined with the high levels of water mixing, suggest that any reduction in the availability of planktonic prey would be undetectable. These potential effects are considered discountable due to the low likelihood of occurrence, lack of substantial change to prey resources, and limited affected area.

The USACE has determined that effects to ESA-listed species would be minor and temporary, and would therefore not have a significant impact to marine ESA-listed species. For marine ESA-listed species and present critical habitat that are likely to be affected by the proposed action (Puget Sound Chinook salmon and steelhead), the main concerns are exposure to entrainment, bucket strike, vessel collision, elevated noise, degraded water quality, and altered benthic habitat (NMFS 2018). Listed marine species would have to be very close to dredging activities to be potentially exposed to any of the stressors identified above, and potential impacts through trophic webs. The probability of entrainment, bucket strike, and vessel collision is very low and any effects would be discountable when considered across the species population. Exposure to elevated noise and degraded water quality would be temporary and limited in scope, and organisms would be able to move away from the potential stressor. The altered benthic habitat constitutes a small percentage of the available benthic habitat of the project area and would not substantially change the prey resources that inhabit the previously disturbed navigation channel. Terrestrial species and bull trout are not expected to experience measurable effects from the proposed action due to the intermittent, temporary, and limited nature of the effects (USFWS 2015).

Dredging methods, timing, and conservation methods will be used to avoid and minimize adverse impacts to ESA-listed species during maintenance dredging and dredged material placement.

3.8.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years

Effects to all ESA-listed species would generally be the same for Alternative 3 as described for Alternative 2, although more spatially limited due to the areas dredged on a biennial basis and with a slight temporal change: about 90 days duration instead of 60 days. ESA-listed species are not expected to experience measurable effects due to the intermittent, temporary, and limited nature of the effects.

3.9 Cultural Resources

The USACE has coordinated its review of cultural resources impacts under Section 106 of the National Historic Preservation Act (NHPA). The USACE has determined the area of potential effect (APE) for both direct and indirect effects to be the Federal navigation channel and the three proposed disposal sites of Jetty Island, Parcel O and Port Gardner Dredged Disposal Site.

A USACE staff archaeologist conducted a records search and literature review for the APE, including a records search of the archaeological and historic site records in the Washington Information System for Architectural and Archaeological Records Database (WISAARD) and reviewed internal documents related to the Snohomish Federal Navigation Channel. A review of the WISAARD database shows that there are no recorded archaeological sites located either within or directly adjacent to the navigation channel or the proposed disposal areas. The closest resources are five unidentified shipwrecks. Four of the wrecks are located near the south end of Jetty Island, and one shipwreck is near the mouth of the Snohomish River. These shipwrecks are outside the APE. In 1975, the USACE consulted with the Washington State Historic Preservation Officer (SHPO) in regards to the Snohomish federal navigation project. At the time it was recommended that a cultural resources survey be conducted as there was concern that there could be archaeological sites located at the proposed disposal areas, one of which was Preston Point. A cultural resource survey was conducted, and the survey confirmed the presence of an important archaeological site at Preston Point (Dunnell and Fuller 1975). The survey recorded additional archaeological sites, but none of these sites were located in the project area or proposed disposal areas. In 1988, a side scan sonar survey was conducted for the proposed Port Gardner open-water disposal site. Results from the survey indicated that there were no shipwrecks within the proposed Port Gardner open-water disposal site (Evans-Hamilton Inc. 1988). The Port Gardner open-water disposal site has been in use since 1989, and is a fully permitted PSDDA disposal site. Jetty Island, one of the proposed disposal sites, is a manmade island constructed in 1903 from the excess dredged material from dredging operations in Everett Harbor. Placement of dredged material continued from 1903 to 1970. In 1972 material placement on Jetty Island ceased due to the implementation of the Clean Water Act and turbidity concerns, and was instead placed in upland locations or in-water disposal sites. In 1989 beneficial placement of dredged material began for a habitat enhancement project that is currently maintained. Parcel O is a City of Everett-owned parcel that was the former log yard for Kimberly Clark. The parcel has been used as a log yard since 1936 (Mesker 1936). The City of Everett now uses the parcel as storage for dredged material. Like Jetty Island, the dredged material is placed on Parcel O via pipeline. On 27 March 2018 the USACE sent a letter to the Washington State Historic Preservation Officer (SHPO) and the following Tribes: Muckleshoot Indian Tribe, Sauk-Suiattle Indian Tribe,

Snoqualmie Indian Tribe, Stillaguamish Tribe of Indians, Swinomish Indian Tribal Community, the Suquamish Indian Tribe, the Tulalip Tribes of Washington and the Yakama Nation. The letter described the project, the APE, and that the USACE was proposing a determination of no historic properties affected. On 29 March 2018, the SHPO responded by letter concurring with the USACE APE. No response has been received from the Tribes. On 20 April 2018 the USACE sent a letter to the Washington SHPO documenting the USACE's determination of No Historic Properties Affected. The Washington SHPO responded by letter dated 23 April 2018 concurring with the USACE's determination.

3.9.1 Alternative 1 – No-Action

The No-Action Alternative would have no effect to cultural resources.

3.9.2 Alternative 2 – Dredge Navigation Channel and Settling Basins To Channel Depth

Alternative 2 would have no effect on cultural resources. There are no known cultural resources located within the APE and the USACE has made a determination of no historic properties affected.

3.9.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years

Alternative 3 would have the same level of effects as Alternative 2 and the USACE has made a determination of no historic properties affected.

3.10 Indian Treaty Rights

In addition to the Federal government's responsibilities under NHPA, the Federal government must consider the effects its actions may have on American Indian treaty rights. The Federal basis of a tribe's legal status rests within the context of U.S. Constitutional provisions for Federal government's powers for treaty making with other sovereign nations, and American Indian tribes' inherent sovereignty. One of the treaty-reserved rights is the ability to conduct fishing activities at all Usual and Accustomed locations. Tribal fisheries are central to the cultural and economic existence of the Tribes and their members.

Native American tribes that may be affected by the proposed action include the Muckleshoot Indian Tribe, Sauk-Suiattle Indian Tribe, Snoqualmie Indian Tribe, Stillaguamish Tribe of Indians, the Suquamish Tribe, Swinomish Indian Tribal Community, the Tulalip Tribes of Washington, and the Confederated Tribes and Bands of the Yakama Tribe. Of these tribes, the Tulalip Tribes of Washington have federally adjudicated off-reservation hunting and gathering rights to locations within the project area.

3.10.1 Alternative 1 – No-Action

The No-Action Alternative would eventually reduce access and capability for Native American fishing to occur due to shoaling in the channel and loss of navigability to some portions of the lower Snohomish River.

3.10.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

Maintenance dredging would keep the navigation channel open and navigable for fishing vessels to launch and access the lower Snohomish River for travel to Puget Sound, including access to Usual and Accustomed fishing and shellfishing locations. Thus, maintaining the project to authorized dimensions would further tribal fishing, an important economic and cultural activity for the tribe.

3.10.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years

The effects of Alternative 3 would be the same as Alternative 2.

3.11 Air Quality and Greenhouse Gas Emissions

In accordance with the Clean Air Act (CAA), the EPA set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to the environment and public health. The six principal pollutants, also known as "criteria" pollutants, are ozone, lead, particulate matter, carbon monoxide, nitrogen dioxide, and sulfur dioxide. Three agencies have jurisdiction over air quality in the project area: the EPA, Ecology, and the Puget Sound Clean Air Agency. These agencies establish regulations that govern both the concentrations of pollutants in the outdoor air and contaminant emissions from air pollution sources. Although their regulations are similar in stringency, each agency has established its own standards. Unless the state or local jurisdiction has adopted more stringent standards, the EPA standards apply.

For each pollutant, areas can be classified as non-attainment if air quality standards are not met followed by classification as a maintenance area if a plan to reduce the pollutant is needed. Snohomish County was a maintenance area for carbon monoxide and ozone until 2016 and is currently in compliance with NAAQS (Ecology 2018c). In 2013, the largest contributor of greenhouse gases in Washington was the transportation sector when fuel is used in cars, trucks, ships, trains, and planes (42.8%; Sandlin 2016). Significant point sources of air pollution in Snohomish County are the Boeing Commercial Airplane facility, Cathcart Landfill, and Northwest Pipeline Company (EPA 2017a).

Noise and disturbance levels are typically fairly high within the majority of the action area. Port Gardner Bay, the Everett Marina, and the shoreline of the lower Snohomish River are subject to frequent and periodically intense noise and disturbance associated with the commercial, maritime, and industrial facilities along the shoreline including marine traffic to and from the Everett Marina and the Everett Naval Station. The lower end of the river, including the downstream settling basin, is subject to recreational vessels of all types and sizes launching and mooring at the Everett Marina. This area also typically reflects the noise of motor vehicles along Interstate 5 and State Highway 529. Other typical existing noise consists of those generated by the ship traffic in the navigation channel, as well as air traffic from nearby Paine Field. Ambient airborne noise was measured at 72-95 dB re 1 µPa (Pentec Environmental 2010; SAIC 2011). Ambient underwater noise in the navigation channel was measured at 123-164 dB re 1 µPa (Pentec Environmental 2010; SAIC 2011).

For the alternatives analysis in this section, the quantity of potential air emissions was estimated using a calculation tool that factors engine horsepower and running time for non-road diesel equipment harborcraft, dredges, and barges; these emissions factors are from the South Coast Air Quality Management District (SCAQMD 2017) and the Sacramento Metropoliton Air Quality Management District (SMAQMD 2017). SCAQMD is the regulatory authority over air emissions in the South Coast air basin in Southern California. SMAQMD is the regulatory authority over air emissions in the County of Sacramento in Central California. The emissions estimate accounts for emissions associated with the operation of vessels and machinery with diesel engines used during dredging activities. These estimates are not intended as an exact calculation of the emissions associated with this project but rather as a means for comparison among the alternatives.

3.11.1 Alternative 1 – No-Action

Under the No-Action Alternative, there would be no change to the site that would affect local air quality or noise levels along the lower Snohomish River. The area would continue to be heavily industrialized with the incumbent air quality and noise issues associated with industrial traffic and processes. The Snohomish River would continue to support heavy industrial, commercial, and recreational vessel use with the associated levels of air pollution and noise generated until shoaling likely eventually reduces use of the navigation channel. The No-Action Alternative would avoid the contribution of noise and exhaust pollution that is typically contributed by the annual dredging operation, and would have no effect on greenhouse gas emissions.

3.11.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

The dredge and the tugs necessary to move the dredge and barges are fossil fuel powered and thus contribute to air pollution. Construction activities associated with the proposal would create air emissions from operating equipment in each of the dredging episodes over the next 15 years. The EPA established threshold levels of pollutants of concern for nonattainment or maintenance areas; the Everett Harbor and Snohomish River Navigation Channel is not located in a nonattainment or is no longer in a maintenance area because air quality in Snohomish County does not have air quality worse than the NAAQS (Ecology 2018c). Furthermore, the EPA sets threshold levels for the requirement of a conformity determination for key NAAQS pollutants in a nonattainment or maintenance area, but in addition to the proposed action not being located in a nonattainment or maintenance area, the thresholds do not apply to "maintenance dredging and debris disposal where no new depths are required, applicable permits are secured, and disposal will be at an approved disposal site" (40 CFR 93.153(c)(2)). Each dredging event will occur when the typical weather would be expected to disperse air pollutants. Emissions from the proposed action alone are not expected to cause adverse health effects or result in violation of applicable air quality standards, therefore, impacts will be inconsequential given the multitude of other contributing sources and the existing air quality in the project area.

Operation of the dredge and associated support vessels would emit greenhouse gasses, primarily carbon dioxide and carbon monoxide from burning fossil fuels (Table 5). In each of the dredging episodes, 60 days of work would emit an estimated 782.7 tons of carbon dioxide and 3.78 tons of carbon monoxide. Annual maintenance dredging constitutes approximately 0.017% of the 4.07 million metric tons of CO_2 emissions produced in 2015 from fossil fuel combustion in the industrial sector in Washington (EPA 2017b), and when compared to the global emissions measured at nearly 7,000 million metric tons in 2015 (EPA 2017b), the minor contribution of the proposed dredging would not constitute a measurable effect among the impacts of climate change and sea level rise and is therefore not considered a significant impact.

Table 5. Estimated emissions in tons per year for pollutants of concern (SCAQMD 2017; SMAQMD 2017).

Air Pollutant	Estimated annual emissions in tons
Reactive Organic Gasses (ROGs)	0.98
Carbon Monoxide (CO)	3.78
Nitrogen Oxides (NOx)	0.01
Sulfur Dioxide (SOx)	0.01
Particulate Matter (PM2.5)	0.55
Carbon Dioxide (CO_2)	782.7

3.11.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years

Due to the longer work period (about 90 days), Alternative 3 would have slightly greater emissions compared to those described for Alternative 2 (Table 5).

Table 6

Table 6. Estimated emissions in tons per year for pollutants of concern (SCAQMD 2017; SMAQMD 2017).

Air Pollutant	Estimated annual emissions in tons
Reactive Organic Gasses (ROGs)	1.5
Carbon Monoxide (CO)	5.7
Nitrogen Oxides (NOx)	0.1
Sulfur Dioxide (SOx)	0.1
Particulate Matter (PM2.5)	0.8
Carbon Dioxide (CO_2)	1174.0

3.12 Recreation and Scenic Values

Due to the highly developed character of the lands surrounding the navigation channel, the visual and aesthetic resources within the vicinity of the downstream settling basin and the navigation channel are limited. Jetty Island is visible to the west of the navigation channel and provides aesthetic interest and recreational opportunities to the area. Visual interest and aesthetics improve upstream within the navigation channel. The extensive mudflats along the northern end of Jetty Island and the mouth of the Snohomish River provide bird and wildlife watching opportunities to local residents and boaters. Aesthetics improve along the navigation channel within the vicinity of the upstream settling basin. Areas of intertidal marsh vegetation, overhanging riparian vegetation, and undeveloped portions of South Ebey Island, Spencer Island, and Smith Island provide visual interest, largely through bird and wildlife watching opportunities to the area.

Recreational opportunities include boating from the marina and visiting the beaches and waterfront parks at Jetty Island and Pidgeon Creek, where birdwatching, kiteboarding, and fishing from shore are popular. Charter fishing and whale watching departs from Everett. Historical attractions highlight the area's industrial, aerospace, and naval heritage.

3.12.1 Alternative 1 – No-Action

Under the No-Action Alternative, there would be little change to the site that would affect local aesthetics along the Snohomish River. The area would continue to be heavily industrialized with few areas of native habitat providing visual interest, particularly along the river channel above the upstream settling basin. The upstream and downstream portions of the river would continue to provide bird and wildlife watching opportunities. Shoaling would eventually reduce the ability of recreational users to access the navigation channel, marinas, and transit between the Snohomish River and Puget Sound. Shoaling may also impact the Jetty Island fast ferry operation from the Port of Everett to Jetty Island.

3.12.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

There is potential for some minor disruption of aesthetic resources during the mobilization and de-mobilization of the dredges and barges under the Alternative 2; however, these disruptions will be temporary and only affect the immediate vicinity of the dredging and disposal operations. There will be a temporary disruption to local bird and wildlife watching, especially at Jetty Island, as a result of the dredging and disposal activities, but the disruption will cease once dredging and disposal operations were concluded. Due to the temporary and localized nature of operating dredges, any changes to aesthetic opportunities within the action area as a result of dredging and disposal activities are short term and expected to be insignificant and discountable. This alternative is not expected to result in long-term degradation of aesthetic opportunities within the action area.

3.12.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years

Alternative 3 would have the same effects to recreation and aesthetics as Alternative 2 compared to the No-Action Alternative.

3.13 Socioeconomic Resources

The project area is contained in Snohomish County, a 2,196 square mile area that includes the city of Everett and nearby towns (e.g., Mukilteo, Edmonds, and Snohomish). The navigation channel is located in a commercial and industrial waterfront area where transportation of goods and services occurs. Main local employers include the Port and City of Everett, Naval Station Everett, the Boeing Company, Everett Community College, marinas, and service-based industries. The Port of Everett supports more than 34,000 jobs and nearly $30 billion worth of U.S. exports, and is the third largest container port in the state (Port of Everett 2015). Recently, cities and suburban areas in the Snohomish River basin have grown rapidly and the human population is projected to increase by 59% in 2030 (Snohomish County 2017).

The Port owns about 3,000 acres of property around and near the navigation channel (Port of Everett 2015). The Census reports that in 2016, 17.6% of the population of Everett was below the poverty level (ACS 2017b). In 2010, there were 44,609 housing units in the community, of which 92.6% were occupied

and 7.4% were vacant. Of the occupied housing units, 45.4% were owner occupied and 54.6% were renter occupied (U.S. Census 2010).

According to the 2010 U.S. Census, Everett had a population of 103,019, with a gender distribution of 50.9% male and 49.1% female. In 2010, about 74.6% of residents were White, about 1.4% American Indian and Alaska Native, 4.1% Black or African American, 7.8% Asian, 0.7% Native Hawaiian and other Pacific Islander, 6.1% some other race, and 5.3% two or more races. 14.2% of residents identified as Hispanic or Latino. The median age in Everett in 2010 was 34.4 years, compared to the national median age of 37.2 years. The American Community Survey (ACS) reported that 88.9% of people ages 25-34 years were high school graduates, compared to 90.8% statewide during 2012-2016 (ACS 2017a). The number holding a Bachelor's degree or higher were 20.6% compared to the statewide 34.5% (ACS 2017).

3.13.1 Alternative 1 – No-Action

The No-Action Alternative poses a substantial risk to the socioeconomic well-being of the local community in the City of Everett and Snohomish County because ocean-going vessels would not be able to access the Port of Everett or other industrial businesses along the lower Snohomish River. Eventually, recreational watercraft movement would be limited. This would likely reduce the number of jobs available in the local area, reduce economic input by tourism, and could negatively impact Snohomish County.

3.13.2 Alternative 2 – Dredge Navigation Channel and Settling Basins to Channel Depth Annually

The dredging project has important socioeconomic benefits for Snohomish County and nearby towns. Maintaining the navigability of the channel would preserve the socioeconomics of the towns around Everett Harbor by maintaining access through the Snohomish River. Ocean-going commercial vessels would be able to continue using Everett Harbor for shipping goods to and from the West Coast. Providing sediment to Jetty Island and sediment to the nearshore zone would also benefit the local economy by attracting visitors to local beach activities. The proposed continued maintenance dredging and material placement would not have a significant negative impact on the socioeconomics of southwestern Washington.

3.13.3 Alternative 3 – Dredge Navigation Channels and Settling Basins in Alternate Years

Alternative 3 would have the same effects to socioeconomic resources as described for Alternative 2 compared to the No-Action Alternative.

4 Cumulative Effects Summary

The NEPA defines cumulative effects as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR §1508.7).

The shoreline of the City of Everett has endured significant modifications to support the Port of Everett activities and commercial developments (Figure 12). Much of the historic intertidal and freshwater wetlands were converted to uplands by diking, draining, and filling, primarily for agricultural use.

Following the authorization of federal dredging, intertidal areas were converted to uplands using dredged material as fill on which to build wharves, buildings, factories and streets.

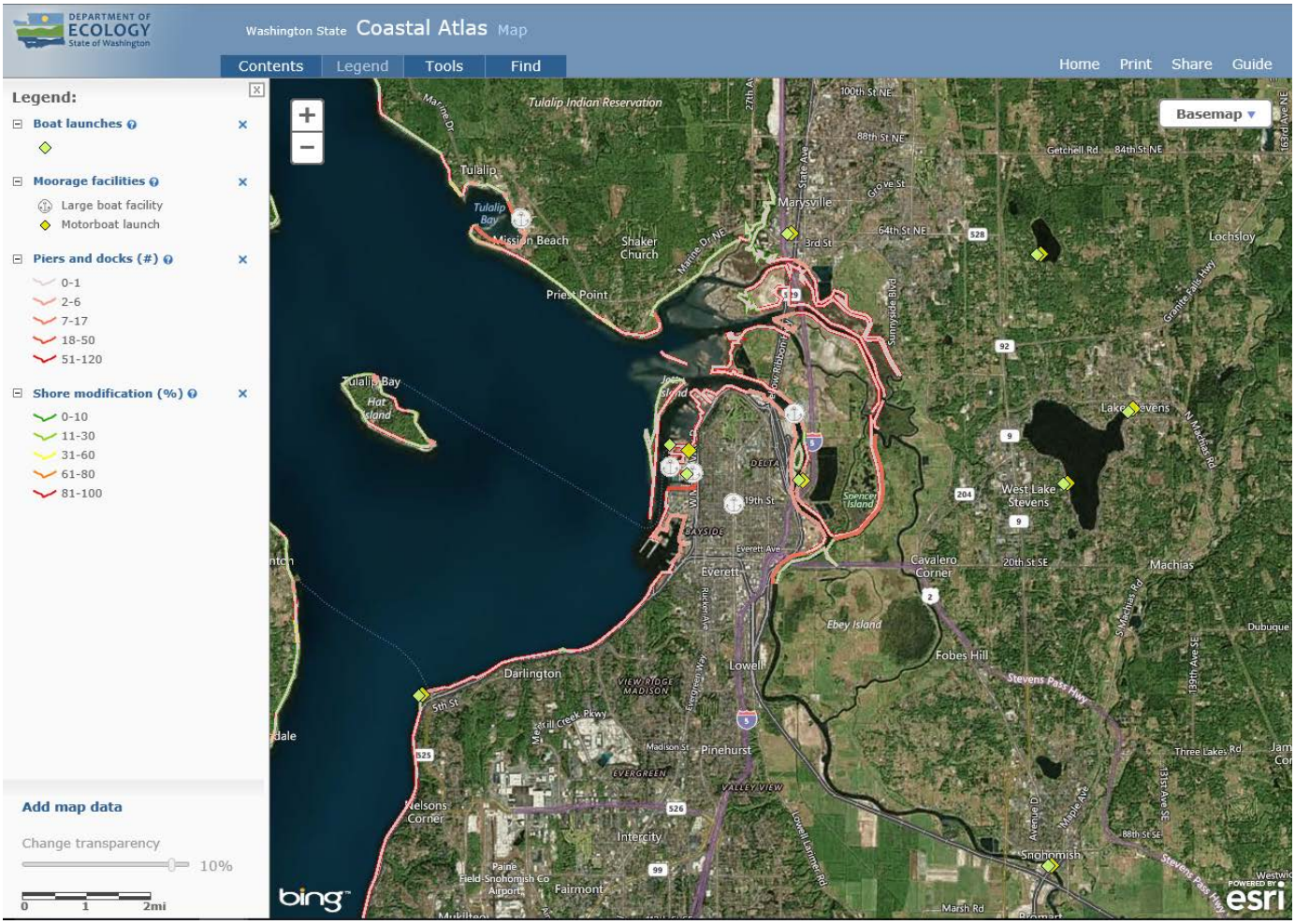

Figure 12. Map of shoreline modifications around the Everett Harbor and Snohomish River navigation channel.

Construction and repair of navigation features and other anthropogenic activities is linked to a loss of about 18.5 square miles of freshwater tidal wetlands (about 90%) and about 5 square miles of oligohaline transition wetlands in the Snohomish River delta (Simenstad et al. 2011). The only near-term USACE action anticipated to occur at the Everett Harbor and Snohomish River Navigation Channel project site includes potential repair and maintenance of the project features to authorized dimensions, and continued maintenance dredging of up to 1.2 million CY annually. Dredging quantities of the past eight years appear in Figure 13. The average quantity dredged is about 150,000 CY annually and the greatest amount dredged in this period occurred in 2010 when 329,594 CY were removed (Figure 13). The USACE has analyzed impacts of dredging up to 1.2 million CY annually.

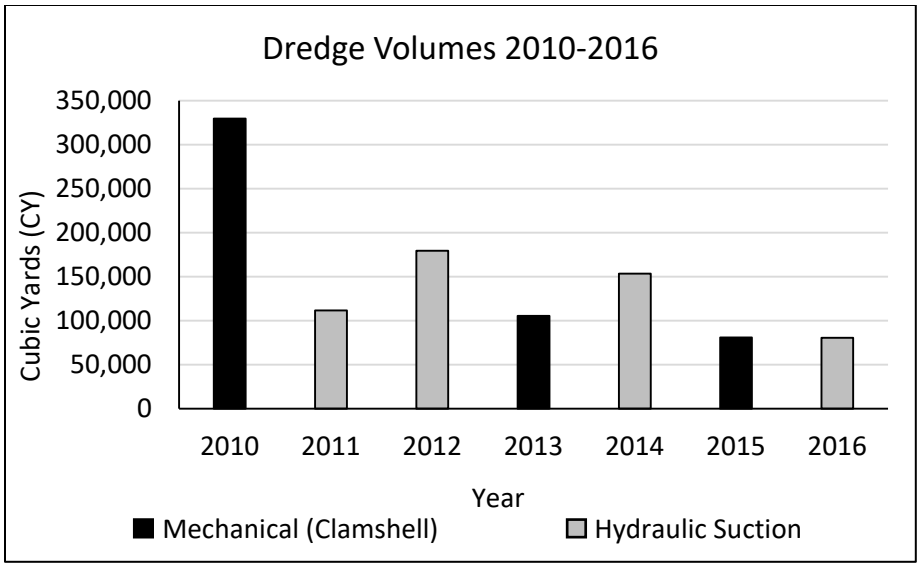

Figure 13. Everett Harbor and Snohomish River navigation channel dredge volumes 2010-2016.

Besides the maintenance dredging of the navigation channel, other activities are likely to occur in the project area. The Water Resource Inventory Area (WRIA) 7 has numerous habitat restoration and conservation projects ongoing or planned (Figure 13). From 2005 to 2015, activities from the Snohomish River Basin Salmon Conservation Plan have been completed or are still in progress (Snohomish County 2016). Projects that were completed include levee removals, floodplain reconnections or restorations, and off-channel habitat reconnection to improve habitat for salmonids (Snohomish County 2016). Within WRIA 7, 164 acres of riparian habitat and 836 acres of estuarine tidal marsh were restored, and 31 large wood jams were added to the mainstem and floodplain habitat (Snohomish County 2016).

The Port of Everett has several projects within Everett Harbor and the lower Snohomish River. Regular maintenance dredging occurs in their marinas and at the 10th Street Boat Launch, and maintenance is performed on their infrastructure, such as bulkheads, docks, lift station, and stormwater system. The Port is responsible for compliance with applicable laws and regulations for their projects, and to obtain the necessary permits, including any from USACE Regulatory. If the 10th Street Boat Launch is hydraulically dredged, the material would be placed on Jetty Island in an area that has been steadily eroding for several decades. Material placement would reduce the erosion to stabilize Jetty Island and prevent a tidal channel from forming, although approximately 0.04 acres of brackish marsh would be covered by material (Port of Everett 2017).

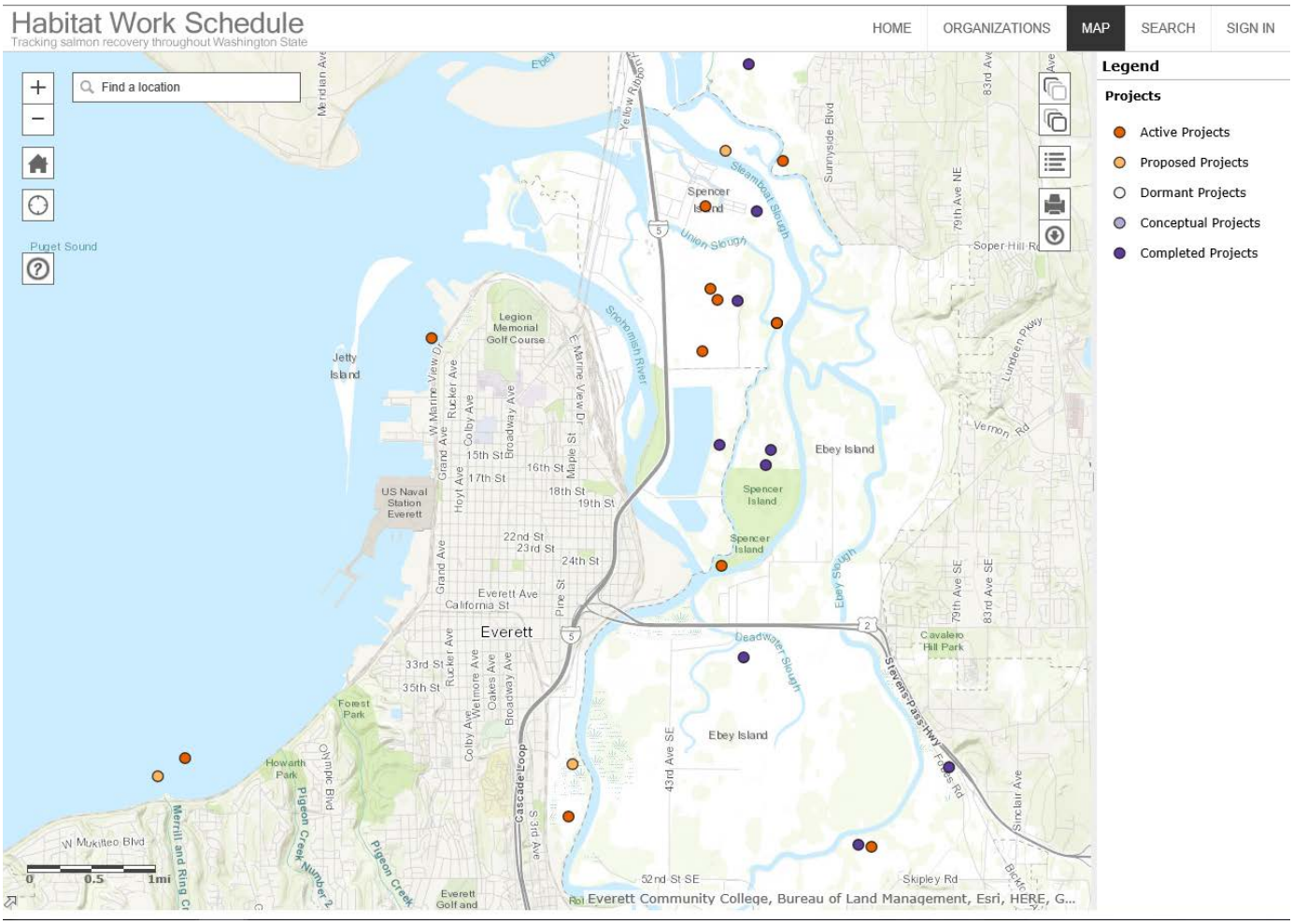

Figure 14. Active, proposed, and completed habitat protection and restoration projects in Water Resource Inventory Area (WRIA) 7 around the project area (HWS 2018).

The proposed maintenance dredging and disposal would cause a temporary effect to biological functions and minor, temporary loss of benthic invertebrates, but would maintain authorized depths. In consideration of past developments still in existence, and the limited amount of known future alterations, the proposed routine maintenance of the Federal navigation channel with associated disposal sites is not a significant addition to cumulative impacts at the Port of Everett. The USACE therefore concludes that there would be no significant contribution to cumulative effects associated with the proposed maintenance dredging and placement actions.

5 Mitigation for Environmental Effects

No compensatory mitigation is proposed for this action as no loss of wetlands, no substantial adverse effects to ESA-listed species, and no significant impacts to commercially important species or protected marine mammals are anticipated to occur based on the analyses in this document. The USACE will implement several avoidance and minimization measures to ensure impacts are no greater than minimal, short-term effects. As part of the ESA compliance process, the USACE developed a list of

conservation measures to reduce environmental impacts of dredging to ESA-listed species. These measures appear below:

1. The USACE will use a clamshell (mechanical) dredge whenever possible to minimize the possibility of entraining or otherwise harming ESA-listed species.
2. The clamshell dredging operation will be conducted in a manner that minimizes spillage of excess sediments from the dredge bucket and transport barge to minimize effects to water quality.
3. The USACE will conduct dredging operations during the prescribed work window. If this cannot be done due to extenuating circumstances, then the USACE will notify the Services and re-consult if necessary.
4. Maintenance dredging will be conducted based on the results of site-specific hydrographic condition surveys conducted for the year of dredging.
5. The USACE will obtain suitability determinations of the sediment following DMMP protocols for sediment disposal and beneficial use.
6. Material determined unsuitable for open-water disposal will be disposed at an approved upland site.
7. Barges used to transport the dredged material to the disposal or transfer sites will not be filled beyond their capacity so that they will completely contain the dredged material.
8. The USACE will require barge operators to maintain the seals on the bottom dump barges to minimize loss of sediment during transport.
9. The USACE will coordinate with the local Indian Tribes that have usual and accustomed fishing rights in the project area.
10. The USACE will coordinate with WRIA groups, per the Salmon Habitat Recovery Plan and other local restoration/stewardship groups, to identify individual and long-term opportunities for beneficial use of dredged material. If beneficial use opportunities are identified, and funds are available, then the USACE will consult with the Services on the beneficial use opportunities.
11. If killer whales approach active tugs towing barges, the tug will continue under power and at a safe speed to maintain safe control of the tug and barge(s). The USACE acknowledges the 2011 expansion of the required vessel separation zone around killer whales (76 FR 20870).
12. Bottom dump barges will not dump when killer whales are nearby; this is to eliminate the possibility of the material hitting a killer whale as it descends through the water column.
13. Once the material has been removed, the material will not be dumped back into the water, except into a disposal or beneficial use site.

6 Coordination

The USACE has coordinated with Federal and state agencies and tribes regarding maintenance dredging of the Federal navigation channel. Coordination activities have included ESA consultation, public notice, a presentation to DMMP agencies, and coordination with the Muckleshoot Indian Tribe, Sauk-Suiattle Indian Tribe, Snoqualmie Indian Tribe, Stillaguamish Tribe of Indians, Swinomish Indian Tribal Community, the Suquamish Indian Tribe, the Tulalip Tribes of Washington and the Yakama Nation. Coordination would continue through the period of proposed maintenance dredging to notify regulatory

agencies and stakeholders and to adapt to changing conditions. During the development of this EA, the USACE consulted and coordinated with the following entities and agencies:

- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- National Marine Fisheries Service
- Washington Department of Archaeology and Historic Preservation
- Washington Department of Fish and Wildlife
- Washington Department of Natural Resources
- Washington State Department of Ecology
- Muckleshoot Indian Tribe
- Sauk-Suiattle Indian Tribe
- Snoqualmie Indian Tribe
- Stillaguamish Tribe of Indians
- Swinomish Indian Tribal Community
- Suquamish Indian Tribe
- Tulalip Tribes of Washington
- Yakama Nation

7 Environmental Compliance

The USACE has analyzed the environmental effects of the alternatives and the following sections describe how the preferred alternative complies with all pertinent environmental laws and executive orders.

7.1 National Environmental Policy Act

The National Environmental Policy Act (NEPA) (42 U.S.C. §4321 et seq.) commits Federal agencies to considering, documenting, and publicly disclosing the environmental effects of their actions and to solicit public comment on the proposal. As required by NEPA, this EA describes existing environmental conditions in the project area, the proposed action and alternatives, potential environmental effects of the proposed project, and measures to minimize environmental effects. The USACE circulated the Draft EA and Draft FONSI for a 30-day public comment period per NEPA requirement 15 June through 15 July 2018. No comments were received. The Final EA will be published on the USACE website.

7.2 Endangered Species Act

The Endangered Species Act (ESA) (16 U.S.C. §1531-1544), Section 7(a) requires that Federal agencies consult with NMFS and USFWS, as appropriate, to ensure that proposed actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their critical habitats.

The USACE determined that the proposed maintenance dredging and dredged material placement at Jetty Island and Parcel O sites may affect, but is not likely to adversely affect any ESA-listed species or designated critical habitat and prepared documentation of this determination for activities over the next 25 years (USACE 2016). The USFWS agreed with this determination and the USACE received a letter of concurrence 24 May 2017. NMFS agreed that the proposed action is not likely to adversely affect most

ESA-listed species or designated critical habitat; however, NMFS concluded that Puget Sound Chinook salmon and steelhead, with their critical habitat, are likely to be adversely affected by the proposed action and the USACE received a biological opinion 26 January 2018 (NMFS 2018). Use of the Port Gardner open-water disposal site (USACE 2015) has undergone separate ESA consultation for disposal through 2040. The USACE determined the proposed dredged material placement at the Port Gardner open-water sites is not likely to adversely affect any ESA-listed species or designated habitat and prepared documentation of this determination (USACE 2015). The USFWS provided a letter of concurrence 28 July 2015 (USFWS 2015) and NMFS provided a biological opinion for adverse effects to rockfish in the Puget Sound/Georgia Basin 17 December 2015 (NMFS 2015). NMFS required the USACE to implement Reasonable and Prudent Measures (RPMs) in the biological opinion by following terms and conditions to minimize the level of "take" associated with the proposed action for these species. The USACE has incorporated the RPMs into the Mitigation and Monitoring section of the draft EA for disposal of dredged material. The USACE will comply with the reasonable and prudent measures of the biological opinions to avoid and minimize adverse impacts to ESA-listed species during maintenance dredging and dredged material placement.

7.3 Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) of 1972 (16 U.S.C. §1361-1407) restricts harassment of marine mammals and requires interagency consultation in conjunction with the ESA consultation for Federal activities. All marine mammals are protected under the MMPA regardless of whether they are endangered, threatened, or depleted. Marine mammal species that have been observed in the action area include harbor seal (*Phoca vitulina*), SRKW (*Orcinus orca*), and California sea lion (*Zalophus californianus*). Other species that may occur in Puget Sound, but are unlikely to enter the dredging area or beneficial use placement sites include Steller sea lion (*Eumetopias jubatus*), harbor porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), Minke whale (*Balaenoptera acutorostrata*), and gray whale (*Eschrichtius robustus*).

The primary concern for marine mammals in dredging projects is underwater noise from construction. The effects of dredging on marine mammals are not expected to rise to the level of take (78 FR 30875, 78 FR 4541). NMFS does not require incidental harassment authorization with regard to dredging operations (Reine and Dickerson 2014). The USACE has compared the estimated noise from dredging and the guidance on assessing impacts and concluded that there is no requirement for an Incidental Harassment Authorization (see section 3.6 for analysis). The USACE will implement all practicable conservation measures and will use BMPs as appropriate to avoid and minimize impacts of noise to marine mammals.

7.4 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), (16 U.S.C. §1801 et. seq.) requires Federal agencies to consult with NMFS on activities that may adversely affect Essential Fish Habitat (EFH). The objective of an EFH assessment is to determine whether the proposed action(s) "may adversely affect" designated EFH for relevant commercial, federally managed fisheries species within the proposed action area. The assessment also describes conservation measures proposed to avoid,

minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed action.

The USACE determined that maintenance dredging and disposal may adversely affect EFH, because removal or open-water disposal of dredged material would constitute a detectable effect to EFH (USACE 2017). NMFS concurred with this determination and provided EFH conservation recommendations that would minimize and/or avoid adverse effects on EFH for Pacific Coast Salmon, Pacific Coast Groundfish, and Coastal Pelagic Species (NMFS 2018). The USACE provided a detailed response to NMFS within 30 days as required by section 3.5(b)(4)(B) of the MSA that agreed with all conservation recommendations, except to return all woody debris to the waterway; NMFS informally concurred with this response. Standard practice is to dredge around large logs with or without root wad so that they remain in the water. Other woody debris is typically small fragments of trees, bushes, or scrap lumber, and not of the quality to be beneficially used. If this woody debris is larger than two feet in any dimension, it is separated from the dredged material and disposed of at an appropriate disposal facility.

The USACE determined that use of the multiuser open-water placement sites may adversely affect EFH (USACE 2015) and received concurrence from NMFS 17 December 2015 (NMFS 2015). The USACE provided a detailed response to NMFS within 30 days as required by section 3.5(b)(4)(B) of the MSA.

7.5 Clean Water Act

The Clean Water Act (33 U.S.C. §1251 et seq.) establishes a Federal policy of protecting the waters of the U.S. The USACE regulations implementing the Act require selecting the means of placement of dredged or fill material into water that, after considering all reasonable and practicable alternatives, represents the least costly alternative that is consistent with sound engineering practices and meets the environmental standards of the Section 404(b)(1) evaluation guidelines. The sections of the Clean Water Act that apply to the proposal are 401 regarding discharges to waterways and 404 regarding fill material in waters.

Section 401

Any project that involves placing dredged or fill material in waters of the U.S. or wetlands, or mechanized clearing of wetlands, requires a water quality certification from EPA or the state agency as delegated by EPA. For this project, the delegated authority is Ecology. For the previous dredging cycle, the USACE received Water Quality Certification Order # 8974 from Ecology. The USACE has initiated coordination with Ecology to certify that the proposed Federal to discharge dredge material into the waters of the United States will be compliant with the applicable state water quality standards. The USACE received a 401 Water Quality Certification (#15949) from Ecology on 07 August 2018 that is in effect until 14 February 2029 for the USACE to dredge a total volume of dredge material no more than 800,000 cubic yards (CY) per dredge cycle from the Snohomish River navigation channel and settling basins. Should the USACE plan to remove more than 800,000 CY in a particular dredge cycle, the USACE would reinitiate coordination with Ecology, reopen this Environmental Assessment and its conclusion, and reevaluate the finding of no significant impact (FONSI) as necessary.

Section 404

Under the "Federal Standard" implementing Section 404, no discharge of dredged or fill material may take place unless it can be demonstrated that disposal would occur in the least costly, environmentally acceptable manner, consistent with engineering requirements established for the project. To comply with Section 404, it is necessary to avoid negative effects to waters of the U.S. wherever practicable, minimize effects where they are unavoidable, and compensate for effects in some cases. The USACE has prepared a Section 404(b)(1) Evaluation and public interest review, which appears in Appendix A. The findings are that there would be no significant adverse effects to aquatic ecosystems functions and values, that this project is within the public interest. Alternative 3 is the agency preferred alternative and meets the Federal Standard for least cost environmentally acceptable alternative.

7.6 Coastal Zone Management Act

The Coastal Zone Management Act of 1972 as amended (16 U.S.C. §1451-1464) requires Federal agencies to conduct activities in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved State Coastal Zone Management Program. The USACE is substantively consistent with the enforceable polices of the applicable Shoreline Master Programs and provided documentation of this through a general consistency determination submitted to Ecology in (Appendix D). The USACE submitted a CZMA consistency determination to Ecology on 10 April 2018, as part of the Water Quality Certification package. Ecology requested a 30-day review extension 29 May 2018 and the USACE agreed to extend the review period until 30 June 2018. Concurrence has not been received from the Washington Department of Ecology (Ecology) specifically concurring that consistency with CZMA is achieved. Because of lack of action within the prescribed 90-day time period, as extended, Ecology's concurrence that the project is consistent to the maximum extent practicable with the enforceable policies of Washington State Coastal Zone Management Program is presumed in accordance with 33 CFR 336.1(b)(9)(iv) and 15 CFR 930.41(a).

7.7 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (16 USC 470) requires Federal agencies to take into account the effects of proposed Federal undertakings on historic properties included or eligible for the National Register of Historic Places. The implementing regulations for Section 106 (36 C.F.R. § 800) require Federal agencies to consult with various parties, including the Advisory Council on Historic Preservation, the State Historic Preservation Office (SHPO), and Indian tribes, to identify and evaluate historic properties and to assess and resolve effects to historic properties.

No cultural resources have been identified within or adjacent to the Snohomish River Federal Navigation Channel. The USACE has consulted with the SHPO, Muckleshoot Indian Tribe, the Sauk-Suiattle Indian Tribe, the Snoqualmie Indian Tribe, the Stillaguamish Tribe of Indians, the Suquamish Tribe, the Swinomish Indian Tribal Community, the Tulalip Tribes of Washington, and the Confederated Tribes and Bands of the Yakama Nation. On 28 March 2018 the USACE sent an area of potential effects (APE) letter to the SHPO describing the project and area of potential effects. On the same date, the USACE sent letters to the Muckleshoot Indian Tribe, the Sauk-Suiattle Indian Tribe, the Snoqualmie Indian Tribe, the Stillaguamish Tribe of Indians, the Suquamish Tribe, the Swinomish Indian Tribal Community, the Tulalip Tribes of Washington, and the Confederated Tribes and Bands of the Yakama Nation asking if there are any properties of cultural or religious significance that would be affected by the project. On 29 March

2018 the SHPO responded by letter concurring with the USACE APE. On 20 April 2018, the USACE sent a letter to the SHPO detailing the USACE finding of "no historic properties affected". The SHPO responded on 23 April 2018, concurring with the USACE determination of "no historic properties affected". To date, the USACE has not received a response from the Tribes. See Appendix D for correspondence.

7.8 Clean Air Act

The Clean Air Act (CAA) as amended (42 U.S.C. §7401, et seq.) prohibits Federal agencies from approving or conducting any action that does not conform to an approved state, tribal, or Federal implementation plan. Under the CAA General Conformity Rule (Section 176(c)(4)), Federal agencies are prohibited from approving any action that causes or contributes to a violation of a NAAQS in a nonattainment area. According to 40 CFR Section 93.153 (c)(2)(ix), the requirement for a conformity determination is waived where the proposal will result in a clearly *de miminis* increase in emissions, as long as the project involves maintenance dredging and disposal operations in which no new depths are required and approved disposal sites are used. The proposed action is maintenance dredging and placement at approved sites with no new widths or depths, in an attainment area where no more than *de minimis* increase in emissions would be generated, and is therefore exempt from the requirement for a General Conformity Determination.

7.9 Native American Tribal Treaty Rights

In the mid-1850s, the United States entered into treaties with many Native American tribes in the Northwest. These treaties guaranteed the signatory tribes the right to "take fish at usual and accustomed grounds and stations . . . in common with all citizens of the territory" [*U.S. v. Washington*, 384 F. Supp. 312 at 332 (WDWA 1974)]. In *U.S. v. Washington*, 384 F. Supp. 312 at 343 - 344, the court resolved that the Treaty tribes have the right to take up to 50 percent of the harvestable anadromous fish runs passing through those grounds, as needed to provide them with a moderate standard of living (Fair Share). Over the years, the courts have held that this right comprehends certain subsidiary rights, such as access to their "usual and accustomed" fishing grounds. More than *de minimis* effects to access usual and accustomed fishing area may violate this treaty right [*Northwest Sea Farms v. Wynn*, F. Supp. 931 F. Supp. 1515 at 1522 (WDWA 1996)]. In *U.S. v. Washington*, 759 F.2d 1353 (9th Cir 1985) the court indicated that the obligation to prevent degradation of the fish habitat would be determined on a case-by-case basis. The Ninth Circuit has held that this right encompasses the right to take shellfish [*U.S. v. Washington*, 135 F.3d 618 (9th Cir 1998)].

The Tulalip Tribes of Washington and the Swinomish Indian Tribal Community have coordinated with the USACE regarding maintenance dredging of the Federal channel and access to ocean fisheries. Additionally, the USACE has initiated consultation with tribal leaders and natural resource directors regarding avoiding impacts to tribal fisheries resources.

The proposed project has been analyzed with respect to its effects on the treaty rights described above. The USACE has determined that the proposed project will not impair the Treaty rights of the Muckleshoot Indian Tribe, the Sauk-Suiattle Indian Tribe, the Stillaguamish Tribe of Indians, the Suquamish Indian Tribe, the Swinomish Indian Tribal Community, the Tulalip Tribes of Washington, or the Yakama Nation. The Snoqualmie Indian Tribe does not have treaty rights in this area.

7.10 Migratory Bird Treaty Act and Executive Order 13186 Migratory Bird Habitat Protection

The Migratory Bird Treaty Act (16 U.S.C. §703-712) as amended protects over 800 bird species and their habitat, and commits that the U.S. will take measures to protect identified ecosystems of special importance to migratory birds against pollution, detrimental alterations, and other environmental degradations. EO 13186 directs Federal agencies to evaluate the effects of their actions on migratory birds, with emphasis on species of concern, and inform the USFWS of potential negative effects to migratory birds.

Implementation of the preferred alternative would not have any direct and deliberate negative effects to migratory birds. There would be no adverse effect on habitat and the project would only have minor and temporary effects to a small number of individual birds that may be present in the project area. No permit application for "take" of migratory birds is thus required. These birds are assumed to be habituated to the noise and activity of the industrialized project area.

7.11 Executive Order 13175 Consultation and Coordination with Indian Tribal Governments

Executive Order 13175 (6 November 2000) reaffirmed the Federal government's commitment to a government-to-government relationship with Indian tribes, and directed Federal agencies to establish procedures to consult and collaborate with tribal governments when new agency regulations would have tribal implications. The USACE has a government-to-government consultation policy to facilitate the interchange between decision makers to obtain mutually acceptable decisions. In accordance with this Executive Order, the USACE has engaged in regular and meaningful consultation and collaboration with the federally recognized tribes in the project area, the Muckleshoot Indian Tribe, Sauk-Suiattle Indian Tribe, Snoqualmie Indian Tribe, Stillaquamish Tribe of Indians, the Suquamish Indian Tribe, Swinomish Indian Tribal Community, the Tulalip Tribes of Washington, and the Yakama Nation. Letters were sent to the federally recognized tribes 27 March 2018 to solicit their input prior to releasing the draft EA for public review.

7.12 Executive Order 12898, Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" provides that each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. Environmental justice concerns may arise from impacts on the natural and physical environment, such as human health or ecological impacts on minority populations, low-income populations, and Indian tribes or from related social or economic impacts.

The USACE evaluated the nature and location of the proposed maintenance dredging and disposal and used the EPA Environmental Justice Viewer to determine whether minority populations, low-income populations, or Indian tribes are present in the action area and may be affected. The USACE has analyzed the potential effects of the alternatives on communities within a 3-mile radius of the proposed action and found that there would be no disproportionately high and adverse human health impacts to any environmental justice communities.

7.13 Executive Order 11990, Protection of Wetlands

Executive Order 11990 entitled Protection of Wetlands (May 24, 1977) requires Federal agencies to take action to avoid adversely impacting wetlands wherever possible, to minimize wetlands destruction and to preserve the values of wetlands, and to prescribe procedures to implement the policies and procedures of this Executive Order. The preferred alternative of dredging in alternate years with placement of dredged material at upland or nearshore aquatic sites, or at the Port Gardner open-water site, would have no effect to existing tidal wetlands, as dredging would maintain existing conditions and the placement sites are sufficiently distant so as not to influence any wetlands.

7.14 Executive Order 11988, Floodplain Management

Executive Order 11988 entitled Floodplain Management (24 May 1977) requires Federal agencies to recognize the significant values of floodplains and to consider the public benefits that would be realized from restoring and preserving floodplains. It is the general policy of the USACE to formulate projects that, to the extent possible, avoid or minimize adverse impacts associated with use of the base floodplain and avoid inducing development in the base floodplain unless there is no practicable alternative that meets the project purpose. Per the procedures outlined in ER 1165-2-26 (Implementation of Executive Order 11988 on Flood Plain Management), the USACE has analyzed the potential effects of the recommended plan on the overall floodplain management of the study area.

Executive Order 11988 outlines the responsibilities of Federal agencies in the role of floodplain management. Each agency shall evaluate the potential effects of actions on floodplains and should avoid undertaking actions that directly or indirectly induce growth in the floodplain or adversely affect natural floodplain values. This EA evaluates effects of alternative water operations on flooding and floodplains. No development in any floodplain is anticipated because of the alternatives considered.

There are eight steps to the decision making process required in this Executive Order. The eight steps and responses to them are summarized below.

1. Determine if the proposed action is in the base floodplain.
   The proposed actions are located within the base floodplains for the Snohomish River.
2. If the action is in the floodplain, identify and evaluate practicable alternatives to locating in the base floodplain.
   As the primary objective of the project is to maintain the congressionally authorized depths of the Everett Harbor and Snohomish River Navigation Channel, there are no practicable alternatives completely outside of the base floodplain that would achieve this objective.
3. Provide public review.
   The proposed project has been coordinated with the public, government agencies, and interested stakeholders. Preparation of this EA is a part of the public review process.
4. Identify the impacts of the proposed action and any expected losses of natural and beneficial floodplain values.
   Chapter 3 of this document presents an analysis of alternatives. Practicable measures and alternatives were formulated and potential impacts and benefits were evaluated. The anticipated impacts associated with the recommended plan are summarized in Chapters 3 and 4

of this report. While construction of the project would result in mostly minor and temporary adverse impacts to the natural environment, the proposed action will meet the proposed purpose of the project. For each resource analyzed in Chapter 3, wherever there is a potential for adverse impacts, appropriate best management practices or other environmental considerations were identified. As there is a no permanent impact to biological resources, no biological mitigation is required for the proposed project. No loss of natural or beneficial floodplain values are anticipated as a result of the proposed dredging operations.

5. Minimize threats to life and property and to natural and beneficial floodplain values. Restore and preserve natural and beneficial floodplain values.
   Implementing the proposed project would have no significant impacts on human health, safety, and welfare. The proposed project will maintain safe navigation within the navigation channel.

6. Reevaluate alternatives.
   Chapter 3 of this document presents an analysis of alternatives. There are no practicable alternatives completely outside of the base floodplain that would achieve study objectives.

7. Issue findings and a public explanation.
   The public will be advised that no practicable alternative to locating the proposed action in the floodplain exists, as indicated in Item 3 above.

8. Implement the action.
   The proposed project does not contribute to increased development in the floodplain and does not increase flood risk. The recommended plan is consistent with the requirements of this Executive Order.

8 Unavoidable Adverse Impacts

The primary unavoidable adverse impact under either Alternatives 2 or 3 would be disruption of the benthic community in the Everett Harbor and Snohomish River navigation channel and the disposal sites. Alternative 2 would disrupt the benthic community of the entire project area annually while impacts from Alternative 3 would occur to half the project area annually; invertebrate communities are likely to recover within the basin due to infrequency of dredging. Another unavoidable adverse impact would be air pollution and greenhouse gas emissions from the dredge and associated machinery. Both air pollution and greenhouse gas emissions would be *de minimis*, although Alternative 3 would produce slightly more air pollution and greenhouse gas emissions than Alternative 2.

There would be some effects to water quality in the immediate vicinity of the active dredge and during dredge material disposal. Any effects to water quality would be short lived and small scale. Therefore, any effects to water quality would be insignificant. Effects to aquatic wildlife would be minimized by working during times of the year when ecologically important aquatic species (including ESA-listed species) would not be in the area or in low abundance, and using a clamshell dredge where feasible, which has low entrainment. The dredge project would not negatively affect the geomorphology of the project area. Noise and light impacts would be temporarily increased by the proposed dredging operation, but to a minor degree.

Sediment re-suspension would lead to increased turbidity in the vicinity of the dredge operation and at the disposal sites. However, the Dredged Material Evaluation and Disposal Procedures User Manual User Manual standards for sediment are designed to be protective of organisms that come into contact with sediments, and concentrations and bioavailability of contaminants in sediments suspended during dredging and disposal are below levels that may cause harm to juvenile or adult salmonids. Sediments to be removed from Everett Harbor and Snohomish River navigation channel have been tested and approved for open-water disposal under the DMMP guidelines.

9 Comparison of No-Action and Other Alternatives

Some effects to the human environment would be greater under the preferred alternative (Alternative 3) than under the no action alternative. The atmospheric environment would continue to be indirectly affected with the preferred alternative by maintaining ocean-going vessel access to Everett Harbor thus slightly increasing air pollution in the City of Everett area. Under the no action alternative there would be no future dredging which eventually could significantly reduce vessel access to the harbor resulting in localized improved air quality.

Changes to the aquatic environment would perhaps be the most dramatic under the no-action alternative. Substrate contours in the Snohomish River would be allowed to undergo natural changes and fauna associated with the substrate may progress to a natural, climax state. Overall this would be beneficial to the aquatic environment and any ESA-listed species in the area. However, the no action alternative would not meet the project purpose and need, as well as significantly negatively affect the local economy of Snohomish County. Commercial fishing, recreational, and charter boats would not be able to use the marina for mooring. Ocean-going shipping vessels would not be able to load or unload cargo.

The no action alternative was rejected because it does not meet the purpose and need for the project. Alternative 2 has a shorter duration (60 days instead of 90 days), but disrupts the entire navigation channel annually and may require non-routine maintenance dredging due to the shallow dredging depths; in comparison, Alternative 3 dredges half the navigation channel annually to deeper depths. The preferred alternative (Alternative 3) is recommended because it would fully achieve the project purpose. The preferred alternative would have greater effect on the environment than the no action alternative, but the proposed dredge project would be cost effective relative to meeting the purpose and need of the proposed project, and would provide the greatest safety for vessels using Everett Harbor. Although the preferred alternative would have a greater effect on the aquatic environment, work window restrictions and other mitigation measures would avoid or minimize effects to the aquatic environment.

10 Public Interest Evaluation Factors for Maintenance Dredging Activities

The USACE conducted an evaluation of the dredging and placement activity in light of the public interest factors prescribed in 33 CFR 336.1(c). These factors include: navigation and the Federal standard for dredged material disposal; water quality; coastal zone consistency; wetlands; endangered species;

historic resources; scenic and recreation values; fish and wildlife; marine sanctuaries; and applicable state/regional/local land use classifications, determinations, and/or policies. Of these, navigation and the Federal standard, water quality, coastal zone consistency, wetlands, endangered species, historic resources, scenic values, recreational values, and fish and wildlife have been evaluated in this EA. The factor of marine sanctuaries established under the Ocean Dumping Act has been considered; there are no sanctuary effects of dredging or placement. The factor of application of non-Federal land use policies was considered in connection with the coastal zone consistency evaluation; no additional impacts to state/regional/local land use classifications, determinations, and/or policies are anticipated as the project would maintain a federally authorized channel that is already used for vessel traffic.

In accordance with 33 CFR 337.1(a)(14) and 325.3(c)(1), the USACE considered the following additional relevant factors:

- Conservation: This action would entail maintenance dredging, and would not involve any new channel construction or change to channel depths. The effects on fish and wildlife, including marine mammals and ESA-listed species, have been fully evaluated. This project would conserve some dredged material as a resource as beneficial use in the nearshore zone (Jetty Island) to return the sediments to the littoral system.
- Economics: As reflected in this EA, the local community relies on the availability and full utility of the channel, the use of which this action would perpetuate. The preferred alternative is the least costly alternative that would meet the project's purpose and need. The economic benefits afforded through accomplishing maintenance dredging to the authorized depths outweigh the Federal costs of the action and the costs the region would incur with an eventual return to the pre-construction conditions that would ensue under the No-Action Alternative.
- Shoreline erosion and accretion: The effects on shoreline erosion and accretion appear in the hydraulics and geomorphology section of this EA. Overall, the proposed placement sites would reduce negative effects of shoreline erosion at Jetty Island.
- Safety: Maintenance dredging to the authorized depths and providing a navigable waterway for the safe and efficient transit of vessels serves the interests of safety.
- Property ownership: Maintaining use of the navigation channel provides full utilization of the private vessel ownership interests by tenants of and visitors to the small boat basin adjacent to the channel.

As provided in 33 CFR Sections 335.4, 336.1(c)(1) and 337.6, the USACE has fully considered, on an equal basis, all alternatives that are both reasonable and practicable, i.e., available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. The necessary budget resources are available and adequate to fully support the action. The preferred alternative represents the least costly alternative, constituting the discharge of dredged or fill material into waters of the U.S. in the least costly manner and at the least costly and most practicable location, is consistent with sound engineering practices, and meets the environmental standards established by the Clean Water Act Section 404(b)(1) evaluation process. Execution of the preferred alternative, following consideration of all applicable evaluation factors, would be in the public interest.

11 Summary

The proposed Federal action of proceeding with Alternative 3, "Dredge Navigation Channels and Settling Basins in Alternate Years" (Preferred Alternative) would result in the biennial dredging for channel maintenance to authorized depths (except for the upstream settling basin which may be dredged to as far as -32 ft MLLW) with disposal of dredged materials at upland or nearshore sites or at Port Gardner would not have significant impacts to the environment of Everett Harbor and the Snohomish River or the sediment disposal areas. Adhering to the in-water work window and limiting work to the designated project footprints is sufficient to avoid significant impacts to natural resources. The USACE would conduct sampling and analysis of the sediments to be dredged according to the DMMP guidelines to assure continued suitability for aquatic disposal. If negative test results are obtained in future sediment testing, or if the proposed dredge activity was to occur to a depth deeper than the current suitability analysis provides, the USACE would reopen this EA and its conclusion and reevaluate the finding of no significant impact (FONSI) as necessary. If the sediment volumes to be deposited at the upland disposal sites (Parcel O and Jetty Island) are planned for either annual or cumulative placement in excess of the volumes identified in this EA (up to 190,000 cubic yards for both sites; up to 150,000 cubic yards of placement at Parcel O, and up to 40,000 cubic yards per year at Jetty Island; the USACE would reinitiate ESA §7 consultation for the disposal, reopen this Environmental Assessment and its conclusion and reevaluate the finding of no significant impact (FONSI) as necessary. For the duration of the current CWA 401 Water Quality Certificate which is in effect until February 14, 2029, if the total volume of dredge material from a particular dredging event is planned to exceed 800,000 cubic yards, the USACE will seek a revised Section 401 Water Quality Certification from Ecology, and the USACE would reopen this Environmental Assessment and its conclusion and reevaluate the FONSI as necessary. The USACE pursued and completed compliance with all environmental laws including ESA, CWA, and CZMA, prior to the finalization of this EA and FONSI.

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Appendix A
Finding of No Significant Impact (FONSI)/Statement of Findings (SOF)

Appendix B
Clean Water Act Section 404(b)(1) Evaluation

CENWS-PMP-E **June 2018**

Everett Harbor and Snohomish River Federal Navigation Project

Maintenance Dredging

City of Everett, Snohomish County, Washington

Substantive Compliance for

Clean Water Act, Section 404(b)(1) Evaluation

1. Introduction. The purpose of this document is to record the evaluation and findings regarding this project pursuant to Section 404 of the Clean Water Act (CWA).

The following action is covered by this document: Routine maintenance dredging during FY 2019 – FY 2034 to remove accumulated sediments in the following areas of the Everett Harbor and Snohomish River Federal Navigation Project:

- A lower, one-mile channel that extends from Puget Sound up the Snohomish River, -15 feet MLLW, and 150 to 425 feet wide.
- An upper channel extending to river mile (RM) 6.3, -8 feet MLLW, and 150 feet wide (and wider at the turns).
- Two settling basins in the navigation channel:
    - the downstream settling basin at 700 feet wide, 1,200 feet long, - 20 feet MLLW, with 500,000 cubic yards (cy) capacity, and
    - the upstream basin at 150 feet wide and 1,740 feet long, - 40 feet MLLW, with one million cy capacity.

Maintenance dredging would occur with hydraulic pipeline dredge when placing material for beneficial use, or clamshell dredge when placing material in an aquatic disposal site. First the downstream settling basin (Sta. 78+00 to 90+00) and lower channel (0+00 to 78+00) would be dredged, and the following year the upstream settling basin (Sta. 335+50 to 355+79) and upper channel (90+00 to 335+50 and 355+79 to 381+79) would be dredged. The order of dredging (i.e., upstream/upper settling basin then downstream/lower settling basin) could be reversed depending on need and previous maintenance timing. Dredging would remove material to -15 ft in the lower channel and -20 ft in the lower settling basin, and to -8ft in the upper channel and -32 ft in the upper settling basin.

Table 7. Characteristics of the Channel and Settling Basins under Alternative 3.

Location	Stations	Authorized Depth (ft MLLW)	Alternative 3 Depth (ft MLLW)
Upstream settling basin	335+50 to 355+79	-40	-32
Upper channel	90+00 to 335+50 and 355+79 to 381+79	-8	-8
Downstream settling basin	78+00 to 90+00	-20	-20
Lower channel	0+00 to 78+00	-15	-15

- Based on dredging history at this project, the USACE may dredge up to 500,000 CY from each settling basin and 200,000 CY from the navigation channel for 1,200,000 CY as a maximum per dredging episode.

Quantities have been estimated conservatively for environmental impacts analysis and would include the amount dredged for two feet of overdepth and two feet of advance maintenance. Removing sediments that build up in the settling basins reduces the dredging effort in the navigation channel outside the settling basins. Dredged material disposal and placement will be at the upland Parcel O or upland/nearshore Jetty Island, or at the in-water at Port Gardner.

Alternating the dredging areas each year is the default; however, if dredging in prior years was limited or not conducted due to funding, bad weather, or other limitations, dredging both the upstream and downstream navigation channels and basins could be accomplished within the approved work window. The dredging and disposal activities would be performed between 16 October and 14 February. Dredging may take about 90 days, depending on quantity of material removed, mechanical breakdowns, and poor weather conditions. Dredging will occur 24 hours per day except for periods of machinery maintenance and crew changes. Timing of this project will adhere to the approved in-water work window

The information contained in this document reflects the findings of the project record. Specific sources of information included the following:

a. National Marine Fisheries Service (NMFS). 2010. Section 7 Biological Opinion for the Continued Use of Puget Sound Dredge Disposal Program Dredged Material Disposal Sites (NMFS Consultation No. 2010/04249). Letter to COL Anthony Wright, U.S. Army Corps of Engineers, dated December 22, 2010.
b. NMFS. 2009. Section 7 Informal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Puget
c. Sound Dredge Disposal Analysis (PSDDA) program (NMFS Tracking No. 2009/05451). Concurrence letter to Deborah Johnston, Chief, Environmental Resources Division [sic], U.S. Army Corps of Engineers, dated November 23, 2009.
d. NMFS. 2007. Concurrence Letter, Endangered Species Act Section 7 Informal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat for the Puget Sound Dredge Disposal Analysis (PSDDA) Program Regarding Southern Resident Killer Whale (SRKW) and SRKW Critical Habitat (NMFS Tracking # 2007/05324). Concurrence letter to Colonel Mark Ziminske, Chief, Environmental Resources Section, U.S. Army Corps of Engineers, dated August 21, 2007.
e. U.S. Fish and Wildlife Service (USFWS). 2011. Endangered Species Act Section 7 Informal Consultation for the Puget Sound Dredged Disposal Analysis (PSDDA) Program. USFWS reference No. 13410-2010-I-0542. Concurrence letter to Evan Lewis, Acting Chief Environmental Resources Section, US Army Corps of Engineers, dated January 11, 2011.
f. US Fish and Wildlife Service (USFWS). 2009. Endangered Species Act Section 7 Informal Consultation for the FY2010-2011 Snohomish River Navigational Channel Maintenance

Dredging. USFWS reference No. 13104-2010-I-0001. Concurrence letter to Kenneth Brunner, Endangered Species Coordinator, Seattle District, US Army Corps of Engineers, dated November 19, 2009.

g. NMFS 2009. Section 7 Informal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Snohomish River Navigation Channel Dredging project in Everett, Snohomish County, Washington (HUC 171100110202, Lower Snohomish River) (NMFS Tracking No. 2009/05451). Concurrence letter to Deborah Johnston, Chief, Environmental Resources Division [sic], U.S. Army Corps of Engineers, dated November 23, 2009.
h. Final Environmental Impact Statement, Unconfined Open-Water Disposal for Dredged Material, Phase II (North and South Puget Sound). September 1989. Environmental Protection Agency Region 10, Seattle District Corps of Engineers, Washington Department of Natural Resources, and Washington Department of Ecology.
i. USFWS (U.S. Fish and Wildlife Service). 2015. Continued Use of Multiuser Dredged Material Disposal Sites in Puget Sound and Grays Harbor. Letter of Concurrence 01EWFW00-2015-I-0724 dated July 28, 2015. Lacey, Washington.
j. USFWS. 2017. Maintenance Dredging Programmatic of Selected Federal Authorized Navigational Channels with Disposal of Dredged Material at Designated Disposal Sites. Letter of Concurrence 01EWFW00-2017-I-0277 dated May 24, 2017. Lacey, Washington.
k. NMFS. 2018. Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for U.S Army Corps of Engineers' (COE) Proposed 25-year Maintenance Dredging Program for Eight Federally-Authorized Navigation Channels in Western Washington State. Consultation Number: WCR-2016-6057. January 26, 2018
l. NMFS. 2015. Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation and Fish and Wildlife Coordination Act Recommendations for the Continued Use of Multi-User Dredged Material Disposal Sites in Puget Sound and Grays Harbor. Consultation Number: WCR-2015-2975. December 17, 2015.
m. CWA, 404(b)(1) Evaluation (see below).
n. Public Interest Review (see below).

This document addresses the substantive compliance issues of the Clean Water Act 404(b)(1) Guidelines [40 CFR §230.12(a)] and the Regulatory Program of the Corps of Engineers [33 CFR §320.4(a)].

2. Description of the Proposed Discharge. The Everett Harbor and Snohomish River Federal Navigation Channel is located north of Seattle, Washington in Snohomish County. The USACE is proposing to discharge up to 1.5 million CY of dredged material annually among three placement sites around the vicinity of the navigation channel. Sediments to be dredged were tested in 2017 and approved for open-water disposal and beneficial use under the Dredge Material Management Program (DMMP) guidelines in 2018.

Direct in-water placement is proposed at the Port Gardner site. Upland placement is proposed at Parcel O with return water discharge to the Snohomish River, and upland/nearshore placement is proposed at Jetty Island. Dredging is by mechanical (clamshell) or hydraulic suction dredge with placement by hydraulic pumping or bottom dump barge, allowing direct placement of material onto the sites.

Port Gardner Disposal Site

Typically, the downstream settling basin is dredged using a mechanical dredge (clamshell). The dredged sediment is loaded onto a bottom-dump barge for disposal at the Puget Sound Dredged Disposal Analysis Program (PSDDA) Port Gardner open-water site (Figure 6). Each barge transports approximately 1,500 CY of material each trip. Once arriving at the disposal site, the bottom-dump barge drops the material into its intended location. Dredged material disposal at the non-dispersive sites is designed to maintain dispersion within a 600-foot radius target zone at each site. The barges doing the disposal are towed at the minimum speed necessary to maintain control. In most instances, material is released from the bottom of the barge which is about 10 feet down in the water column. All disposal tugs are required to record and report when and where sediment is released within the target zone. The disposal sites were originally sized so that a barge being towed at an average speed of three knots can unload completely in a few minutes.

A Puget Sound Dredged Disposal Analysis (PSDDA) site designation process conducted during the development of the 1988 and 1989 environmental impact statements (EIS) resulted in the selection of three dispersive sites and five non-dispersive sites throughout Puget Sound (PSDDA/FEIS 1988; 1989).

Parcel O Disposal Site

Parcel O is an upland 9-acre area in the former Kimberly Clark log yard, located on the left bank of the Snohomish River at about river mile 4 (**Error! Reference source not found.**). Hydraulically dredged sediments from the upstream settling basin and adjacent channel would be directly discharged and disposed of at this site

Typically, up to 150,000 CY of sediment would be disposed at the site every-other year, but the frequency could vary. Over the next 15 years, about 400,000 CY of dredged sediments would be disposed of at the site.

Jetty Island Disposal Site

Typically, up to 40,000 CY of sediment is disposed at Jetty Island every-other year, but the frequency could vary. Disposal at the site is done via a hydraulic pipeline that is placed across the island.

Placement of material on Jetty Island is considered beneficial use of dredged material. The primary purposes for placing material on Jetty Island are for stabilization of the jetty and for suppression of the nonnative, invasive Scot's broom (Cytisus scoparius). Additionally, the sediment is beneficial for salmon habitat. Placement is unconfined in the nearshore zone and materials are allowed to settle out and naturally disperse. Up to about 750,000 CY could be placed in the disposal site over the next 15 years. Jetty Island disposal is typically conducted biennially, although the frequency could vary based on factors such as shoaling rates and available budget.

3. Project Need. Maintenance dredging of the Everett Harbor and Snohomish River Federal Navigation Project is needed because the rate of accretion of sediment from most of the navigation channel reaches requires removal biennially or annually to achieve adequate depth for safe navigation. The Port of Everett is the third largest container port in the state, specializing in deep draft ocean-going vessels such as oversized aircraft component containers and ships up to 200 m in length that require deep berths (e.g., up to 40 ft MLLW) (Port of Everett 2013; 2015). The Port of Everett operates the largest public marina on the West Coast (Port of Everett 2013). The lower channel was most recently mechanically dredged in FY 2015, and the upstream and downstream settling basins were most recently hydraulically dredged in FY 2017. As of the most recent bathymetric survey of the waterway in June 2016, the accreted volume above the authorized depth in all areas (except the upstream settling basin, which was calculated above -20 feet MLLW instead of the authorized depth of -40 feet MLLW) was 653,211 CY. Additional sediment is expected to have accumulated since June 2016.

4. Project Purpose. The purpose of the action is to provide for safe navigation and moorage by maintaining the authorized depth of each channel reach and the adjacent settling basin, plus two feet of allowable overdepth, and two feet of authorized advanced maintenance as needed to provide adequate depth for vessels. The purpose of placement at Jetty Island is to stabilize the jetty, suppress nonnative plant species, and provide sediment for nearshore habitat that benefits salmonids. The purpose of placement at Parcel O is to provide fill material for the Port or City of Everett.

5. Availability of Less Environmentally Damaging Practicable Alternatives to Meet the Project Purpose. The alternatives evaluated for this project were as follows:

a. *Alternative 1 (No-Action).* The No-Action Alternative is analyzed as the future without-project conditions for comparison with the action alternatives. If the USACE takes No-Action to remove accumulated sediment from the Everett Harbor and Snohomish River navigation channel, this would cause continued shoaling posing a risk to vessels and restrict navigation of some tribal and recreational users when transiting the area. This alternative would not meet the project purpose and need, but is carried forward for evaluation purposes.

b. *Alternative 2 – Dredging Navigation Channel and Settling Basins to Channel Depth Annually.* This alternative proposes to annually conduct routine maintenance dredging of accumulated sediments to the authorized depths for the entire length of the Snohomish River navigation channel (Figure 3). Dredging would remove material to -15 ft in the lower channel and -8 ft in the upper channel in the navigation channel, and would include dredging in the settling basins only to the depth of the adjacent navigation channel. Maintenance dredging would occur with hydraulic pipeline dredge when placing material for beneficial use, or clamshell dredge when placing material in an aquatic disposal site. Dredging would be conducted annually between October 16 and February 14 during the approved in-water work window. The duration of dredging would be about 60 days.

For Alternative 2, because shoaling varies from year to year the USACE has estimated up to approximately 190,000 cy, would be transported to two beneficial use upland or nearshore disposal sites: Site “O,” and Jetty Island. The remainder, approximately 110,000,000 cy, would

be transported to the Dredged Material Management Program (DMMP) Port Gardner open-water disposal site.

c. *Alternative 3 – Dredging Navigation Channel and Settling Basins in Alternate Years.* This alternative proposes to proposes to conduct routine maintenance dredging of accumulated sediments in the Snohomish River navigation channels in alternating years. Dredging would remove material to -15 ft in the lower channel and -20 ft in the lower settling basin, and to -8 ft in the upper channel and -32 ft in the upper settling basin. The sediment volumes placed at Parcel O and Jetty Island would be the same between Alternatives 2 and 3, and have undergone ESA consultation (USFWS 2017; NMFS 2018).

Based on dredging history at this project, the USACE may dredge up to 500,000 CY from each settling basin and 200,000 CY from the navigation channel for 1,200,000 CY as a maximum per dredging episode. Quantities have been estimated conservatively for environmental impacts analysis and would include the amount dredged for two feet of overdepth and two feet of advance maintenance, if needed, in any dredging episode.

Removing sediments that build up in the settling basins reduces the dredging effort in the navigation channel outside the settling basins. Dredged material disposal and placement locations will be the same as Alternative 2.

d. *Findings.* The USACE rejected Alternative 1 because it would not meet the project purpose and need. Alternative 2 was not chosen because it disrupts the entire navigation channel annually and may require non-routine maintenance dredging due to the shallow dredging depths. Alternative 3 was selected as the preferred alternative because it is the least environmentally damaging practicable alternative that meets the purpose and need. Alternative 3 will reduce risk of grounding vessels and maintain the navigation channel in the least cost, environmentally acceptable manner and reduce the potential for emergency dredging or dredging episodes that are longer or more frequent. With Alternative 3, the settling basins will be available to contain more sediment as compared to Alternative 2, and will therefore reduce the amount of shoaling in the navigation channel.

6. Significant Degradation, Either Individually or Cumulatively, to the Aquatic Environment.

a. *Impacts on Ecosystem Function.* Habitat in the Snohomish River navigation channel, as well as the nearshore and multiuser open-water disposal sites, will be disturbed by dredging and the disposal of dredge material. Dredging would temporarily reduce the populations of the benthic and epibenthic invertebrate community through removal of the benthic substrate and smothering as suspended sediments settle out of the water column. Invertebrate prey for juvenile salmonids and bottom fish would thus be temporarily reduced along the center-line of the dredged portions of the navigation channel and within the upstream and downstream settling basins. Total organic carbon could be slightly lower in the newly exposed sediments after dredging. Thus, the amount of food (in the form of organic matter) available for benthic invertebrates in these areas would be slightly reduced on a temporary basis. While benthic and epibenthic prey species would be temporarily displaced, populations are expected to recover

shortly (within one year) after dredging activities are completed. Because the dredging would occur only in a portion of the navigation channel and within the settling basins, adjacent undisturbed intertidal habitat along the edges of the dredged areas would continue to provide an established source of benthic and epibenthic invertebrates to colonize the newly disturbed subtidal substrate. Since new invertebrate communities would recolonize the dredging area, no long-term loss of biological productivity or prey base for juvenile salmonids or bottom fish is expected.

The USACE has assessed potential effects from dredging and open-water disposal and determined that they will generally be localized to previously-disturbed areas, short in duration (occur when disposal occurs and since disposal takes only minutes per episode, the disposal site will sustain a short duration effect), and minor in spatial scope. Effects of dredging and disposal operations on salmonids, forage fish, and benthic organisms will be reduced and/or avoided through implementation of timing restrictions and dredge type usage, and mobile organisms are expected to be able to avoid entrainment. Due to these measures, negative effects to the Endangered Species Act (ESA) listed species should not be significant either individually or cumulatively.

NMFS concluded that Puget Sound Chinook salmon and steelhead and their critical habitats are likely to be adversely affected in the project area and the USACE received a biological opinion 26 January 2018 (NMFS 2018). The USACE determined the proposed dredged material placement at the multiuser open-water sites is not likely to adversely affect any ESA-listed species or designated habitat and prepared documentation of this determination (USACE 2015). The USFWS provided a letter of concurrence 28 July 2015 (USFWS 2015) and NMFS provided a biological opinion for adverse effects to rockfish at the Port Gardner open-water disposal site 17 December 2015 (NMFS 2015). The USACE will comply with all required conditions of the biological opinions.

b. *Impacts on Recreational, Aesthetic and Economic Values*. There is potential for some minor disruption of aesthetic and recreational resources during the mobilization and de-mobilization of the dredges and barges; however, the channel will remain navigable to recreational and commercial boats and these disruptions will be temporary in the immediate vicinity of the dredging and disposal operations only. There will be a temporary disruption to local bird and wildlife watching, especially at Jetty Island, as a result of the dredging and disposal activities, but the disruption will cease once dredging and disposal operations No significant adverse effects on recreation, aesthetics, or the economy are anticipated.

Findings. The USACE has determined that the proposed work would have beneficial economic impacts and that there would be no significant adverse effects to aquatic ecosystem functions and values.

7. Appropriate and Practicable Measures to Minimize Potential Harm to the Aquatic Ecosystem

a. *Impact Avoidance Measures*. The primary avoidance measure concerns the timing of in-water work and placement of dredged materials. Dredging would only occur within the allowed in-water work window for the protection of juvenile salmon. Avoiding the shoreline and associated

intertidal habitats that contain important rearing and foraging habitats would minimize the impact of maintenance dredging and disposal to fish and wildlife species.

b. *Impact Minimization Measures.* The number of organisms injured and killed by dredge material disposal is minimized through timing restrictions (i.e. conducting dredge operations during times when disposal of dredge material will have minimal effects on the aquatic ecosystem).

c. *Compensatory Mitigation Measures*. There will be no compensatory mitigation measures because the work will not have more than a negligible change to any habitat characteristics.

Findings. The USACE has determined that all appropriate and practicable measures have been taken to minimize potential harm. There are no practicably available placement alternatives that would be less costly and still be consistent with engineering and environmental requirements, while meeting the project need for disposition of dredged material.

8. Other Factors in the Public Interest.

a. *Fish and Wildlife*. The USACE is coordinating with State and Federal agencies, as well as the Tulalip Tribes of Washington, to assure careful consideration of fish and wildlife resources. The USACE prepared an analysis of effects to threatened and endangered species in accordance with the ESA and has completed Section 7 ESA consultation for the proposed project. The USACE analyzed potential effects of placement at PSDDA multiuser open-water Port Gardner disposal site, Jetty Island and the upland Parcel O on ESA-listed species and their designated critical habitat. The USACE determined that the proposed maintenance dredging and dredged material placement at Jetty Island and Parcel O may affect, but is not likely to adversely affect any ESA-listed species or designated critical habitat and prepared documentation of this determination (USACE 2016). The USFWS agreed with this determination and the USACE received a letter of concurrence May 24, 2017. NMFS agreed that the proposed action is not likely to adversely affect most ESA-listed species or designated critical habitat; however, NMFS concluded that Puget Sound Chinook salmon and steelhead and their critical habitats are likely to be adversely affected in the project area and the USACE received a biological opinion 26 January 2018 (NMFS 2018). The USACE determined the proposed dredged material placement at the PSDDA approved multiuser open-water site, Port Gardner, is not likely to adversely affect any ESA-listed species or designated habitat and prepared documentation of this determination (USACE 2015). The USFWS provided a letter of concurrence 28 July 2015 (USFWS 2015) and NMFS provided a biological opinion for adverse effects to rockfish in Puget Sound/Georgia Basin at the Port Gardner site 17 December 2015 (NMFS 2015).

b. *Water Quality*. The USACE will obtain a Section 401 Water Quality Certification from the Washington State Department of Ecology. Once concurrence is received from Ecology, the USACE will abide by the applicable conditions in the Water Quality Certification associated with activities involving the discharge of dredged material into waters of the United States, to ensure compliance with State water quality standards.

c. *Historic and Cultural Resources*. The USACE has consulted with the Washington SHPO and the Muckleshoot Indian Tribe, Sauk-Suiattle Indian Tribe, the Snoqualmie Indian Tribe, the

Suquamish Indian Tribe, the Tulalip Tribes of Washington and the Yakama Nation. The USACE has determined that no historic properties would be affected and the Washington SHPO concurred by letter dated 23 April 2018.

d. *Activities Affecting Coastal Zones*. The USACE has determined that this work is consistent to the maximum extent practicable with the enforceable policies of the City of Everett Shoreline Master Program and provided documentation of this consistency determination to Ecology in April 2018.

e. *Environmental Benefits.* Placement of dredged materials on Jetty Island for stabilization of the jetty also suppresses nonnative, invasive Scot's broom (Cytisus scoparius). Additionally, the sediment is beneficial for salmon habitat. Nearshore habitat has been identified as a limiting factor for salmon recovery in this basin; therefore, material is occasionally placed at Jetty Island as beneficial use in the nearshore zone.

f. *Navigation*. A minor, temporary disruption of navigation traffic may result from dredging and placement operations. A "Notice to Mariners" will be issued before dredging and placement operations are initiated. The proposed action will have an overall benefit for navigation by returning the Federal navigation channel and adjacent settling basins to authorized depths.

Findings. The USACE has determined that this project is within the public interest based on review of the public interest factors.

9. Conclusions. Based on the analyses presented in the Environmental Assessment, as well as the following 404(b)(1) Evaluation and General Policies analysis, the USACE finds that this project complies with the substantive elements of Section 404 of the Clean Water Act.

404(b)(1) Evaluation [40 CFR §230]

Potential Impacts on Physical and Chemical Characteristics (Subpart C)

1. **Substrate [230.20].** The surface substrate at the sites consists of generally sandy, river-derived sediments. Dredged materials placed at these sites will be similar particle size and will integrate with the natural sediments. Placement is considered a beneficial use to nearby littoral habitat.
2. **Suspended Particulate/Turbidity [230.21].** The discharge of dredged material to the disposal sites, including Port Gardner, will result in a temporary increase in turbidity and suspended particulate levels in the water column. The material will rapidly sink to the bottom, while a small percentage of finer material is expected to remain in suspension. Increases in turbidity associated with placement operations will be minimal (confined to the areas in the immediate vicinity of the placement site) and of short duration (suspended material is expected to settle shortly after placement). Placement at Jetty Island is unconfined in the nearshore zone and materials are allowed to settle out and naturally disperse. At Parcel O, a sand berm/perimeter dike separates the dredged material discharge area from the Snohomish River. The slurry of water and sand temporarily ponds in the placement site, and water is conveyed via a series of weirs into the Snohomish River. The return water at Parcel O is not likely to result in short-term, localized increases in turbidity related to the return water, as past monitoring has shown that the turbidity of the return water is less than the river turbidity. Turbidity levels of discharged decant water are monitored and managed in accordance with the conditions of the CWA Section 401 water quality certification issued by Ecology.
3. **Water Quality [230.22].** No significant water quality effects are anticipated. The USACE has obtained a Section 401 Water Quality Certification from Ecology. The USACE will abide by the applicable criteria and conditions in the Water Quality Certification associated with the discharge of dredged material into the waters of the United States to ensure compliance with State water quality standards. No release of contaminants is expected due to the clean nature of the material. Based on the short-term, minor effects to water quality, there would be no significant impact to this resource. All of the sediments have been tested and approved for open-water placement under the guidelines of the Dredged Material Management Program (DMMP) administered by the USACE, Environmental Protection Agency (EPA), Ecology, and Washington Department of Natural Resources. Any material that does not meet DMMP guidelines will be disposed of in an approved upland disposal site and thus will not affect water quality. Thus, no long-term changes to the chemical or physical characteristics of the receiving waters are expected.
4. **Current Patterns and Water Circulation [230.23].** The placement of material will not obstruct flow, change the direction or velocity of water flow/circulation, or otherwise change the dimensions of the receiving water body.
5. **Normal Water Fluctuations [230.24].** The placement of material will not impede normal tidal fluctuations. The receiving sites are upland (Parcel O), along the shore of Puget Sound (Jetty

Island), or within Port Gardner Bay (Port Gardner open-water disposal site). Dredged material placed at these sites and discharged water (from Parcel O) are not of a quantity that could affect water fluctuations.

6. **Salinity Gradients [230.25].** The placement of material will not divert or restrict tidal flows and thus will not affect salinity gradients.

Potential Impacts on Biological Characteristics of the Aquatic Ecosystem (Subpart D)

1. **Threatened and Endangered Species [230.30].** Pursuant to Section 7 of the ESA, the USACE analyzed potential effects of placement at PSDDA multiuser open-water Port Gardner disposal site, Jetty Island and the upland Parcel O on ESA-listed species and their designated critical habitat. The USACE determined that the proposed maintenance dredging and dredged material placement at Jetty Island and Parcel O may affect, but is not likely to adversely affect any ESA-listed species or designated critical habitat and prepared documentation of this determination (USACE 2016). The USFWS agreed with this determination and the USACE received a letter of concurrence May 24, 2017. NMFS agreed that the proposed action is not likely to adversely affect most ESA-listed species or designated critical habitat; however, NMFS concluded that Puget Sound Chinook salmon and steelhead and their critical habitats are likely to be adversely affected in the project area and the USACE received a biological opinion 26 January 2018 (NMFS 2018). The USACE determined the proposed dredged material placement at the PSDDA approved multiuser open-water site, Port Gardner, is not likely to adversely affect any ESA-listed species or designated habitat and prepared documentation of this determination (USACE 2015). The USFWS provided a letter of concurrence 28 July 2015 (USFWS 2015) and NMFS provided a biological opinion for adverse effects to rockfish in Puget Sound/Georgia Basin at the Port Gardner site 17 December 2015 (NMFS 2015).

2. **Aquatic Food Web [230.31].** Turbidity associated with placement of dredged material at Parcel O, Jetty Island, and Port Gardner may interfere with feeding and respiratory mechanisms of benthic, epibenthic, and planktonic invertebrates. Some sessile invertebrates in the navigation channel will suffer mortality from dredge operations. Species characteristics of these sites are opportunistic species, often small tube-dwelling, surface-deposit feeders that exhibit patchy distribution that varies throughout the year. Sediments would be a similar type and coarseness as those already present in the nearshore sites and the depth of the total habitat area available would not change. In a relatively short period (several months), organisms would reestablish in the placement areas due to recruitment from adjacent non-disturbed areas, but the populations may not reach full maturity due to frequent material placement. Based on these factors, effects to benthic invertebrate populations and their habitat at the placement sites would be minor and discountable. Potential effects of placement operations on salmonids, forage fish, and benthic species will be reduced and/or avoided through implementation of timing restrictions and by the limited extent of dredging and disposal. Runoff from Parcel O would have no effect to the aquatic food web.

3. **Wildlife [230.32].** Noise associated with placement operations may have an effect on bird and marine mammals in the project area. The effects of any sound disturbance would likely result in

displacement of animals, but not injury. Increases in turbidity associated with dredged material placement could reduce visibility, thereby reducing foraging success for any animals in the area. Any reduction in availability of food would be highly localized and would subside rapidly upon completion of the placement operations. Placement operations are not expected to result in a long-term reduction in the abundance and distribution of prey items.

Potential Impacts to Special Aquatic Sites (Subpart E)

1. **Sanctuaries and Refuges [230.40].** Not applicable.

2. **Wetlands [230.41].** Dredged material will not be discharged in wetlands. Use of the designated placement sites will not alter the inundation patterns of wetlands in the project area.

3. **Mudflats [230.42].** Dredged material will not be discharged onto mudflats.

4. **Vegetated Shallows [230.43].** Eelgrass beds are located to the west of Jetty Island, but no dredging or disposal would occur within the eelgrass beds. Dredged material will not be discharged onto or directly adjacent to vegetated shallows.

5. **Coral Reefs [230.44].** Not applicable.

6. **Riffle and Pool Complexes [230.45].** Not applicable.

Potential Effects on Human Use Characteristics (Subpart F)

1. **Municipal and Private Water Supplies [230.50].** Not applicable.
2. **Recreational and Commercial Fisheries [230.51].** This project is not expected to impact the suitability of the lower Snohomish River, or Port Gardner Bay for recreational or commercial fisheries. While local fish populations may experience be disturbed by the turbidity, noise, and activity associated with the dredging and disposal operations, these impacts are expected to be temporary in nature and limited in extent to the immediate vicinity of the dredging and disposal. No long-term disruptions to fish populations are expected. Recreational fishing may be temporarily disrupted in the immediate vicinity of the dredging and disposal activities, as vessels would have to navigate around dredging and barge equipment. However, these impacts are not expected to be significant. There are no commercial fisheries within Elliott Bay or Port Gardner Bay to be impacted by this project. The USACE continues to coordinate with the Tulalip Tribes of Washington regarding tribal fishing that may occur with the lower Snohomish River and in Port Gardner Bay during the period of dredging and disposal activities.
3. **Water-related Recreation [230.52].** Due to the timing of the dredging and disposal activities (October through February), water related recreation on the lower Snohomish River, on Jetty Island, and within Port Gardner and Elliott Bays is expected to be very limited. While some disturbance to bird and wildlife watching, recreational boating, kayaking, and hiking along the

shoreline may take place, such disturbance is expected to be temporary in nature and limited in extent to the immediate vicinity of the dredging operations.

4. **Aesthetics [230.53].** The dredging and disposal of the sediments would not substantially change the general character of the lower Snohomish River, Port Gardner Bay, Jetty Island, or the quality of life of local residents. The aesthetics of the action area may be temporarily impacted during the period of active dredging due to the noise and temporary turbidity, but this impact is expected to be temporary in nature and limited in extent to the immediate vicinity of the dredging. As the dredged material cell within Parcel O is currently devoid of vegetation and contains previously dredged sediments, no change to the aesthetics of the sites are expected. The Port Gardner disposal site is underwater, and as such, is not visible from boats.

5. **Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves [230.54].** Not applicable.

Evaluation and Testing (Subpart G)

1. **General Evaluation of Dredged or Fill Material [230.60].** All candidate material for disposal at the proposed sites is thoroughly tested, through a series of tiered chemical and biological testing protocols, to determine if it is suitable grain size and chemical composition, including the presence of chemicals that are known to bioaccumulated in aquatic food webs. These evaluations have been completed (see G.2. below) and the material has been found suitable for both open-water disposal and beneficial use.

2. **Chemical, Biological, and Physical Evaluation and Testing [230.61].** Sediment sampling occurred within the navigation channel in 2017 to determine suitability of sediments for aquatic disposal (DMMP 2018). Based on results from the most recent sediment sampling and suitability determination, 778,221 CY of dredged material from the Federal navigation project in the Snohomish River is suitable for unconfined open-water disposal at the Port Gardner non-dispersive site (DMMP 2018). Sediment from the navigaton channel has been characterized under the DMMP six times, including four full characterization and a dedicated characterization for dioxins, and has been determined suitable for open-water disposal since 1992. The navigation channel is ranked “low-moderate” by the DMMP and is characterized every six years (DMMP 2018).

   If additional material not included in the suitability determination needs to be dredged, the DMMP agencies would be consulted to evaluate any additional material. This would include dredging the upstream settling basin below -22 ft MLLW or if advanced maintenance is necessary, authorized, and funded.

   Sediments within the navigation channel and settling basins overall are mostly (> 50%) sand (DMMP 2018). The lower channel had the most silt (36%) and the silt content decreased from 33% to 6% in the upstream direction within the downstream settling basin (DMMP 2018). The upper channel and upstream settling basin contained mostly sand (> 92%) and the highest gravel content (4.5%) was in the uppermost reach of the upper channel (DMMP 2018).

Action to Minimize Adverse Effects (Subpart H)

1. **Actions Concerning the Location of the Discharge [230.70].** The effects of the discharge are minimized by the choice of placement sites. The placement sites have been designated for dredged material discharge. The discharge will not disrupt tidal flows. The location of the proposed discharge has been planned to minimize negative effects to the environment.
2. **Actions Concerning the Material to be Discharged [230.71].** The material was tested in 2017 and meets the criteria for open water disposal. Concentrations of chemicals of concern in the materials to be discharged are low, therefore no treatment substances nor chemical flocculates will be added before placement. The potency and availability of any pollutants present in the dredged material will remain unchanged.
3. **Actions Controlling the Material after Discharge [230.72].** No containment levees or capping are necessary because the clean material is intended to serve as nearshore littoral zone nourishment and jetty stabilization, and has been approved for open-water disposal at Port Gardner. Dredged material disposed of at the upland Parcel O will be confined in berms to allow the material to settle so that clean water will be decanted for discharge to the Snohomish River.
4. **Actions Affecting the Method of Dispersion [230.73].** The open-water site in Port Gardner Bay is a non-dispersive site, intended to limit the transport of deposited sediments outside of the disposal zone. The berm around Parcel O is designed to contain the slurry of dredged material on the site and allow for clean water to be decanted off the site.
5. **Actions Related to Technology [270.74].** Appropriate machinery and methods of transport of the material for discharge will be employed. All machinery will be properly maintained and operated.
6. **Actions Affecting Plant and Animal Populations [270.75].** The timing of the proposed discharge operations would minimize the potential for adverse effects to fish and wildlife. No vegetation of concern exists within the aquatic disposal sites.
7. **Actions Affecting Human Use [230.76].** The discharge will not result in damage to aesthetic features of the aquatic landscape. The dredging window of October 16 through February 14 minimizes potential overlap between maintenance dredging and disposal and summer periods of high recreational use of the lower river. This winter window minimizes aesthetic and transportation-related impacts to the local area.
8. **Other actions [230.77].** Not applicable.

Application by Analogy of the General Policies for the Evaluation of Public Interest [33 CFR §320.4, used as a reference]

1. **Public Interest Review [320.4(a)]** The USACE finds these actions to be in compliance with the 404(b)(1) guidelines and not contrary to the public interest.
2. **Effects on Wetlands [320.4(b)].** No wetlands will be altered by the placement of material from dredging operations.

3. **Fish and Wildlife [320.4(c)].** The USFWS, NMFS, and the Tulalip Tribes of Washington were consulted to ensure that direct or indirect loss and damage to fish and wildlife resources attributable to dredging and disposal operations will be minimized.
4. **Water Quality [320.4(d)].** The USACE will obtain a 401 Water Quality Certification from the Washington State Department of Ecology and will abide by the applicable conditions of the Certification associated with the discharge of dredge and fill material into waters of the U.S., to ensure compliance with water quality standards.
5. **Historic, Cultural, Scenic, and Recreational Values [320.4(e)].** No wild and scenic rivers, historic properties, National Landmarks, National Rivers, National Wilderness Areas, National Seashores, National Recreation Areas, National Lakeshores, National Parks, National Monuments, estuarine and marine sanctuaries, or archaeological resources would be adversely impacted by disposal operations.
6. **Effects on Limits of the Territorial Sea [320.4(f)].** Not applicable.
7. **Consideration of Property Ownership [320.4(g)].** Not applicable.
8. **Activities Affecting Coastal Zones [320.4(h)].** The proposed placement is consistent to the maximum extent practicable with the enforceable polices of the approved State Coastal Zone Management Program.
9. **Activities in Marine Sanctuaries [320.4(i)].** Not applicable.
10. **Other Federal, State, or Local Requirements [320.4(J)].**

a. National Environmental Policy Act. An Environmental Assessment (EA) was prepared to satisfy the documentation requirements of NEPA.

b. Endangered Species Act. Pursuant to Section 7 of the ESA, the USACE analyzed potential effects of placement at multiuser open-water, nearshore, and upland placement sites and runoff from the upland Parcel O on protected species. The USACE determined that the proposed maintenance dredging and dredged material placement at nearshore and upland site may affect, but is not likely to adversely affect any ESA-listed species or designated critical habitat and prepared documentation of this determination (USACE 2016). The USFWS agreed with this determination and the USACE received a letter of concurrence May 24, 2017. NMFS agreed that the proposed action is not likely to adversely affect most ESA-listed species or designated critical habitat; however, NMFS concluded that Puget Sound Chinook salmon and steelhead and their critical habitats are likely to be adversely affected in the project area and the USACE received a biological opinion 26 January 2018 (NMFS 2018). The USACE determined the proposed dredged material placement at the multiuser open-water sites is not likely to adversely affect any ESA-listed species or designated habitat and prepared documentation of this determination (USACE 2015). The USFWS provided a letter of concurrence 28 July 2015 (USFWS 2015) and NMFS provided a biological opinion for adverse effects to rockfish in Puget Sound/Georgia Basin at the Port Gardner site 17 December 2015 (NMFS 2015).

c. Clean Water Act. The USACE must demonstrate compliance with the substantive requirements of the Clean Water Act. This document records the USACE's evaluation and findings regarding this project

pursuant to Section 404 of the Act. The USACE obtained a Section 401 Water Quality Certification from Ecology (#15949). The USACE will abide by the applicable conditions in the Water Quality Certification associated with the discharge of dredged material into the waters of the United States to ensure compliance with State water quality standards.

d. Coastal Zone Management Act. The Coastal Zone Management Act of 1972 (CZMA), as amended, requires Federal agencies to carry out their activities in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved Coastal Zone Management Program. . The USACE has submitted a CZMA consistency determination for the Everett Harbor and Snohomish River navigation channel maintenance program; this document demonstrates that the proposed work substantively complies with the enforceable polices of the approved State Coastal Zone Management Program. Concurrence has not been received from Ecology specifically concurring that consistency with CZMA is achieved. Ecology's concurrence that the project is consistent to the maximum extent practicable with the enforceable policies of Washington State Coastal Zone Management Program is presumed in accordance with 33 CFR 336.1(b)(9)(iv) and 15 CFR 930.41(a).

e. Marine Protection, Research, and Sanctuaries Act. Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) authorizes the EPA to promulgate ocean dumping criteria and designate ocean disposal sites. This project will not involve ocean disposal of dredged material.

f. National Historic Preservation Act. The National Historic Preservation Act (16 USC 470) requires that the effects of proposed actions on sites, buildings, structures, or objects included or eligible for the National Register of Historic Places must be identified and evaluated. The USACE has initiated consultation with the Washington SHPO and the Muckleshoot Indian Tribe, Sauk-Suiattle Indian Tribe, Snoqualmie Indian Tribe, Stillaquamish Tribe of Indians, the Suquamish Tribe, Swinomish Indian Tribal Community, the Tulalip Tribes of Washington, and the Confederated Tribes and Bands of the Yakama Tribe. The USACE has determined no historic properties would be affected.

g. Fish and Wildlife Coordination Act. The Fish and Wildlife Coordination Act (16 USC 470) requires that wildlife conservation receive equal consideration and be coordinated with other features of water resource development projects. A Fish and Wildlife Coordination Act Report (FWCA) is not required for the proposed disposal of sediments because the FWCA does not apply to operations and maintenance activities on existing projects.

11. Safety of Impoundment Structures [320.4(k)]. Not applicable.

12. Floodplain Management [320.4(l)]. Disposal operations will not alter any floodplain areas.

13. Water Supply and Conservation [320.4(m)]. Not applicable.

14. Energy Conservation and Development [320.4(n)]. Not applicable.

15. Navigation [320.4(o)]. This project will maintain the navigability of the Federal Navigation Channel. The placement activities will not impede navigation.

16. Environmental Benefits [320.4(p)]. Placement of dredged materials on Jetty Island for stabilization of the jetty also suppresses nonnative, invasive Scot's broom. Additionally, the sediment is beneficial for salmon habitat. Nearshore habitat has been identified as a limiting factor for salmon

recovery in this basin; therefore, material is occasionally placed at Jetty Island as beneficial use in the nearshore zone.

17. Economics [320.4(q)] USACE has determined that this project is economically justified.

18. Mitigation [320.49(r)] Potential effects of placement operations will be avoided and minimized through implementation of timing restrictions. No compensatory mitigation is required for the project.

Appendix C
Clean Water Act Section 401 Water Quality Certification

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

August 7, 2018

U.S. Army Corps of Engineers
Seattle District
ATTN: Evan Lewis, Chief
P.O. Box 3755
Seattle, WA 98124-3755

RE: Water Quality Certification Order No. **15949** for the Snohomish River Federal Navigation Channel Maintenance Dredging and Disposal FY 2019-2033 in Snohomish County, Washington

Dear Mr. Lewis:

On April 10, 2018, U.S. Army Corps of Engineers (Corps) submitted a Joint Aquatic Resources Permit Application (JARPA) to the Department of Ecology (Ecology) for a Section 401 Water Quality Certification (401 Certification) under the federal Clean Water Act for the Snohomish River Federal Navigation Channel Maintenance Dredging and Disposal FY 2019-2033 project in Snohomish County, Washington.

The proposed project entails conducting routine maintenance dredging in the Snohomish River Federal Navigation Channel using either a mechanical clam shell or hydraulic pipeline dredge. Depending on the method of dredging, the sediment will be disposed of either at the Port Gardiner open water disposal site, Jetty Island, or Parcel O, an upland storage site.

On behalf of the State of Washington, Ecology certifies that the work described in the JARPA and the public notice complies with applicable provisions of Sections 301, 302, 303, 306, and 307 of the Clean Water Act, as amended and applicable state laws. This certification is subject to the conditions contained in the enclosed Order.

If you have any questions, please contact Penny Kelley at 360-407-7298. The enclosed Order may be appealed by following the procedures described in the Order.

Sincerely,

Brenden McFarland, by Lorcé Randall
Shorelands and Environmental Assistance Program

Enclosure

cc: Jo Gardiner, Corps of Engineers

by certified mail 9489 0090 0027 6066 4196 84

e-cc: Laura Arber, WDFW
Kurt Nelson, Tulalip Tribe
Alison O'Sullivan, Suquamish Tribe
ECY RE FEDPERMITS
Loree' Randall – HQ, SEA

IN THE MATTER OF GRANTING A WATER QUALITY CERTIFICATION TO U.S. Army Corps of Engineers in accordance with 33 U.S.C. 1341 (FWPCA § 401), RCW 90.48.120, RCW 90.48.260 and Chapter 173-201A WAC	))))))	**ORDER # 15949** Conduct maintenance dredging of the Snohomish River Federal Navigation channel on Possession Sound and the Snohomish River in the City of Everett, Snohomish County, Washington.

U.S. Army Corps of Engineers
Seattle District
Attn: Evan Lewis, Chief
P.O. Box 3755
Seattle, WA 98124-3755

On April 10, 2018, Ecology received a Joint Aquatic Resources Permit Application (JARPA) from the U.S. Army Corps of Engineers, Seattle District (Corps) requesting a Section 401 Water Quality Certification (WQC). Ecology issued a public notice for the project on May 8, 2018.

The Corps is proposing to conduct routine maintenance dredging in the Snohomish River Federal Navigation Channel. The navigation channel comprises the following:

- A lower channel extending from Possession Sound up the Snohomish River one mile with a -15 depth at mean lower low water (MLLW) and 150 to 425 feet wide
- An upper channel above the lower channel extending up the Snohomish River to river mile 6.3 with a -8 depth at MLLW and 150 feet wide.

There are two settling basins within the navigation channel: a downstream basin at -20 feet MLLW with a 250,000 cubic yard capacity and an upstream basin at -40 feet MLLW with a one million cubic yard capacity

The dredging will be done using either a mechanical clam shell or a hydraulic pipeline dredge with a total volume of up to 800,000 cubic yards removed per dredging event. Depending on the method of dredging, the sediment will be disposed of at one of the following sites:

- Port Gardiner open water disposal w/bottom dump barge
- Sediment placement/beneficial reuse at Jetty Island
- Upland storage of sediment at Parcel O

Actual volumes placed at the upland sites will depend on the outcome of required coordination, necessary permits, and site activities including beneficial uses which affect site availability and actual capacity. Port of Everett will provide all necessary permits, approvals and real estate documentation required prior to use of disposal sites.

The purpose of the dredging is to remove accumulated sediment and maintain authorized depths for navigation. The project is located on Possession Sound and extending up the Snohomish River to river mile 6.3 within the City of Everett, Snohomish County, Washington. Latitude/Longitude (NAD83): 48.001667N/-122.22389W (WRIA 7 Snohomish)

AUTHORITIES

In exercising authority under 33 U.S.C. § 1341, RCW 90.48.120, and RCW 90.48.260, Ecology has reviewed this application pursuant to the following:

1. Conformance with applicable water quality-based, technology-based, and toxic or pretreatment effluent limitations as provided under 33 U.S.C. §§1311, 1312, 1313, 1316, and 1317 (FWPCA §§ 301, 302, 303, 306 and 307);

2. Conformance with the state water quality standards contained in Chapter 173-201A WAC and authorized by 33 U.S.C. §1313 and by Chapter 90.48 RCW, and with other applicable state laws; and

3. Conformance with the provision of using all known, available and reasonable methods to prevent and control pollution of state waters as required by RCW 90.48.010.

WATER QUALITY CERTIFICATION CONDITIONS

Through issuance of this Order, Ecology certifies that it has reasonable assurance that the activity as proposed and conditioned will be conducted in a manner that will comply with applicable water quality standards and other appropriate requirements of state law. In view of the foregoing and in accordance with 33 U.S.C. §1341, RCW 90.48.120, RCW 90.48.260 Chapter 173-200 WAC and Chapter 173-201A WAC, water quality certification is granted to the Applicant subject to the conditions within this Order.

Certification of this proposal does not authorize the Corps to exceed applicable state water quality standards (Chapter 173-201A WAC), ground water quality standards (Chapter 173-200 WAC) or sediment quality standards (Chapter 173-204 WAC). Furthermore, nothing in this certification absolves Applicant from liability for contamination and any subsequent cleanup of surface waters, ground waters or sediments resulting from project construction or operations.

A. General Conditions

1. In this Order, the term "Applicant" shall mean the U.S. Army Corps of Engineers, Seattle District (Corps) and its agents, assignees, and contractors.

2. All submittals required by this Order shall be sent to HQ Office, Attn: Federal Permit Manager, P.O. Box 47600, Olympia, WA 98504-7600 or via e-mail to fednotification@ecy.wa.gov and cc to pkel461@ecy.wa.gov. The submittals shall be identified with Order No. 15949 and include the Applicant name, project name, project contact, and the contact's phone number.

3. Work authorized by this Order is limited to the work described in the JARPA received by Ecology on April 10, 2018.

4. The Applicant shall obtain Ecology review and approval before undertaking any changes to the proposed project that might significantly and adversely affect water quality, other than those project changes required by this Order.

5. Within 30 days of receipt of any updated information, Ecology will determine if the revised project requires a new water quality certification and public notice or if a modification to this Order is required.

6. The Applicant shall keep copies of this Order on the job site and readily available for reference by Ecology personnel, the construction superintendent, construction managers and lead workers, and state and local government inspectors.

7. The Applicant shall provide access to the project site and all mitigation sites upon request by Ecology personnel for site inspections, monitoring, necessary data collection, and/or to ensure that conditions of this Order are being met.

8. Nothing in this Order waives Ecology's authority to issue additional orders if Ecology determines that further actions are necessary to implement the water quality laws of the state. Further, Ecology retains continuing jurisdiction to make modifications hereto through supplemental order, if additional impacts due to project construction or operation are identified (*e.g.*, violations of water quality standards, downstream erosion, etc.), or if additional conditions are necessary to further protect water quality.

9. In the event of changes or amendments to the state water quality, ground water quality, or sediment standards, or changes in or amendments to the state Water Pollution Control Act (RCW 90.48), or the federal Clean Water Act, Ecology may issue an amendment to this Order to incorporate any such changes or amendments applicable to this project.

10. The Applicant shall provide to Ecology a signed statement (see Attachment A as an example) that s/he has read and understands the conditions of this Order and any permits, plans, documents and approvals referenced herein. The signed statement shall be submitted to Ecology per Condition A.2 at least 7 days prior to start of in-water work.

11. This Order does not authorize direct, indirect, permanent, or temporary impacts to waters of the state or related aquatic resources, except as specifically provided for in conditions of this Order.

12. Failure of any person or entity to comply with the Order may result in the issuance of civil penalties or other actions, whether administrative or judicial, to enforce the terms of this Order.

B. Notification Requirements

1. Notification shall be made via phone or e-mail to fednotification@ecy.wa.gov and to Ecology's Federal Permit Manager via phone (360-407-7298). Notifications shall be identified with Order No. 15949 and include the Applicants name, project name, project location, project contact and the contact's phone number.

    a. Immediately following a violation of state water quality standards or when the project is out of compliance with any of this Orders conditions.
        i. In addition to the phone or e-mail notification, the Applicant shall submit a detailed written report to Ecology within five (5) days that describes the nature of the event, corrective action taken and/or planned, steps to be taken to prevent a recurrence, results of any samples taken, and any other pertinent information.
    b. At least ten (14) days prior to all pre-dredge meetings
    c. At least seven (7) days within project completion each dredging cycle.

C. Timing

1. This Order shall remain in effect until February 14, 2029. Continuing this project beyond this date will require separate certification.

2. Dredging and disposal shall occur from October 16 through February 14 of any given year.

D. Water Quality Monitoring & Criteria

1. Possession Sound is categorized as excellent and the criteria of the categorization apply as described in WAC 173-201A-210 (1).

2. This Order does not authorize temporary exceedances of water quality standards beyond the limits established in WAC 173-201A, except as otherwise authorized by this Order.

3. This Order authorizes a temporary turbidity mixing zones for the following activities per Table 1 below:

Table 1

Activity	Point of Compliance
Mechanical Clamshell Dredging	600
Hydraulic Dredging & Disposal at Jetty Island	600

4. The Applicant shall conduct water quality monitoring as described in the *Mechanical Dredging, Snohomish River Federal Navigation Channel Maintenance Dredging and Disposal FY 2019-2033* dated June 5, 2108 and the *Hydraulic Dredging Snohomish River Federal Navigation Channel Maintenance Dredging and Disposal FY 2019-2033* dated July 9, 2018.

5. Ecology must approve, in writing, any changes or additions to the WQMPP.

6. Monitoring results shall be submitted weekly to the Ecology Federal Permit Manager, per condition A.2.

7. Mitigation and/or additional monitoring may be required if the monitoring results indicate that the water quality standards have not been met.

E. Dredging, In-water & Upland Disposal

Equipment & Maintenance

1. If the contractor needs to stage materials and or equipment to be used for the management of sediment in upland areas, staging areas will be located a minimum of 50 feet and, where practical, 200 feet, from waters of the state including wetlands. If a staging area must be located within 50 feet of waters of the state, then the Applicant shall provide a written explanation and obtain approval from Ecology's Federal Permit Manager before placing the staging area in the setback area.

2. Equipment used for this project shall be free of external petroleum-based products while used around the waters of the state, including wetlands. Accumulation of soils or debris shall be removed from the drive mechanisms (wheels, tires, tracks, etc.) and the undercarriage of equipment prior to its use around waters of the state, including wetlands.

3. Secondary containment shall be placed under any equipment left overnight on Jetty Island.

4. No equipment shall enter, operate, be stored or parked within any sensitive area except as specifically provided for in this Order.

5. The access route on Jetty Island shall be clearly marked.

6. Fuel hoses, oil drums, oil or fuel transfer valves and fittings, etc., shall be checked regularly for drips or leaks, and shall be maintained and stored properly to prevent spills into state waters.

7. Wash water containing oils, grease, or other hazardous materials resulting from wash down of equipment or working areas shall not be discharged into state waters. The Applicant shall set up a designated area for washing down equipment.

8. Barges shall not be allowed to ground-out during in-water work.

Dredging

9. All dredging is to be done using a mechanical clamshell or hydraulic pipeline dredge. **Use of any other type of dredge requires preapproval from Ecology.**

10. All dredged material will be disposed at the Port Gardiner open water disposal site, Jetty Island or Parcel O. **Use of any other type of disposal method or location requires pre-approval by Ecology.**

11. At least 30 days prior to starting the dredging activity, the Applicant shall submit a *Dredging and Disposal Workplan* to Ecology for review and approval, per A.2.

12. The *Dredging and Disposal Workplan* shall include the following:
    a. General information including schedule, primary contact, and hours of operation
    b. Dredged quantities and disposal location
    c. Dredging procedures and sequence
    d. Equipment list
    e. A description of the BMPs to be used when placing material at upland sites and/or at Jetty Island

13. Dredging operations shall be conducted in a manner that minimizes the disturbance and siltation of adjacent waters and prevents the accidental discharge of petroleum products, chemicals or other toxic or deleterious substances into state waters.

14. Dredged material shall not be temporarily or permanently stockpiled below the OHWM.

15. All return water from upland disposal shall be treated prior to it entering waters of the state.

16. Anchors and/or spuds shall not be deployed in seagrass or kelp

17. The Applicant shall maintain anchor cable tension, set and retrieve anchors vertically, and prevent mooring cables from dragging to avoid impacts to seagrass and kelp.

18. All debris larger than two (2) feet in any dimension shall be removed from the dredged sediment prior to disposal at the open water site. Similar-sized debris floating in the dredging or disposal area shall be removed.

19. During dredging, the Applicant shall have a boat available on site at all times to retrieve debris from the water.

20. Dredged material shall be placed onto a barge and transported by tugboat to the open water disposal site. The barges shall have sidewalls to contain the material, and the barges shall not be overfilled to prevent barge overflow. Additional BMPs shall be implemented to allow filtering so as to prevent exceedence of water quality standards.

21. A pre-dredge meeting is required to be convened prior to the start of dredging.

22. Prior to each dredging cycle, the Applicant shall contact the DMMP agencies to determine whether additional sediment testing is required. If additional testing is required, no dredging or disposal shall be conducted until the material has been tested and a suitability determination has been issued. This area ranks low moderate in potential for contamination and the recency determination extends until September of 2023. Contact the DMMO for a possible extension on this recency determination.

23. If the maintenance dredging will not be conducted per the approved *Dredging and Disposal Workplan*, the Applicant shall submit a revised plan 30 days prior to the maintenance dredging event.

F. Emergency/Contingency Measures

1. The Applicant shall develop and implement a spill prevention and containment plan for this project and shall have spill cleanup material available on site at all times during construction.

2. Work causing distressed or dying fish, discharges of oil, fuel, or chemicals into state waters or onto land with a potential for entry into state waters, is prohibited. If such work, conditions, or discharges occur, the Applicant shall notify the Ecology Federal Permit Manager per condition B.1.a. and immediately take the following actions:

    a. Cease operations at the location of the non-compliance.
    b. Assess the cause of the water quality problem and take appropriate measures to correct the problem and/or prevent further environmental damage.
    c. In the event of a discharge of oil, fuel, or chemicals into state waters, or onto land with a potential for entry into state waters, containment and cleanup efforts shall begin immediately and be completed as soon as possible, taking precedence over normal work. Cleanup shall include proper disposal of any spilled material and used cleanup materials.
    d. Immediately notify Ecology's Regional Spill Response Office at 425-649-7000 and the Washington State Department of Fish & Wildlife with the nature and details of the problem, any actions taken to correct the problem, and any proposed changes in operation to prevent further problems.
    e. Immediately notify the National Response Center at 1-800-424-8802, for actual spills to water only.

3. Notify Ecology's Regional Spill Response Office at 425-649-7000 immediately if chemical containers (e.g. drums) are discovered on-site or any conditions present indicating disposal or burial of chemicals on-site that may impact surface water or ground water.

YOUR RIGHT TO APPEAL

You have a right to appeal this Order to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do all of the following within 30 days of the date of receipt of this Order:

- File your appeal and a copy of this Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel RD SW STE 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

CONTACT INFORMATION

Please direct all questions about this Order to:

Penny Kelley
Department of Ecology
P.O. Box 47600
Olympia, WA 98503-7600

360-407-7298
pkel461@ecy.wa.gov

MORE INFORMATION

- **Pollution Control Hearings Board Website**
  www.eho.wa.gov/Boards_PCHB.aspx
- **Chapter 43.21B RCW - Environmental and Land Use Hearings Office – Pollution Control Hearings Board**
  http://apps.leg.wa.gov/RCW/default.aspx?cite=43.21B
- **Chapter 371-08 WAC – Practice And Procedure**
  http://apps.leg.wa.gov/WAC/default.aspx?cite=371-08
- **Chapter 34.05 RCW – Administrative Procedure Act**
  http://apps.leg.wa.gov/RCW/default.aspx?cite=34.05
- **Chapter 90.48 RCW – Water Pollution Control**
  http://apps.leg.wa.gov/RCW/default.aspx?cite=90.48
- **Chapter 173.204 Washington Administrative Code (WAC) Sediment Management Standards**
  http://www.ecy.wa.gov/biblio/wac173204.html
- **Chapter 173-200 WAC Water Quality Standards for Ground Waters of the State of Washington**
  http://www.ecy.wa.gov/biblio/wac173200.html
- **Chapter 173-201A WAC Water Quality Standards for Surface Waters of the State of Washington**
  http://www.ecy.wa.gov/biblio/wac173201A.html

SIGNATURE

Dated this 7th day of August, 2018 at the Department of Ecology, Lacey Washington

Brenden McFarland, Section Manager, by Loree' Randall
Shorelands and Environmental Assistance Program
Headquarters

Attachment A
Statement of Understanding
Water Quality Certification Conditions

Snohomish River Federal Navigation Channel Maintenance Dredging & Disposal FY 2019-2033
U.S. Army Corps of Engineers
Water Quality Certification Order No. **15949**

As the Applicant for the Snohomish River Federal Navigation Channel Maintenance Dredging & Disposal FY 2019-2033 project, I have read and understand the conditions of Washington State Department of Ecology Order #15949, and any permits, plans, documents, and approvals referenced in the Order.

I have and will continue to ensure that all project engineers, contractors, and other workers at the project site with authority to direct work have read and understand the conditions of this Order and any permits, plans, documents, and approvals referenced in the Order.

_____ _____
Signature Date

_____ _____
Title Phone

_____
Company

Water Quality Monitoring Plan: Hydraulic Dredging
Snohomish River Federal Navigation Channel
Maintenance Dredging and Disposal FY2018-2032
9 July 2018

Constituents Monitored:

The Snohomish River Federal Navigation Maintenance Dredging and Disposal project requires the following water quality monitoring parameters pursuant to Water Quality Certification (WQC) # XXXXX/Public Notice of Application CENWS-PMP-YR-XX Snohomish River, Everett, WA for State of Washington 401 Water Quality Certification and Coastal Zone Management Act Consistency (XX XXX 2018) and WAC 173-201A-210:

- Turbidity applicable criteria:
  - Point of Compliance (POC) is 600 feet down-current from the dredging activity or the point of disposal.
  - Visual turbidity anywhere at or past the POC from the activity and/or the disposal location shall be considered an "exceedance" of the standard.
  - Visual turbidity at 150 feet and 300 feet down-current from the activity and/or the disposal location shall be "recorded" as observed.

Frequency of Monitoring:

- The contractor's dredging equipment shall operate for at least one hour prior to visual turbidity observations to ensure the observations are representative of water quality conditions during active operations.
- The contractor's water quality monitoring will correspond with; 1) slack tide and 2) ebb or flood tidal conditions to the extent these times adequately reflect periods of active dredging and occur during daylight hours.
- The contractor shall monitor for turbidity visually during daily dredging activities during daylight hours:
  - Monitor visual turbidity at the dredging monitoring locations every four (4) hours during daylight hours.
  - Record visible turbidity within the disposal area for every disposal action during daylight hours.
  - No monitoring shall occur before sunrise or after sunset unless authorized by the Corps.
- The contractor shall continue to monitor and record (written) daily visual turbidity monitoring at the dredging monitoring locations and at the disposal site during every disposal event every day (daylight hours only) the dredge is in operation. At any point, including observations outside normal monitoring, if visual monitoring indicates a turbidity plume, the exceedance protocol listed below shall be followed.

Sampling Approach:

- The contractor shall visually observe turbidity during daylight hours and record the findings according to the frequency.

- The contractor shall visually observe turbidity within the disposal area and record the findings of every disposal action during daylight hours.

Monitoring Locations:

- The area of mixing point of compliance for turbidity during hydraulic dredging is 600 feet down-current from the dredging activity and at the point of disposal, and thus will move as the dredging and disposal progresses.
- The contractor shall establish Monitoring Points at:
  - Visual down-current of Point of Compliance - visual turbidity observed at or beyond 600 feet of the dredging activity will be recorded.
  - Visual down-current of Point of Compliance - visual turbidity observed at or beyond 150 feet and 300 feet of the dredging activity will be recorded.
  - The contractor shall observe and record visible turbidity within the disposal area for every disposal action during daylight hours.
- A map of sample locations will be included in the final plan, which will be developed by the dredge contractor.

Exceedances and Exceedance Protocol

- If a visual turbidity plume is present at or beyond 600 feet from the dredging activity and/or within the disposal area for a disposal action, that sample is recorded as an EXCEEDANCE.
  - The Contractor shall immediately verify that dredging and disposal BMPs are already implemented. If not, immediately implement appropriate BMPs.
  - The Contractor shall notify the Corps by telephone as soon as is practicable, but within 30 minutes after there has been a visual exceedance.
  - The Corps will notify Washington Department of Ecology (WA Ecology) of the situation as soon as is practicable, but within 24 hrs of the visual exceedance.
  - The Corps will work with the Contractor to evaluate and identify conditions or actions that may be contributing to increased turbidity.
- During the notification and evaluation period, the Contractor will monitor and record the turbidity plume every 30 minutes until it is no longer visible.
- If the visual turbidity is caused by the dredging and/or disposal actions, those actions will be immediately addressed and corrected.
- If compliance cannot be achieved, the Contracting Officer may issue a stop work order until corrections are completed and/or plume has dissipated.
- Once compliance has again been achieved, the Contracting Officer will order the Contractor to resume dredging.
- The Corps will provide monitoring data to WA Ecology and notify WA Ecology that dredging has resumed.

Reporting:

- The Corps will report exceedances, including potential causes and BMPs to prevent reoccurrence, and/or dredging shut downs to WA Ecology by telephone and email as soon as is practicable, but within 24 hrs.
- The contractor shall document any dredging shut downs with an Incident Report, which will be transmitted to the Corp by email and through the QCS/RMS system within 24 hours of the exceedance.
- The Incident Report shall document all exceedances and will include the date, time, location, activity, turbidity data collected, name of person collecting the data, names of persons notified of the exceedance, photographs if taken, and summary of how the exceedance was resolved following the above protocol.
- The Corp will send the Incident Reports to WA Ecology within five (5) days of the exceedance, per the 401 WQC.
- Per the 401 WQC, weekly visual turbidity reporting will be sent to WA Ecology.
- Within 60 days of termination of the dredging and disposal activities, the Corps will submit a summary report of the measured turbidity results to WA Ecology.

Responsibility and Communication Plan:

- The Corps will oversee turbidity monitoring conducted by the contractor.
- The Corps will be responsible for coordinating with WA Ecology and submitting the Turbidity Monitoring Reports and data provided by the contractor.
- The Corps will notify WA Ecology within 24 hours if an exceedance occurs.
- The Corps will coordinate with the dredging contractor.
- The contractor shall provide Turbidity Monitoring Report and data to the Corps, as directed.
- The contractor shall notify the Corps within 30 minutes if an exceedance occurs.
- The contractor POC will be provided in the Contractor Water Quality Monitoring Plan.
- The Corps Points of Contact for turbidity monitoring will be John Pell, Project Manager (206-316-3413), and Kaitlin Whitlock, Environmental Coordinator (206-764-3576).
- The WA Ecology Point of Contact is Penny Kelley, Federal Permit Coordinator, (360-407-7298).
- Official reporting of any incidents are to be sent to both the WA Ecology Point of Contact AND to the fednotification@ecy.wa.gov inbox.

Water Quality Monitoring Plan - Mechanical Dredging
Snohomish River Federal Navigation Channel
Maintenance Dredging and Disposal FY 2019-2033
5 June 2018

Constituents Monitored:

The Snohomish River Federal Navigation Maintenance Dredging and Disposal project requires the following water quality monitoring parameters pursuant to Water Quality Certification (WQC) # XXXXX/Public Notice of Application CENWS-PMP-YR-XX Snohomish River Federal Navigation Channel Maintenance Dredging and Disposal project, Everett, Washington, for State of Washington 401 Water Quality Certification (WQC) and Coastal Zone Management Act Consistency (XX XXX 2017) and WAC 173-201A-210:

- Turbidity applicable criteria:
  - Point of Compliance (POC) is 600 feet down-current of the maximum swing radius of the dredge plant or from the point of disposal.
  - Turbidity readings at the POC shall not exceed 5 NTU (nephelometric turbidity units) over background when the background is 50 NTU or less, or a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
  - Visual turbidity anywhere at or past the POC from the activity and/or the disposal location shall be considered a possible exceedance of the standard and shall be verified through measured turbidity sampling.

Frequency of Monitoring:

- The contractor's dredging equipment shall operate for at least one hour prior to the collection of turbidity readings to ensure readings and observations are representative of water quality conditions during active operations.
- The contractor's water quality monitoring will correspond with; 1) slack tide and 2) ebb or flood tidal conditions to the extent these times adequately reflect periods of active dredging and occur during daylight hours.
- The contractor's water quality monitoring sampling times will be at least two (2) hours apart, to the extent these times adequately reflect periods of active dredging and occur during daylight hours.
- The contractor shall monitor for turbidity, instrument measured and visual, during daily dredging activities during daylight hours:
  - Take and record readings twice daily at one (1) up-current and three (3) down-current locations the first five (5) consecutive days of dredging, assuming no exceedances.
  - Record visible turbidity down-current of the point of compliance recorded at each reading collected at the point of compliance the first five (5) consecutive days of dredging, assuming no exceedances.

- Take and record readings once a day along a transect across the navigation channel at the point of compliance the first five (5) consecutive days of dredging, assuming no exceedances.
- Record visible turbidity within the disposal area for every disposal action during daylight hours the first five (5) consecutive days of dredging and disposal, assuming no exceedances.
- No monitoring shall occur before sunrise or after sunset unless authorized by the Corps.

❖ Upon completion of the instrument measured monitoring days, the contractor shall send the monitoring data report daily to the Corps within 24 hours of completion of monitoring activity.

- If there are no exceedances in water quality within the five (5) consecutive days, the contractor shall discontinue instrument monitoring, unless otherwise directed by the Corps, if required by WA Ecology.
- If there are exceedances in water quality within the five (5) consecutive days, the contractor shall continue monitoring following the steps listed in "Exceedances and Exceedances Protocol."

❖ The contractor shall continue to monitor and record (written) daily visual turbidity monitoring at the dredging Point of Compliance and at the disposal site during every disposal event every day (daylight hours only) the dredge is in operation. At any point, if visual monitoring indicates a turbidity plume, the contractor shall take a physical reading to confirm/verify if an exceedance has occurred. If an exceedance is confirmed/verified through physical monitoring, the exceedance protocol listed below shall be followed.

Sampling Approach:

❖ The contractor shall establish water quality conditions according to the following:

- The contractor shall measure turbidity with a meter (HydroLab or similar), starting at least one hour after the dredging equipment has been operating, to ensure readings and observations are reflective of conditions during active operations.
- The contractor shall verify the calibration of the meter and calibrate as necessary with standardized samples prior to the start of each day's monitoring, per the manufacturer's specifications.
- The contractor shall collect readings within the water strata:
  - near the surface (~ 2 feet below)
  - mid-depth
  - near the bottom (~2 feet above)

❖ The contractor shall compare water quality readings taken at the point of compliance to background levels within the water column strata (i.e., surface level at points of compliance compared to surface level at background stations) to determine compliance with constituent standards.

- The contractor shall visually observe turbidity during daylight hours beyond the point of compliance and record the findings at the same time the turbidity levels are measured.
- The contractor shall visually observe turbidity within the disposal area and record the findings every disposal action during daylight hours.

Monitoring Locations:

- The area of mixing point of compliance for turbidity during clamshell dredging is 600 feet down-current of the maximum swing radius of the dredge plant and thus will move as the dredging progresses.
- The contractor shall establish Monitoring Points at:
  - Measured Background – a minimum of 300 feet up-current from the dredging.
  - Measured down-current Early Warning – 300 feet down-current of the maximum swing radius of the dredge plant.
  - Measured down-current Point of Compliance – 600 feet down-current of the maximum swing radius of the dredge plant.
  - Visual down-current of Point of Compliance – visual turbidity observed at or beyond 600 feet of the maximum swing radius of the dredge plant will be recorded at the same time the turbidity levels are measured.
- The contractor shall establish channel transect Monitoring Points across the navigation channel located at the Point of Compliance. This transect shall be:
  - Monitored once per day
  - Located at a minimum of three (3) points spaced roughly equidistant across the navigation channel
  - Collect three (3) readings within the water strata; 1) just below the surface (~ 2 feet below), 2) mid- depth, and 3) near the bottom (~2 feet above)
- The contractor shall observe and record visible turbidity within the disposal area for every disposal action during daylight hours.
- A map of sample locations will be included in the final plan, which will be developed by the dredge contractor.

Elevations at the Early Warning Location

- If measurements taken at the Early Warning location show recorded turbidity is greater than 5 NTU over background where the background is less than 50 NTU, or if more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU, that sample is recorded as an ELEVATION. Assuming dredging continues, the contractor shall continue to monitor per the protocol below:
  - Review existing BMPs, including, but not limited to:
    - Check the seal on the bucket, remove any obstructions, repair/replace bucket if point of closure does not fully close

- Do not overfill bucket – only fill to bucket's capacity
- Slow speed of lifts from bottom to surface and swing from surface to barge
- Do not allow water in barge to excessively overtop

o Evaluate potential new BMPs.

Exceedances and Exceedance Protocol

❖ If measurements taken at the Point of Compliance or in the disposal site show recorded turbidity are greater than 5 NTU over background where the background is less than 50 NTU, or if more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU, that sample is recorded as an EXCEEDANCE. Assuming dredging continues, the contractor shall continue to monitor per the exceedance protocol below:

o *Step 1: Verification of the problem*

- If monitoring indicates an exceedance, the contractor shall collect, within ten (10) minutes of the initial reading, another series of readings (~ 2 feet below), mid-depth, and near the bottom (~2 feet above) in the same location.
- If the exceedance still exists, the contractor shall photograph conditions at the point of compliance and then collect another series of readings at the nearest up-current background station to determine if the exceedance is caused by the dredging and disposal or by a change in background conditions (for example due to a heavy rainfall event).
- The contractor shall notify the Corps by telephone within 30 minutes after there has been a measured confirmed exceedance.
- The Corps will direct the contractor to implement best management practices (BMPs), as appropriate and applicable, to reduce turbidity. Example BMPs include, but not limited to:
  - ✓ Check the seal on the bucket, remove any obstructions, repair/replace bucket if point of closure does not fully close
  - ✓ Do not overfill bucket – only fill to bucket's capacity
  - ✓ Slow speed of lifts from bottom to surface and swing from surface to barge
  - ✓ Do not allow water in barge to excessively overtop

o *Step 2: Increased monitoring*

- The contractor shall collect another reading no more than one (1) hour after the exceedance is recorded to verify the dredging operation has been altered to reduce the exceedance to within acceptable limits.
- If this second reading, taken 1 hour later, still shows an exceedance, the contractor shall immediately notify the Corps by telephone that there is still a measured exceedance.
- The Corps will again direct the contractor of the situation and require the contractor take all measures possible to reduce turbidity.

- Finally, the contractor shall collect a third reading, taken no more than two (2) hours after the first exceedance is recorded.
- Contractor shall notify Corps that a reportable exceedance occurred, the reason for the exceedance, as well as BMPs to prevent reoccurrence, and provide documentation from the incident to the Corps to forward to WA Ecology. Based on WA Ecology's response, the Contracting Officer may order the contractor to stop dredging until compliance is achieved.

o *Step 3a: Continued sampling until compliance is achieved, assuming dredging continues*

- Once a reportable exceedance is confirmed and reported, monitor every 2 hours until sunset or until two consecutive readings that do not exceed standards.
- Return to twice per day for 5 consecutive days of no further exceedances of water quality monitoring.
- The Corps will again direct the contractor to take all measures possible to reduce turbidity.
- The contractor shall resume the normal schedule of water quality monitoring as per specific requirements above until directed by the Corps to cease monitoring.
- If compliance cannot be achieved, the Contracting Officer may order the contractor to stop dredging until compliance is achieved.

o *Step 3b: Continued sampling until compliance is achieved, assuming dredging has been stopped.*

- After the contractor has stopped dredging, the contractor shall collect readings at hourly intervals until sunset and resume the following morning until water quality levels return to background.
- Once compliance has again been achieved, the Contracting Officer will order the contractor to resume dredging.
- The Corps notify WA Ecology that dredging has resumed.
- Once dredging has resumed, the contractor will return to twice a day for 5 consecutive days of no further exceedances of water quality monitoring, which shall become the responsibility of the contractor.
- The contractor shall continue the normal schedule of water quality monitoring as per specific requirements above until directed by the Corps to cease monitoring.

Reporting:

❖ The Corps will report exceedances, including potential causes and BMPs to prevent reoccurrence, and/or dredging shut downs to WA Ecology by telephone and email as soon as is practicable, but within 24 hrs.

❖ The contractor shall document any dredging shut downs with an Incident Report, which will be transmitted to the Corp by email and through the QCS/RMS system within 24 hours of the exceedance.

- The Incident Report shall document all exceedances and will include the date, time, location, activity, turbidity data collected, name of person collecting the data, names of persons notified of the exceedance, photographs if taken, and summary of how the exceedance was resolved following the above protocol.
- The Incident Report shall be sent to WA Ecology within five (5) days of the exceedance, per the 401 Certification.
- WA Ecology will require the restart of the five (5) consecutive days of instrument measured turbidity monitoring, which shall be the responsibility of the contractor, until compliance is achieved for 5 consecutive days.
- Per the 401 WQC, weekly turbidity (visual or measured) reporting will be sent to WA Ecology.
- Within 60 days of termination of the dredging and disposal activities, the Corps will submit a summary report of the measured turbidity results to WA Ecology.

Responsibility and Communication Plan:

- The Corps will oversee turbidity monitoring conducted by the contractor.
- The Corps will be responsible for coordinating with WA Ecology and submitting the Turbidity Monitoring Reports and data provided by the contractor.
- The Corps will notify WA Ecology within 24 hours if an exceedance occurs.
- The Corps will coordinate with the dredging contractor.
- The contractor shall provide Turbidity Monitoring Report and data to the Corps, as directed.
- The contractor shall notify the Corps within 30 minutes of a confirmed exceedance and follow required notifications per the exceedance protocols.
- The contractor POC will be provided in the Contractor Water Quality Monitoring Plan.
- The Corps Points of Contact for turbidity monitoring will be John Pell, Project Manager (206-764-3413), and Jo Gardiner, Environmental Coordinator (206-764-6878).
- The WA Ecology Point of Contact is Penny Kelley, Federal Permit Coordinator, (360-407-7298).
- Official reporting of any incidents are to be sent to both the WA Ecology Point of Contact AND to the fednotification@ecy.wa.gov inbox.

Request for Water Quality
Extended Area of Mixing

Snohomish River Federal Navigation Channel
Maintenance Dredging

U.S. Army Corps of Engineers, Seattle District
July 2018

US Army Corps
of Engineers ®
Seattle District

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Request for Water Quality Area of Mixing

The U.S Army Corps of Engineers (Corps) is requesting an extension of the State Water Quality Area of Mixing for in-water work activities. The Corps is proposing that the downstream point of compliance (POC) for proposed in-water work activities be extended from 150 feet downstream to 600 feet downstream of the activity. The proposed in-water work is dredging with a mechanical (clamshell bucket) and hydraulic dredging and disposal for maintenance of the Snohomish River Federal Navigation Channel (Snohomish navigation channel). Previously, the Washington Department of Ecology (Ecology) provided an extension of the Point of Compliance to 600 feet in Water Quality Certification Order #8974. This request would apply only to this project and only for the proposed in-water work activity as described below.

Project Description

The Corps is proposing to conduct maintenance dredging in the Snohomish navigation channel and settling basins at Everett, Washington. The Snohomish navigation channel provides commercial and recreational vessels access to the Port of Everett, the City of Everett, marinas and boat launches, and other maritime businesses. Because of continuous sedimentation from the Snohomish River, sediment accumulation in the navigation channel can pose a hazard to transiting vessels and can make some areas of the channel inaccessible at low tides. The purpose of this project is to maintain the authorized depths of the navigation channel and settling basins, to facilitate the continuation of normal vessel traffic in the Snohomish navigation channel.

The Snohomish navigation channel consists of lower and upper navigation channels and two settling basins. The lower channel extends from the entrance at Possession Sound up the lower Snohomish River for one mile, and varies in width from 150 to 425 feet wide. The authorized depth of the lower navigation channel is -15 feet at mean lower low water (MLLW). The authorized depth of the lower settling basin is-20 feet at MLLW and has a capacity of 250,000 cubic yards (cy). The upper channel extends from the lower settling basin to river mile (RM) 6.3 and is 150 feet wide. The authorized depth is -8 feet at MLLW. The authorized depth of the upper settling basin is -40 feet; however, the upstream settling basin is maintained to a depth of up to -32 feet at MLLW and has a capacity of 1,000,000 cy.

A suitability determination was prepared on February 8, 2018 by the Dredge Material Management Program (DMMP) agencies (the Corps, the U.S. Environmental Protection Agency, Ecology, and the Washington State Department of Natural Resources) (Attachment 1). Based on the results of testing, the DMMP concluded that all dredged material, approximately 800,000 cy per dredge event, are suitable for unconfined open-water disposal at the Puget Sound Dredged Disposal Analysis (PSDDA) approved Port Gardner non-dispersive site. The Corps typically removes 500,000 cy per dredge event.

Proposed In-Water Work Activities Covered by Area of Mixing Request (What in-water work activities necessitate an area of mixing and why (may use past experiences to help explain the need)

To execute the construction, a dredge would be operating continuously except for breaks for crew change or machinery maintenance. The methods for dredging are mechanical (clamshell) and hydraulic. It is difficult to estimate how much material would be dredged hydraulically, and how much would be dredged mechanically because shoaling varies from year to year. The actual quantity of material to be dredged per event will be determined based on a full-condition survey that is conducted annually, at a minimum, and typically occurs anytime in March through May of the dredging year. The condition of the settling basins and navigation channel is also confirmed by a pre-dredge survey that typically occurs one week prior to the dredging event. The volume of material to be dredged from each location and the

appropriate disposal option will be finalized based on the results of these surveys.

When dredging is conducted using a mechanical dredge (clamshell), all dredged material would be placed on a bottom-dump barge adjacent to the dredge. It is then transported to the approved open-water disposal site at Port Gardner. The quantity of material expected to be resuspended during clamshell dredging is approximately 3% (EPA 2012).

Some years there is a need for dredged sediment for beneficial re-use purposes. A hydraulic dredge is used to remove accumulated sediment, which is then transported via pipeline to Jetty Island, Parcel O, and other approved upland sites. In the past, material has been placed directly at Jetty Island and Parcel O sites using a hydraulic dredge and pipeline.

Impacts to Sensitive or Important Habitat (Explain how there will not be any loss of sensitive or important habitat and will not result in damage to the ecosystem within the area of mixing mixing requested)

There will be no loss of sensitive or important habitat from the proposed in-water work within the area of mixing. Disturbances to ESA-listed species have been determined to be of minor intensity and short duration. In the aquatic habitat available in the Snohomish navigation channel, approximately 8 miles long, extending the area of mixing down-current from the dredge from 150 feet to 600 feet would not constitute a significant increase in risk to sensitive or important habitat. The project footprint and area of potential effect of the area of mixing contains state priority habitats, primarily occurrence/migration corridor for salmonids, which will be absent during dredging due to the approved in-water work window. These include some breeding areas for bull trout, and coho and sockeye salmon that are adjacent to the Snohomish navigation channel; however, all dredging will be conducted within the approved in-water work window to avoid impacts to species listed under the Endangered Species Act. On Jetty Island, there are breeding areas for purple martin and waterfowl concentrations; however, placement of dredged sediment on Jetty Island would not be conducted during the breeding season. There is a harbor seal haulout located just south of a large marina adjacent to the Snohomish navigation channel. It is assumed by the location of the haulout that the harbor seals are habituated to maritime industries.

The temporary change of area of mixing from 150 to 600 feet will not change the ecosystem functions of the project area. This is reflected in the previous WQC Order for the project (# 8974), which provided a temporary extension of the point of compliance to 600 feet down-current from the dredging activities. For this project, the Corps is requesting the same temporary point of compliance.

Impacts to Public Health (Identify any adverse effect to public health if the area of mixing is granted)

As reported in the Water Quality Atlas for Washington State (Ecology 2016), Ecology provides an assessment of water quality and a 303(d) list of impaired waterbodies for fresh and marine waters in Washington State. Washington State is obligated under the Federal Clean Water Act (CWA) §303(d) and §305(b) to identify polluted waters (known as the 303(d) list), as well as report on the status of water quality statewide where data is available. Several areas in the Snohomish River appear on the state's 303d list for surface water and sediment; however, not all areas shown in Figure 1 are within the navigation channel. Based on the suitability determination prepared for the project February 8, 2018 and the annual dredging of the navigation channel, it is assumed that these contaminated materials occur in the Snohomish River but outside of the navigation channel (Attachment 1).

Changing the area of mixing from 150 feet to 600 feet would have no change to the estimated risks to public

health because there is no change to how humans interact with this waterway between the 150-foot mixing area and a 600-foot mixing area. The sediments that become resuspended during dredging would not move any closer to areas where humans may come in contact with them. All sediments have been determined suitable for aquatic disposal at the Port Gardner non-dispersive site farther away from human populations, as well as authorized for beneficial re-use.

Best Management Practices (BMPs) to Control Turbidity for Mechanical Dredging (What BMPs will be implemented and why do you feel that they will not be sufficient to meet water quality standards on this project?)

The dredging contractor will be required to adhere to the water quality monitoring plan (WQMP) as approved by Ecology. Additionally, turbidity will be monitored during dredging according to the WQMP. BMPs are intended to avoid and minimize impacts to the environment. The Corps will direct the contractor to implement BMPs, as appropriate and applicable, to reduce turbidity. Example BMPs include, but not limited to:

1. The bucket will be open when lowered, not dropped, to the substrate. Upon retrieval, the bucket would generally be full of sediment and open at the top allowing any fish that might be in the bucket to escape.
2. The bucket will be raised through the water column at a velocity that reduces spillage of sediment.
3. The appropriate bucket size will be selected to reduce overflow and excessive water in the bucket to reduce the need to take multiple grabs.
4. Avoid intentionally sweeping the bucket to smooth out high spots; only single grabs should be taken.
5. Check the seal on the bucket, remove any obstructions, repair/replace bucket if point of closure does not fully close.
6. Use real-time positioning to allow the operator to better control the dredge cut and bucket depth.
7. All dredging will occur only in authorized areas of the navigation project; no new dredging of greater widths or depths would occur.
8. Do not overload barges and eliminate barge overflow.

Best Management Practices (BMPs) to Control Turbidity for Hydraulic Dredging

1. Overflow shall be moderated using a suitably sized control structure (weir) that controls the rate and direction of flow, such that sediment is allowed to settle in the basin before overflowing into the river.
2. Pipeline dredged material shall be placed to specified elevations and sloped to allow proper drainage. No material shall be placed outside the limits of the placement area.
3. As described in the Biological Opinion issued by the National Marine Fisheries Service (NMFS) dated January 26, 2018, “Hopper and hydraulic pipeline dredges limit, to the extent possible, pumping activities to when the suction equipment is on the substrate. In general, pump operations start after the equipment is on the substrate. When hoppers are full or dredging is interrupted, the equipment is lifted off the surface long enough to flush the remaining sediment from the pipes and then pumping is stopped.”

The dredging contractor will be directed to employ BMPs to the maximum extent practicable and these will be based on water quality monitoring. However, the dredging must achieve a certain productivity to complete the entire project within the in-water work window, otherwise, the dredging would need to extend into a period when fish at sensitive life-stages may be present. The preference is to limit the environmental effects of dredging to the minimum amount of time required to achieve the needed navigation improvements. BMPs that reduce dredging productivity could result in failing to complete the project within the estimated period.

Waterbody Characteristics (What are the characteristics of the stream that would make it difficult to meet water quality standards while performing construction activities in the stream. (i.e., flow, sediment type, width and depth of water body, etc.)?)

Sediment

The Pilchuck, Skykomish, and Snoqualmie Rivers are the largest tributaries to the Snohomish River. Hume et al. (2015) identified three general categories of degraded sediment processes in the lower Snohomish basin (Figure 2); however only 1 and 2 affect the Snohomish River:

1. Mountainous areas with steep slopes, high precipitation, erodible soils and intense forestry activities.
2. Lowland floodplain areas with erodible soils, moderate precipitation and intense agricultural activities and/or urban development.

For the mountainous areas, the model results suggests that the Pilchuck River planning unit has relatively high rates of sediment export due to commercial logging activities in the upper watershed. For the lowland floodplain category, results suggest higher levels of sediment export due to commercial agricultural activities and urban development in the Snohomish mainstem and lower Pilchuck River.

Within the Snohomish navigation channel, is a mix of gravel, sand, silt and clay throughout most of the area to be dredged. As would be expected, sediment in the upper settling basin and navigation channel between two settling basins has a higher percentage of sand (93 – 97%) and 3 – 7% total fines (silt and clay combined) when compared to sediment distribution in the lower channel and lower settling basin. The percentage of sand is lower in the lower channel and lower settling basin (48 – 68%) and 32 – 52% total fines.

Habitat

The proposed dredging will not impact the intertidal areas. The intertidal areas along the edges of the navigation channel will remain as habitat and will provide a movement corridor for fish and wildlife as the dredging operation proceeds through the basin and down the channel. The approximately 400-foot wide intertidal area will be retained along both banks of the navigation channel during and after dredging. This area extends between the outer edge of the dredged channel and Jetty Island to the west of the navigation channel and between the more developed shorelines of the Everett Marina, the 12th Street Channel, and the Everett Naval Station to the east of the outer edge of the navigation channel. The approximately 100 feet of intertidal area along the outer-most (western) edge of the widest portion of the downstream settling basin and the approximately 200 feet of intertidal area along the outermost (western) edge of the

narrowing portion of the downstream settling basin will not be disturbed by the Corps dredging. The existing approximately 200 feet of intertidal area along the entire eastern edge of the downstream settling basin will be retained.

Flow Rate

The Snohomish River has annual mean flow of 9,606 cubic feet per second (cfs) based on the average annual flow from 1963-2013 (USGS 2014).

Length of Time Area of Mixing is requested for In-Water Work Activities

The Corps is requesting a temporary change in the length of the area of mixing for the proposed in-water work activities for the duration of the approved in-water work window although dredging may not take the entire period. All activities would take place during the approved in-water work window at the site (October 16 – February 15).

Designated Uses of the Waterbody in the Project Area and Potential Impacts

The project area is located at in Water Resource Inventory Area (WRIA) 7 Snohomish, in the Snohomish River from the mouth to the southern tip of Ebey Island at RM 8. The Use Designations for fresh waters are described in the Washington Administrative Code (WAC) Chapter 173-201A-602. The freshwater designated uses and criteria are described in WAC Chapter 173-201A-200. This section of the Snohomish River is recorded as follows:

> **Aquatic Life Uses***: Spawning/Rearing* – Is defined as salmonid spawning, rearing, and migration. The key identifying characteristic of this use is salmon or trout spawning and emergence that only occurs outside of the summer season (September 16 - June 14). Other common characteristic aquatic life uses for waters in this category include rearing and migration by salmonids.
>
> **Recreation Uses:** *Primary Contact Recreation*
>
> **Water Supply Uses:** *Domestic Water, Industrial Water, Agricultural Water, Stock Water*
>
> **Miscellaneous Uses:** *Wildlife habitat, Harvesting, Commerce/Navigation, Boating, Aesthetic*

Aquatic Life Uses

The project area is a migration corridor for Chinook, chum, coho, and pink salmon and steelhead, as well as Dolly Varden/bull trout and coastal cutthroat trout (WDFW 2018). All dredging will occur during the approved in-water work window at the site (October 16 – February 15). Turbidity from dredging is anticipated to have a small plume directly associated with the dredging operation, which may cause fish to avoid the water column around the dredge. No delays to salmon migration are expected due to the substantial area of aquatic habitat available to avoid the small turbidity plume. The construction will avoid having any impact to tribal harvest of adult salmon by coordinating with tribal fisheries managers.

WDFW (2018) has documented breeding areas in the Snohomish Channel for sockeye, coho, and chum salmon, as well as Dolly Varden/bull trout. All dredging will occur during the approved in-water work window at the site (October 16 – February 15). It is unlikely the breeding areas will be impacted because the proposed dredging will not impact the intertidal areas of the Snohomish Channel (Corps 2012). The intertidal areas along the edges of the navigation channel will remain as habitat and will provide a movement corridor for fish and wildlife during dredging operations (Corps 2012). The intertidal area, approximately 400-feet wide, will be retained along both banks of the Snohomish Channel during and

after dredging. This area extends between the outer edge of the dredged channel and Jetty Island to the west of the navigation channel and between the more developed shorelines of the Everett Marina, the 12th Street Channel, and the Everett Naval Station to the east of the outer edge of the navigation channel (Corps 2012). The intertidal area along the western edge of the widest portion of the downstream settling basin, approximately 100 feet, and the intertidal area along the western edge of the narrowing portion of the downstream settling basin, approximately 200 feet, will not be disturbed by the Corps dredging. The intertidal area along the entire eastern edge of the downstream settling basin, approximately 200 feet, will be retained (Corps 2012).

Recreation Uses

Primary contact recreation does not occur in the Snohomish River Navigation Channel and the proposed project would have no effect to nearby recreation areas.

Water Supply Uses

The proposed project would have no effect to domestic water, industrial water, agricultural water, and stock water. The purpose of the project is to maintain navigation to facilitate safe vessel transit within the navigation channel.

Miscellaneous Uses:

Among the miscellaneous uses listed, commerce/navigation, boating, and aesthetic occur within the project area. The purpose of the project is to maintain navigation to facilitate safe vessel transit within the navigation channel. The Snohomish River contains several marinas and a boat launch for recreational boaters. There is recreation and wildlife viewing at Jetty Island.

Access for Monitoring (Verify land access to the waterbody– if an area of mixing is granted, water quality monitoring is required at various points along the length of the area of mixing as well as at the point of compliance. If land access is not possible, the Applicant needs to verify that monitoring can be done from the water. Provide such verification to Ecology within the request)

The dredging contractor will execute water quality monitoring for dredging operations from their own boat and will report all results to the Corps. The contractor will execute water quality monitoring in the channel upstream and downstream of the dredging activity. No sampling will take place from the land. Nor will land access be required to perform water quality monitoring.

Notification of Area of Mixing Request to Services (Provide written documentation verifying that the NFMS and/or US Fish & Wildlife (Services) have been notified that the Applicant is requesting an area of mixing– Ecology cannot grant an area of mixing in addition to what is allowed in the standards if the Services have not been notified.)

See Attachment 2.

References

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WDFW (Washington Department of Fish and Wildlife). 2018. List of priority habitats and species at http://wdfw.wa.gov/mapping/phs/ accessed January 24, 2018.

CENWS-ODS-ND

MEMORANDUM FOR RECORD February 8, 2018

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF DREDGED MATERIAL FROM THE SNOHOMISH RIVER, SNOHOMISH COUNTY, EVERETT, WA, EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT, FOR UNCONFINED OPEN-WATER DISPOSAL AT THE PORT GARDNER NONDISPERSIVE SITE.

1. Introduction. This memorandum reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers (USACE), Washington Departments of Ecology and Natural Resources, and the Environmental Protection Agency) regarding the suitability of 778,221 cubic yards (cy) of dredged material from the Snohomish River federal navigation channel and settling basins for disposal at the Port Gardner nondispersive open-water disposal site.

2. Background. The Everett Harbor and Snohomish River Project ("project") consists of deep and shallow-draft navigation channels and two settling basins to serve navigation in Everett Harbor and the Snohomish River. The authorized design depth varies from -8 feet (ft) Mean Lower Low Water (MLLW) in the shallow draft channel up to -40 ft MLLW in the upstream settling basin. Table 2 summarizes the project feature dimensions. The USACE Seattle District is responsible for dredging portions of the authorized project as needed to maintain navigation.

   Sedimentation in the navigation channel is due to input from the Snohomish River watershed. Sediment in the waterway has been characterized previously by the USACE under the Puget Sound Dredged Disposal Analysis (PSDDA) program or DMMP six times, including four full characterizations and a dedicated characterization for dioxins. Table 3 provides a summary of the previous characterization and survey results. A complete description can be found in Attachment A – Description of Previous Sediment Characterizations.

   A bathymetric survey of the waterway conducted by the USACE in June 2016 showed that significant sedimentation had occurred. The USACE contracted with Herrera Environmental and subcontractor NewFields to characterize the waterway to authorized depths plus 2 ft of overdepth for all areas except the upper settling basin. Characterization of the upper settling basin, which is rarely, if ever, dredged to its full authorized depth of -40 ft MLLW, was restricted to -22 ft MLLW (-20 ft plus 2 ft of overdepth).

3. Project Summary. Table 1 below includes project summary and tracking information.

Table 1. Project Summary and Tracking Information

Project ranking	Low-moderate[1]
Characterized volume (CY)	778,221
Characterized depth (plus 2 ft overdepth)	Varies; see Table 2
Draft SAP received	August 11, 2017
Draft SAP returned for revisions	August 25, 2017
2nd draft SAP received	August 28, 2017
Final SAP received	September 6, 2017
Sampling dates	September 13, 2017
Draft data report received	December 15, 2017
Comments provided on draft report	January 26, 2018
Final data report received	February 6, 2018
DMMO tracking number	EVEOM-1A-F-386
EIM Study ID	EVEOM17
Recency Determination (6 years for low-moderate)	September 2023

Notes: 1 – Although the Snohomish is technically ranked low-moderate, the DMMP agencies agreed to a special one-time "confirmatory" ranking status for this project to define the number of DMMUs and sampling density for this sediment characterization.

4. Project Ranking and Sampling Requirements. Sediments in the Snohomish River navigation channel are ranked low-moderate following the 1992 partial characterization and down-ranking. For the 2011 characterization, the DMMP agreed to a temporary ranking of "Very Low, Low and Confirmatory" based on data collected since the 1992 characterization. Results from the 2011 characterization enabled the DMMP to assign a special one-time "confirmatory" ranking for the entire navigation channel for the purposes of the 2017 sediment characterization. The confirmatory sampling volume requirements were thus uniquely defined for the 2017 sediment characterization as follows:

Maximum volume per DMMU = 100,000 CY
Maximum volume per grab sample = 20,000 CY

Based on past sampling findings, material in the navigation channel is considered homogeneous in nature. Thus, no distinction between surface and subsurface material was required, and grab samples were approved by the DMMP agencies as a representative sampling technique.

Using bathymetric survey data from March-April 2017and the characterization depths specified in Table 2, ten (10) Dredged Material Management Units (DMMUs) were defined to characterize 778,221 CY of proposed dredged material (Table 4).

In addition, a tiered approach to sampling was approved for the composite representing the most upstream DMMU (DMMU 10). Full chemical analysis would not be required if the grain size was <20% fines and total organic carbon (TOC) was <0.5%.

5. Sampling and Analysis. Sampling occurred on September 13, 2017 in accordance with the approved Sampling and Analysis Plan at the locations shown in Figures 2 through 4. All samples were collected using a stainless steel 0.2 m^2 power grab sampler attached to a winch and cable and deployed from the sampling vessel. A total of 41 sediment surface grab locations were collected and composited into 10 DMMUs (Tables 4 and 5).

   Wet sieving for grain size was conducted in the field for DMMU 10 (sample D10-C from the shallow draft channel upstream of the upper settling basin) to determine if additional chemistry analyses would be necessary. The field wet sieve results for composite DMMU 10 indicated 13 percent fines. This was under the threshold for 20 percent fines, and additional chemistry was not conducted on this sample beyond grain size and Total Organic Carbon (TOC). Conventional results later confirmed that full analysis of DMMU 10 was not required.

   The DMMU composites were submitted to ALS, located in Kelso, Washington for conventionals and chemical analyses. The Kelso laboratory performed all method analyses except for polybrominated diphenyl ether (PBDE) congeners, which were conducted by the ALS laboratory in Houston, Texas.

6. Results. The conventionals and chemistry results for the 10 DMMU composites are presented alongside the DMMP marine guidelines and Sediment Management Standards (SMS) benthic criteria in Tables 6 and 7, respectively.

   Grain Size and Sediment Conventionals. Percent fines varied from a high of 43.3% in the deep draft channel (DMMU 1) and decreased rapidly in the downstream settling basin (8.7 to 40.4% fines). The shallow draft channel and upstream settling basin contained less than 3.7% fines. TOC and sulfides followed a similar pattern, with decreasing percent/concentration upstream. DMMUs 5 through 10 had TOC concentrations less than 0.5%; thus, comparisons to OC-normalized benthic Sediment Management Standards were not performed for these sample results.

   Standard Chemicals of Concern. No chemistry results (detects and non-detects) exceeded the DMMP Screening Level (SL), Bioaccumulation Trigger (BT), or Maximum Level (ML) for the chemicals of concern (COCs). In general, concentrations were low for all chemicals of concern (COC) and correlated to percent fines and percent TOC. The downstream COC concentrations were slightly higher than those in the shallow draft channel and upstream settling basin. PCBs were non-detect in all DMMU composites.

   Dioxins/furans. Dioxin analyses were not required for this project due to existing data. Snohomish River sediments were most recently tested for dioxins in 2009; the maximum concentration measured at that time was 1.06 pptr TEQ (ND = ½ RL), which is well below the dispersive dioxin criteria of 4 pptr TEQ (DMMP, 2009).

TBT. Tributyltin (TBT) analyses were not required for this project based on results from previous monitoring.

PBDEs. Analyses for polybrominated diphenyl ethers (PBDEs) were performed on 3 of the 10 DMMU composites to fulfill the Essential Fish Habitat conservation recommendations that accompanied the National Marine Fisheries Service's biological opinion on the effects of dredged material disposal on listed rockfish species (DMMO, 2016). The three DMMU composites analyzed for PBDEs (DMMUs 1, 3, and 8) were selected to provide spatial coverage over the project area. Results from these analyses are included in Table 8. PBDE-209 was the most frequently detected congener with the highest concentration (2,660 ng/kg in D03-C). No sediment guidelines (DMMP, state, or federal) exist for PBDE congeners.

Comparison to SMS Benthic Criteria. Ecology does not recommend carbon-normalization when TOC is below 0.5 percent; therefore, only OC-normalized chemistry results from DMMUs 1 through 4 (TOC > 0.5%) were compared to Ecology's benthic criteria (Table 7). No detects or non-detects exceeded Ecology's benthic criteria.

Data Validation. All chemistry data were validated to a minimum of EPA Stage 2b; in addition, PBDE data underwent 10% Stage 4 data validation. Only minor issues were encountered during the data validation, and all data were considered usable by the data validator for the study purpose.

7. Biological Testing. Biological testing was not required; concentrations of all detected and non-detected chemicals of concern were below the DMMP screening level criteria.

8. Sediment Exposed by Dredging. Sediment exposed by dredging must either meet the State of Washington Sediment Quality Standards (SQS) (Ecology, 2013) or the State's anti-degradation standard (DMMP, 2008). Concentrations of all DMMP chemicals of concern were below the DMMP SLs; therefore, this project is in compliance with the State of Washington anti-degradation standard.

9. Debris Management. The DMMP agencies implemented a debris management requirement following the 2015 SMARM in order to prevent the disposal of debris (wood or otherwise) greater than 12 inches in any dimension at open-water disposal sites in Puget Sound (DMMP, 2015). The Snohomish River federal navigation channel is dredged almost annually to maintain navigation; little to no reported debris has been encountered during recent dredging events. However, as in past characterizations, some small woody and leafy debris was observed in the lower settling basin and deep draft channel grab samples during this characterization. The DMMP agencies concur that the dredge project area is of low concern for debris, and a 12" X 12" screening grid or grizzly is not required for this project. However, if any debris larger than 12 inches in any dimension is encountered, or man-made debris of any size, it must be segregated and disposed of in an upland landfill or other appropriate use. At no time may any debris greater than 12 inches in any dimension or man-made debris of any size, be disposed at an open-water disposal site.

10. Suitability Determination. This memorandum documents the evaluation of the suitability of sediment from the federal navigation project in the Snohomish River for unconfined open-water disposal. The data gathered were determined to be sufficient and acceptable for regulatory decision-making under the DMMP program.

    In summary, based on the results of the testing, the DMMP agencies have concluded that all 778,221 CY of dredged material are suitable for unconfined open-water disposal at the Port Gardner non-dispersive site.

    The USACE Navigation dredging program also places dredged material suitable for open-water disposal at the Site O upland rehandling site and Jetty Island beneficial use site; USACE Navigation maintains the appropriate environmental documentation to cover this activity.

11. References.

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DMMO, 2016. *Statutory Response to EFH Conservation Recommendations for the Continued Use of Multi-User Dredged Material Disposal Sites in Puget Sound and Grays Harbor (Fourth Field HUCs 17110020 Dungeness-Elwha, 17110002 Strait of Georgia, 1711019 Puget Sound, and 17100105 Grays Harbor) Washington. NMFS Consultation Number: WCR-2015-2975.* Prepared by the Seattle District Dredged Material Management Office, January 2016.

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PSDDA, 1996. *Memorandum for Record: Suitability Determination for Dredged Material from the Everett Downstream Settling Basin and River Channel for Disposal at the PSDDA Port Gardner Open-Water Nondispersive Site (Public Notice CENPS-OP-TS-NS-99).* Prepared by the Seattle District Dredged Material Management Office for the Puget Sound Dredged Disposal Analysis Program, November 14, 1996.

10. Agency Signatures.

signed copy on file in DMMO - Seattle District office

Concur:

_____ _____
Date Heather Whitney Fourie - Seattle District Corps of Engineers

_____ _____
Date Justine Barton - Environmental Protection Agency

_____ _____
Date Laura Inouye, Ph.D. - Washington Department of Ecology

_____ _____
Date Celia Barton - Washington Department of Natural Resources

Copies furnished:

DMMP signatories
John Hicks, CENWS-ODS-NS
Elizabeth Chien, CENWS-ODS-NS
John Pell, CENWS-ODS-NS

Table 2. Project Features, Characterization Depths, and Characterization Volumes from March/April 2017 Condition Survey

Feature	Stations	Authorized Depth (ft MLLW)	Characterization Depth (ft MLLW)	Characterization Depth + 2 ft Overdepth (ft MLLW)	Characterization Depth + 2 ft Allowable Overdepth Volume (cy)
Deep-draft channel	0+00 to 78+00	-15	-15	-17	79,322
Downstream Settling Basin	78+00 to 90+00	-20	-20	-22	246,645
Shallow-draft channel	90+00 to 335+50	-8	-8	-10	159,125
Upstream Settling basin	335+50 to 355+79	-40	-20	-22	261,924
Shallow-draft channel	355+79 to 381+79	-8	-8	-10	31,205
				Total:	778,221

Table 3. Summary of Past Sediment Characterizations of Snohomish River Federal Navigation Channel (NewFields, 2017)

Characterization Event	Dredge Material Volume	Results	Suitability Determination
1992 Partial Characterization	NA	No SLs exceeded	Supported a down-ranking from moderate to low-moderate
1993 Full Characterization	462,243 cy	Two SL exceedances for anthracene and one SL exceedance for 4-methylphenol in a total of 3 DMMUs; SL exceedances passed biological testing	All material suitable for open-water disposal
1996 Full Characterization	300,347 cy	Diethyl phthalate exceeded SL in one DMMU; no biological testing was conducted	All material suitable for open-water disposal
2003-2004 Full Characterization	271,210 cy	No SLs exceeded	All material suitable for open-water disposal
2009 Dioxin Evaluation	801,849 cy	Dioxin concentrations ranged from 0.16 to 1.06 ng/kg TEQ	Sediment characterization was for planning purposes only; no dredging was performed
2011 Full Characterization	651,571 cy	Benzyl alcohol exceeded SL in 3 DMMUs of the downstream turning basin	DMMP agencies determined material suitable for open-water disposal without requiring bioassays

CY = cubic yards
SL = Screening Level
NA = not applicable
DMMP = Dredged Material Management Program
DMMU = dredged material management unit
TEQ = toxic equivalents

Table 4. Approximate Dredged Material Volumes and Field Sample Counts by DMMU (NewFields, 2017)

Feature	DMMU	Design Depth + 2 ft Allowable Overdepth Volume (cy)	Number of Field Samples
Deep-draft channel	1	79,322	4
Downstream Settling Basin	2	79,836	4
Downstream Settling Basin	3	79,094	4
Downstream Settling Basin	4	87,716	5
Shallow-draft channel	5	79,439	4
Shallow-draft channel	6	79,686	4
Upstream Settling basin	7	76,565	4
Upstream Settling basin	8	97,173	5
Upstream Settling basin	9	88,186	5
Shallow-draft channel	10	31,205	2
	Total:	778,221	41

Table 5. Sampling Locations, DMMU Composites, water depths, and mudline elevations

DMMU	Location Name	Date	State Plane WA-N, NAD83		Latitude (N) NAD83	Longitude (W) NAD 83	Water Depth (ft.)	Recorded Tidal Height (ft. MLLW)	Corrected Tidal Height (ft. MLLW)	Mudline (ft. MLLW)
			Northing	Easting						
SN17-D01-C	D01-1	9/13/17	366017.1	1299460.9	47.994963	122.225955	-16.3	2.9	3.0	-13.3
	D01-2	9/13/17	366651.5	1299618.3	47.996709	122.225358	-16.5	3.2	3.3	-13.2
	D01-3	9/13/17	367554.9	1299539.4	47.999182	122.225748	-18.5	3.5	3.6	-14.9
	D01-4	9/13/17	367639.1	1299849.7	47.999428	122.224486	-16.4	3.8	3.9	-12.5
SN17-D02-C	D02-1	9/13/17	368024.0	1299292.1	48.000455	122.226792	-14.0	4.5	4.6	-9.4
	D02-2	9/13/17	367912.6	1299539.7	48.000162	122.225773	-18.7	4.7	4.8	-13.9
	D02-3	9/13/17	368145.0	1299850.4	48.000814	122.224521	-15.1	4.8	4.9	-10.2
	D02-4	9/13/17	367874.1	1299890.8	48.000074	122.224336	-17.3	5.1	5.2	-12.1
SN17-D03-C	D03-1	9/13/17	368277.1	1299343.9	48.001151	122.226599	-17.5	5.8	5.9	-11.6
	D03-2	9/13/17	368484.3	1299525.3	48.001728	122.225874	-23.2	6.1	6.2	-17.0
	D03-3	9/13/17	368490.6	1299895.0	48.001764	122.224364	-15.4	6.4	6.5	-8.9
	D03-4	9/13/17	368259.3	1299756.4	48.001123	122.224913	-23.6	6.7	6.8	-16.8
SN17-D04-C	D04-1	9/13/17	368937.8	1299923.3	48.002991	122.224282	-14.4	7.2	7.3	-7.1
	D04-2	9/13/17	368656.7	1299867.4	48.002218	122.224489	-16.3	7.3	7.4	-8.9
	D04-3	9/13/17	368843.0	1299724.5	48.002721	122.225087	-22.5	7.6	7.7	-14.8
	D04-4	9/13/17	368956.0	1299365.1	48.003013	122.226563	-21.1	7.8	7.9	-13.2
	D04-5	9/13/17	368729.9	1299523.0	48.002401	122.225902	-24.2	8.1	8.2	-16.0
SN17-D05-C	D05-1	9/13/17	369906.1	1299743.5	48.005636	122.225088	-14.7	8.3	8.4	-6.3
	D05-2	9/13/17	370882.3	1299846.0	48.008317	122.224741	-14.7	8.5	8.6	-6.1
	D05-3	9/13/17	372300.5	1300003.8	48.012212	122.224201	-16.5	8.6	8.7	-7.8
	D05-4	9/13/17	373034.4	1300366.1	48.014242	122.222776	-17.4	9.0	9.1	-8.3
SN17-D06-C	D06-1	9/13/17	374795.2	1306774.8	48.019382	122.196723	-16.6	9.1	9.2	-7.4
	D06-2	9/13/17	371439.3	1310953.4	48.010385	122.179411	-16.8	9.2	9.3	-7.5
	D06-3	9/13/17	368896.3	1311430.7	48.003438	122.177280	-16.8	9.3	9.4	-7.4
	D06-4	9/13/17	364753.0	1310942.6	47.992058	122.178978	-16.9	9.4	9.5	-7.4
SN17-D07-C	D07-1	9/13/17	364490.2	1311102.6	47.991345	122.178305	-16.7	9.4	9.5	-7.2
	D07-2	9/13/17	364327.9	1311144.9	47.990902	122.178121	-16.6	9.4	9.5	-7.1
	D07-3	9/13/17	364294.8	1311324.5	47.990820	122.177385	-18.3	9.4	9.5	-8.8
	D07-4	9/13/17	364102.9	1311418.2	47.990298	122.176989	-15.1	9.5	9.6	-5.5
SN17-D08-C	D08-1	9/13/17	364112.9	1311547.7	47.990332	122.176461	-16.4	9.4	9.5	-6.9
	D08-2	9/13/17	363959.4	1311596.9	47.989914	122.176249	-14.6	9.3	9.4	-5.2
	D08-3	9/13/17	363947.9	1311769.3	47.989891	122.175544	-15.4	9.3	9.4	-6.0
	D08-4	9/13/17	363788.8	1311817.9	47.989457	122.175335	-14.6	9.2	9.3	-5.3
	D08-5	9/13/17	363772.7	1311975.7	47.989420	122.174689	-14.8	9.2	9.3	-5.5
SN17-D09-C	D09-1	9/13/17	363614.3	1312042.4	47.988989	122.174405	-14.8	9.0	9.1	-5.7
	D09-2	9/13/17	363609.3	1312183.0	47.988982	122.173831	-14.7	8.9	9.0	-5.7
	D09-3	9/13/17	363458.8	1312237.9	47.988572	122.173596	-14.9	8.4	8.5	-6.4
	D09-4	9/13/17	363451.1	1312399.2	47.988559	122.172937	-15.8	8.8	8.9	-6.9
	D09-5	9/13/17	363275.8	1312463.2	47.988082	122.172663	-14.8	8.7	8.8	-6.0
SN17-D10-C	D10-1	9/13/17	361797.8	1313354.4	47.984073	122.168919	-14.1	8.5	8.6	-5.5
	D10-2	9/13/17	361547.5	1313453.9	47.983391	122.168495	-16.3	8.4	8.5	-7.8

Table 6. Snohomish River Navigation Channel Chemistry and Conventionals Results

	SL	ML	BT	SN17-D01-C 9/13/2017	LQ	VQ	SN17-D02-C 9/13/2017	LQ	VQ	SN17-D03-C 9/13/2017	LQ	VQ	SN17-D04-C 9/13/2017	LQ	VQ	SN17-D05-C 9/13/2017	LQ	VQ	SN17-D06-C 9/13/2017	LQ	VQ	SN17-D07-C 9/13/2017	LQ	VQ	SN17-D08-C 9/13/2017	LQ	VQ	SN17-D09-C 9/13/2017	LQ	VQ	SN17-D10-C 9/13/2017	LQ	VQ
Conventionals																																	
Total Solids (%)	--	--	--	57.2			60.3			69.6			73.5			74.3			85.4			87.2			89.7			91.7			89.5		
Total Organic Carbon (%)	--	--	--	1.41			1.55			1.54			0.957			0.168			0.15			0.097			0.107			0.094			0.109		
Sulfides (mg/kg)	--	--	--	286			132			85			71			0.67	U		0.59	U		0.57	U		0.56	U		0.55	U		--		
Ammonia (mg/kg)	--	--	--	8.2		J	10.9			10.3			5.13			1.07			0.12	J		0.55	U		0.55	U		0.53	U		--		
Total Volatile Solids (%)	--	--	--	4.8			4.6			3.8			3.2			1.4			1.3			1.3			1.3			1.3			--		
Grain Size (%)																																	
Gravel (>2,000 µm)	--	--	--	0.51			0.16			0.22			1.25			1.36			0.24		J	0		J	0.92			0.46			4.52		
Very Coarse Sand	--	--	--	0.54			0.41			0.34			1.07			5.44			2.31		J	0.68		J	7.04			6.03			8.35		
Coarse Sand	--	--	--	0.65			0.67			1.18			8.8			39.34			14.26		J	29.03		J	40.32			46.68			31.04		
Medium Sand	--	--	--	2.44			4.32			22.76			22.36			53.21			32.09		J	60.89		J	43.02			40.97			47.78		
Fine Sand	--	--	--	28.24			24.88			30.36			40.27			8.03			34.72		J	5.76		J	4.5			3.12			5.18		
Very Fine Sand	--	--	--	27.5			26.99			25.92			15.45			0.29			3.57		J	0.08		J	0.1			0.06			0.21		
Sand (62.5 to 2,000 µm)	--	--	--	59.37			57.27			80.56			87.95			106.31			86.95			96.44			94.98			96.86			92.56		
Silt (3.9 to 62.5 µm)	--	--	--	36.01			32.74			13.23			6			2			0.62		J	0.01		J	0.09			0.05			0.33		
Clay (0 to 3.9 µm)	--	--	--	7.27			7.7			4.25			2.71			1.65			0.82		J	0.56		J	0.4			0.31			0.19		
Percent Fines[a]	--	--	--	43.28			40.44			17.48			8.71			3.65			1.44		J	0.57		J	0.49			0.36			0.52		
Metals (mg/kg)																																	
Antimony	150	200	--	3.3		J	4.1		U	3.9		U	3.4		U	3.8		U	3.5		U	3.8		U	3.6		UJ	3.7		U	--		
Arsenic	57	700	507.1	11.3			10.2			9.8			7.4			6			5.7			5.5			4.9			5.8			--		
Cadmium	5.1	14	--	0.28		U	0.21		U	0.19		U	0.17		U	0.19		U	0.18		U	0.19		U	0.18		U	0.19		U	--		
Chromium	260	--	--	41.1			38.1			31.8			29			23.6			23.1			21.6			18.5			19.9			--		
Copper	390	1300	--	38.5			36.6			27.5			21.9			17.1			16.9			18.4			29.5		J	18.8			--		
Lead	450	1200	975	7.6			6.4			5.8			5.1			4			3.6			3.5			3.5			3.5			--		
Mercury	0.41	2.3	1.5	0.047			0.049			0.034			0.022			0.019		J	0.014		J	0.014		J	0.017		J	0.013		J	--		
Selenium	--	--	3	0.17			0.14			0.118			0.054		J	0.086		U	0.031		J	0.095		U	0.088		U	0.09		U	--		
Silver	6.1	8.4	--	1.1		U	0.82		U	0.77		U	0.69		U	0.76		U	0.71		U	0.76		U	0.71		U	0.74		U	--		
Zinc	410	3800	--	62.2			58.4			50.9			45			40.6			40.4			40.7			37.6			40.5			--		
PAHs (ug/kg)																																	
Naphthalene	2100	2400	--	9.6			10			13			11			6.8		U	6		U	4.1		J	4.4		J	3.7		J	--		
Acenaphthylene	560	1300	--	8.7		U	8.3		U	7.2		U	6.8		U	6.8		U	6		U	6		U	6		U	6		U	--		
Acenaphthene	500	2000	--	3.6		J	3.9		J	3.8		J	6.8		U	6.8		U	6		U	6		U	6		U	6		U	--		
Fluorene	540	3600	--	5.7		J	8.3		U	4.6		J	3.3		J	6.8		U	6		U	6		U	6		U	6		U	--		
Phenanthrene	1500	21000	--	20			9.7			15			14			6.8		U	6		U	6		U	6		U	6		U	--		
Anthracene	960	13000	--	21			8.3		U	3.3		J	8.9			6.8		U	6		U	6		U	6		U	6		U	--		
2-Methylnaphthalene	670	1900	--	3.9		J	3.1		J	4.3		J	3.2		J	6.8		U	6		U	6		U	6		U	6		U	--		
Total LPAHs[b]	5200	29000	--	59.9			23.6			39.7			37.2			6.8		U	6		U	4.1		J	4.4		J	3.7		J	--		
Fluoranthene	1700	30000	4600	18			16			23			20			6.8		U	6		U	6		U	6		U	6		U	--		
Pyrene	2600	16000	11980	15			13			25			17			6.8		U	6		U	6		U	6		U	6		U	--		
Benzo(a)anthracene	1300	5100	--	7.8		J	5.3		J	11			4.7		J	6.8		U	6		U	6		U	6		U	6		U	--		
Chrysene	1400	21000	--	16			5.6		J	9.7			7.6			6.8		U	6		U	6		U	6		U	6		U	--		
Benzofluoranthenes	3200	9900	--	10			6.9			12			7			6.8		U	6		U	6		U	6		U	6		U	--		
Benzo(a)pyrene	1600	3600	--	5.2		J	4.4		J	7.4			4		J	6.8		U	6		U	6		U	6		U	6		U	--		
Indeno(1,2,3-cd)pyrene	600	4400	--	3.2		J	8.3		U	3.4		J	6.8		U	6.8		U	6		U	6		U	6		U	6		U	--		
Dibenzo(a,h)anthracene	230	1900	--	8.7		U	8.3		U	7.2		U	6.8		U	6.8		U	6		U	6		U	6		U	6		U	--		
Benzo(g,h,i)perylene	670	3200	--	8.7		U	8.3		U	7.2		U	6.8		U	6.8		U	6		U	6		U	6		U	6		U	--		
Total HPAHs[c]	12000	69000	--	75.2			51.2			91.5			60.3			6.8		U	6		U	4.1		J	4.4		J	3.7		J	--		
Phenols (ug/kg)																																	
2,4-Dimethylphenol[g]	29	210	--	6.3		U	6.3		U	6.3		U	6.3		U	6.3		U	6.3		U	6.3		U	6.3		U	6.3		U	--		
2-Methylphenol	63	77	--	8.7		U	8.3		U	7.2		U	6.8		U	6.8		U	6		U	6		U	6		U	6		U	--		
4-Methylphenol	670	3600	--	26			10			11			7			6.8		U	6		U	6		U	6		U	6		U	--		
Pentachlorophenol	400	690	504	87		U	83		U	72		U	68		U	68		U	36		U	58		U	56		U	55		U	--		
Phenol	420	1200	--	3.6		J	3.9		J	4.5		J	21		U	21		U	11		U	18		U	17		U	17		U	--		
Phthalates (ug/kg)																																	
Butyl benzyl phthalate	63	970	--	41			11			18			15			6.8		U	16			6		U	6		U	6		U	--		

	SL	ML	BT	SN17-D01-C 9/13/2017	LQ	VQ	SN17-D02-C 9/13/2017	LQ	VQ	SN17-D03-C 9/13/2017	LQ	VQ	SN17-D04-C 9/13/2017	LQ	VQ	SN17-D05-C 9/13/2017	LQ	VQ	SN17-D06-C 9/13/2017	LQ	VQ	SN17-D07-C 9/13/2017	LQ	VQ	SN17-D08-C 9/13/2017	LQ	VQ	SN17-D09-C 9/13/2017	LQ	VQ	SN17-D10-C 9/13/2017	LQ	VQ
Dibutyl phthalate	1400	5100	--	18	U		17	U		15	U		14	U		14	U		7.2	U		12	U		12	U		11	U		--		
Di-n-Octyl phthalate	6200	6200	--	9.4			7.4	J		7.2	U		8.4			7.9			6	U		4.8	J		4.7	J		7.6			--		
Diethyl phthalate	200	1200	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
Dimethyl phthalate	71	1400	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
Bis(2-Ethylhexyl) Phthalate	1300	8300	--	16	J		13	J		11	J		11	J		68	U		36	U		9.8	J		9.2	J		55	U		--		
Other SVOCs (ug/kg)																																	
Dibenzofuran	540	1700	--	3.9	J		8.3	U		3.7	J		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
Benzoic Acid	650	760	--	350	U	UJ	330	U	UJ	290	U	UJ	270	U	UJ	270	U	UJ	200	U	UJ	230	U	UJ	230	U	UJ	220	U	UJ	--		
Benzyl Alcohol	57	870	--	15	J		6.4	J		6	J		5.8	J		14	U		7.2	U		12	U		12	U		11	U		--		
1,2-Dichlorobenzene	35	110	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
1,4-Dichlorobenzene	110	120	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
Hexachlorobenzene	22	230	168	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
Hexachlorobutadiene	11	270	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
N-Nitrosodiphenylamine	28	130	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
1,2,4-Trichlorobenzene	31	64	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
PCB Aroclors (ug/kg)																																	
Aroclor 1016	--	--	--	16	U		14	U		13	U		14	U		12	U		12	U		11	U		11	U		10	U		--		
Aroclor 1221	--	--	--	31	U		27	U		25	U		27	U		23	U		23	U		22	U		21	U		19	U		--		
Aroclor 1232	--	--	--	16	U		14	U		13	U		14	U		12	U		12	U		11	U		11	U		10	U		--		
Aroclor 1242	--	--	--	16	U		14	U		13	U		14	U		12	U		12	U		11	U		11	U		10	U		--		
Aroclor 1248	--	--	--	16	U		14	U		13	U		14	U		12	U		12	U		11	U		11	U		10	U		--		
Aroclor 1254	--	--	--	16	U		14	U		13	U		14	U		12	U		12	U		11	U		11	U		10	U		--		
Aroclor 1260	--	--	--	16	U		14	U		13	U		14	U		12	U		12	U		11	U		11	U		10	U		--		
Total PCBs[d]	130	3100	--	31	U		27	U		25	U		27	U		23	U		23	U		22	U		21	U		19	U		--		
Total PCBs[d] (mg/kg carbon)			38	2.2	U		1.74	U		1.62	U		2.82	U		13.7	U		15.3	U		22.7	U		19.6	U		20.2	U		--		
Pesticides (ug/kg)																																	
Heptachlor[g]	1.5	270	--	0.6	U		0.53	U		0.48	U		0.51	U		0.44	U		0.44	U		0.43	U		0.4	U		0.39	U		--		
Aldrin	9.5	--	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
Dieldrin	1.9	1700	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
4,4'-DDE	9	--	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
4,4'-DDD	16	--	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
4,4'-DDT	12	--	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
Total DDTs[e]	--	69	50	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
Oxychlordane	--	--	--	1.7	U		0.39	J		1.4	Ui	U	1.2	U		1.1	U		1.2	U		1.2	U		1	U		1	U		--		
cis-Nonachlor	--	--	--	1.7	U		1.3	U		1.4	U		1.2	U		1.1	U		1.2	U		1.2	U		1	U		1	U		--		
trans-Nonachlor	--	--	--	1.7	U		1.3	U		1.4	U		1.2	U		1.1	U		1.2	U		1.2	U		1	U		1	U		--		
gamma-Chlordane	--	--	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
cis-Chlordane	--	--	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
Total chlordane[f]	2.8	--	37	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		

Notes: LQ: laboratory qualifier VQ: validation qualifier SL: screening level ML: maximum level BT: bioaccumulation trigger
U the analyte was analyzed for, but not detected
i the LOQ is elevated due to chromatographic interference
J the result is estimated
--not targeted for analysis
a. sum of silt and clay fractions
b. sum of detected values of naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene
c. sum of detected values of fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzofluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, and benzo(ghi)perylene
d. sum of detected PCB Aroclors
e. sum of 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT
f. sum of gamma-chlordane, cis-chlordane, cis-nonachlor, trans-nonachlor, and oxychlordane
g. non-detect results reported at the method detection limit

Table 7. Snohomish River Carbon-Normalized Chemistry Results Compared to SQS

	SQS	CSL	SN17-D01-C 9/13/2017	LQ	VQ	SN17-D02-C 9/13/2017	LQ	VQ	SN17-D03-C 9/13/2017	LQ	VQ	SN17-D04-C 9/13/2017	LQ	VQ
Conventionals														
Total Organic Carbon (%)	--	--	1.41			1.55			1.54			0.957		
PAHs (ug/kg)														
Naphthalene	99	170	0.681			0.645			0.844			1.15		
Acenaphthylene	66	66	0.617	U		0.535	U		0.468	U		0.711	U	
Acenaphthene	16	57	0.255	J		0.252	J		0.247	J		0.711	U	
Fluorene	220	1200	0.404	J		0.535	U		0.299	J		0.345	J	
Phenanthrene	23	79	1.42			0.626			0.974			1.46		
Anthracene	100	480	1.49			0.535	U		0.214	J		0.93		
2-Methylnaphthalene	38	64	0.277	J		0.2	J		0.279	J		0.334	J	
Total LPAHs	370	780	4.25			1.52			2.58			3.89		
Fluoranthene	160	1200	1.28			1.03			1.49			2.09		
Pyrene	1000	1400	1.06			0.839			1.62			1.78		
Benzo(a)anthracene	110	270	0.553	J		0.342	J		0.714			0.491	J	
Chrysene	110	460	1.13			0.361	J		0.63			0.794		
Benzo(b)fluoranthene	--	--	0.709			0.445	J		0.779			0.731		
Benzo(k)fluoranthene	--	--	0.617	U		0.535	U		0.468	U		0.711	U	
Benzofluoranthene	230	450	0.709			0.445			0.779			0.731		
Benzo(a)pyrene	99	210	0.369	J		0.284	J		0.481			0.418	J	
Indeno(1,2,3-cd)pyrene	34	88	0.227	J		0.535	U		0.221	J		0.711	U	
Dibenzo(a,h)anthracene	12	33	0.617	U		0.535	U		0.468	U		0.711	U	
Benzo(g,h,i)perylene	31	78	0.617	U		0.535	U		0.468	U		0.711	U	
Total HPAHs	960	5300	5.33			3.3			5.94			6.3		
Phthalates (ug/kg)														
Butyl benzyl phthalate	4.9	64	2.91			0.71			1.17			1.57		
Dibutyl phthalate	220	1700	1.28	U		1.1	U		0.974	U		1.46	U	
Di-n-Octyl phthalate	58	4500	0.667			0.477	J		0.468	U		0.878		
Diethyl phthalate	61	110	0.617	U		0.535	U		0.468	U		0.711	U	
Dimethyl phthalate	53	53	0.617	U		0.535	U		0.468	U		0.711	U	
Bis(2-Ethylhexyl) Phthalate	47	78	1.13	J		0.839	J		0.714	J		1.15	J	
Other SVOCs (ug/kg)														
Dibenzofuran	15	58	0.277	J		0.535	U		0.24	J		0.711	U	
1,2-Dichlorobenzene	2.3	2.3	0.617	U		0.535	U		0.468	U		0.711	U	
1,4-Dichlorobenzene	3.1	9	0.617	U		0.535	U		0.468	U		0.711	U	
Hexachlorobenzene	0.38	2.3	0.234	U		0.213	U		0.214	U		0.345	U	
Hexachlorobutadiene	3.9	6.2	0.617	U		0.535	U		0.468	U		0.711	U	
N-Nitrosodiphenylamine	11	11	0.617	U		0.535	U		0.468	U		0.711	U	
1,2,4-Trichlorobenzene	0.81	1.8	0.617	U		0.535	U		0.468	U		0.711	U	
PCB Aroclors (ug/kg)														
Total PCBs	12	65	2.2	U		1.74	U		1.62	U		2.82	U	

Notes:
Non-detect result exceeding either the SQS or CSL criteria
LQ: laboratory qualifier VQ: validation qualifier SQS: sediment quality standard CSL: cleanup screening level OC: organic carbon normalized
U the analyte was analyzed for, but not detected
J the result is estimated
a. sum of detected values of naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene
b. sum of detected values of fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzofluoranthene, benzo(a)pyrene, indeno(1,2,3-cd) pyrene, dibenzo(a,h)anthracene, and benzo(ghi)perylene
c. sum of detected PCB Aroclors

Table 8. Polybrominated Diphenyl Ether Results

	SN17-D01-C	LQ	VQ	SN17-D03-C	LQ	VQ	SN17-D08-C	LQ	VQ
PBDEs (ng/kg)									
PBDE-008/011	1.58	J		1.36	J		0.037	U	
PBDE-015	2.13	J		1.47	J		0.416	J	
PBDE-017/025	16.4			9.55			0.361	J	
PBDE-028/033	5.1			2.85	J		0.605	J	
PBDE-032	0.21	MJR	U	2.78	J		0.067	U	
PBDE-035	0.33	JR	U	0.22	MJR	U	0.06	U	
PBDE-037	0.51	JR	U	0.3	JR	U	0.12	MJR	U
PBDE-047	79.9			44.4			8.92		J
PBDE-049	33.4			15.4			1.15	MJ	
PBDE-051	3.01	J		1.39	J		0.059	U	
PBDE-066	4.91			2.63	J		0.48	JR	U
PBDE-071	3.74			1.84	J		0.12	MJR	U
PBDE-075	0.22	MJR	U	0.16	U		0.08	U	
PBDE-077	0.17	U		0.13	U		0.069	U	
PBDE-079	0.17	U		0.13	U		0.067	U	
PBDE-085	2.32	J		0.95	J		0.35	MJ	J
PBDE-099	74.6			35.5			7.57		J
PBDE-100	20			9.83			1.55	J	
PBDE-105	0.41	U		0.25	U		0.18	U	
PBDE-118	0.41	U		0.25	U		0.18	U	
PBDE-119/120	0.38	U		0.24	U		0.17	U	
PBDE-126	0.3	MJ		0.15	U		0.11	U	
PBDE-128	0.92	U		0.68	U		0.69	U	
PBDE-138/166	2.2	MJ		0.52	U		0.53	U	
PBDE-140	0.97	JR	U	0.33	U		0.34	U	
PBDE-153	9.6			3.66	J		0.62	JR	UJ
PBDE-154	8.83	M		3.86	MJ		0.76	J	
PBDE-155	1.16	J		0.41	MJ		0.24	U	
PBDE-156	1	U		0.77	U		0.78	U	
PBDE-181	0.43	U		0.27	U		0.37	U	
PBDE-183	2.96	J		1.89	MJ		0.22	U	
PBDE-184	1.1	JR	U	0.46	MJ		0.19	U	
PBDE-190	0.6	U		0.37	U		0.51	U	
PBDE-191	1.36	MJ		0.3	U		0.42	U	
PBDE-196	2.7	JR	U	2.88	J		0.24	U	
PBDE-197	2.9	JR	U	2.96	J		0.19	U	
PBDE-203	4.33	J		6.09	J		0.26	U	
PBDE-206	19.1	J		60.7			1.51	J	
PBDE-207	21.3	J		54.5			0.78	JR	U
PBDE-208	18.7	J		39.2			0.39	MJR	U
PBDE-209	422			2660			57.6		J

Notes:
LQ: laboratory qualifier VQ: validation qualifier DW: dry weight BDE: brominated diphenyl ether
M a peak has been manually integrated
R the ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
J the analyte was detected below the calibrated range but above the EDL
U the analyte was not detected above the EDL

Figure 1. Snohomish River Study Area

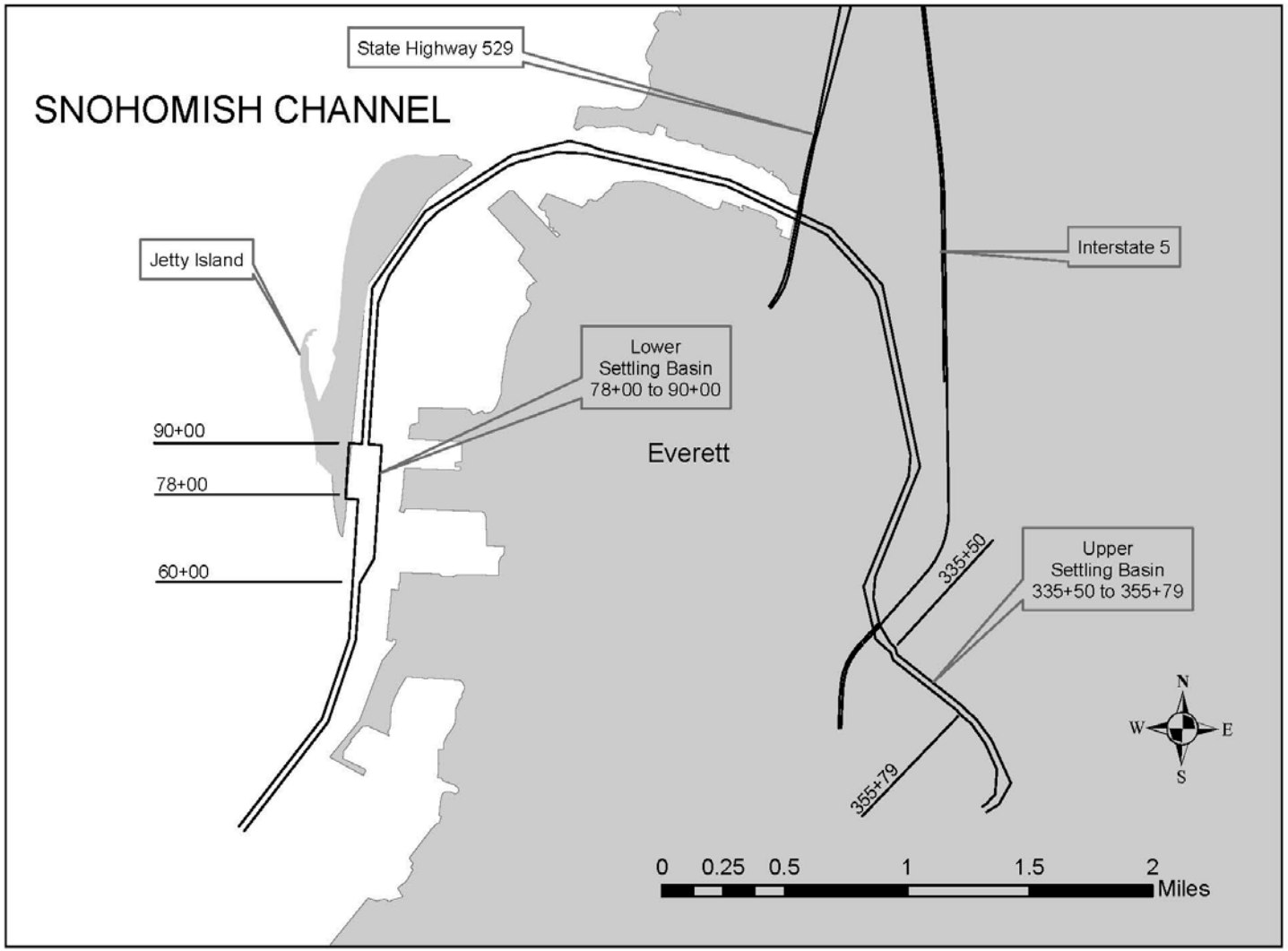


Figure 2. Deep-draft Channel and Downstream Settling Basin Sampling Locations (DMMUs 1, 2, 3, and 4) (NewFields, 2018)

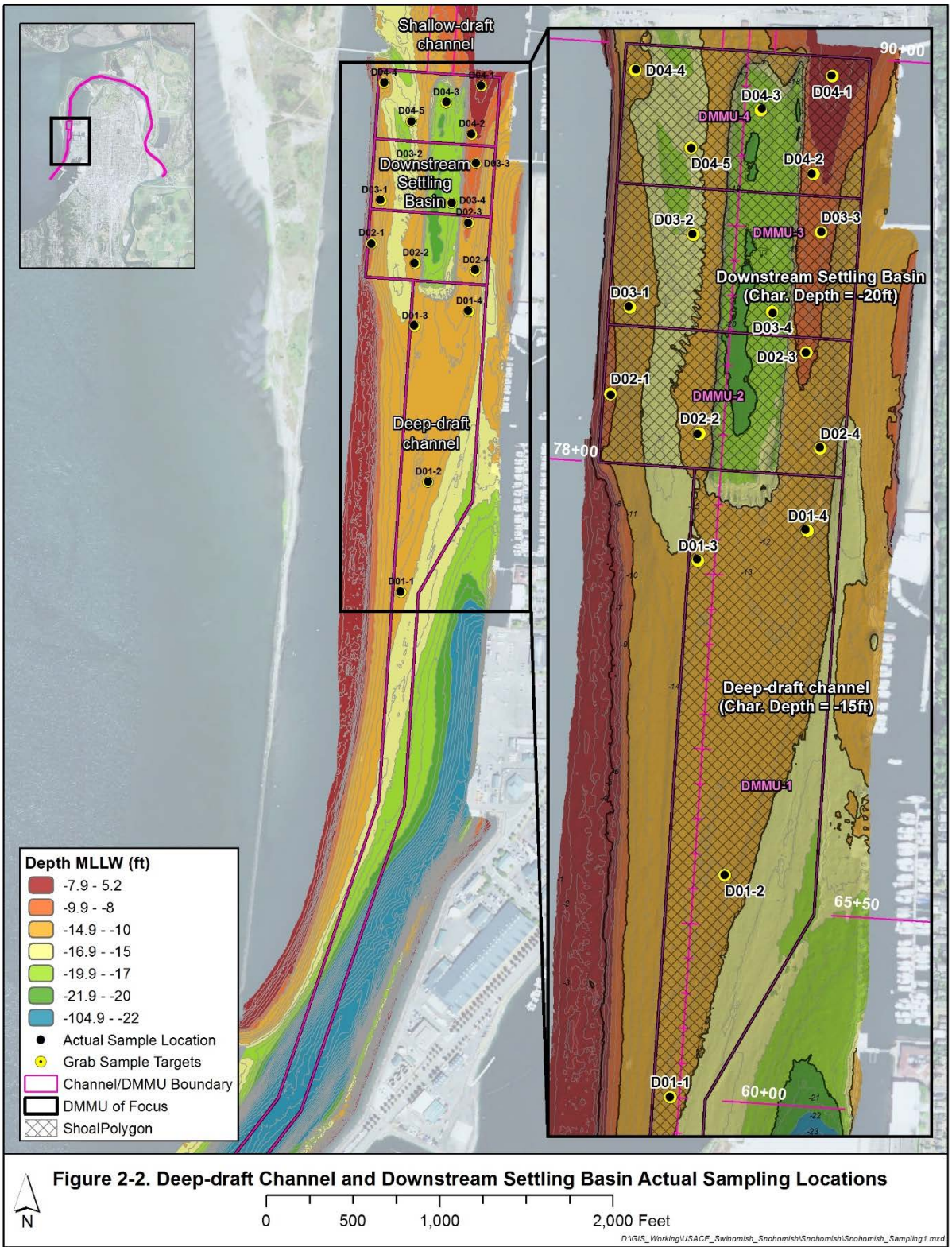


Figure 2-2. Deep-draft Channel and Downstream Settling Basin Actual Sampling Locations

Figure 3. Shallow-draft Channel Sampling Locations (DMMU 5 and 6) (NewFields, 2018)

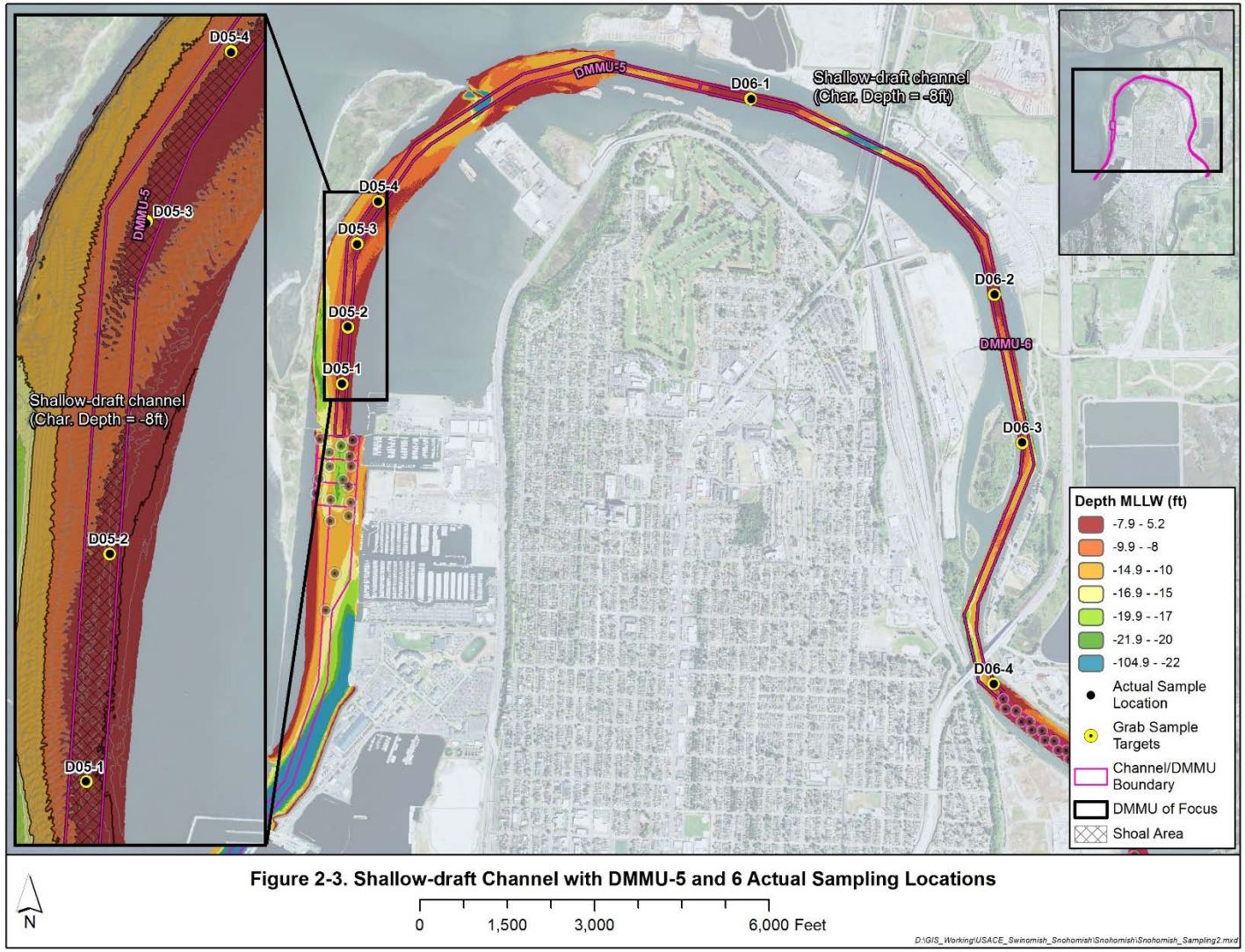
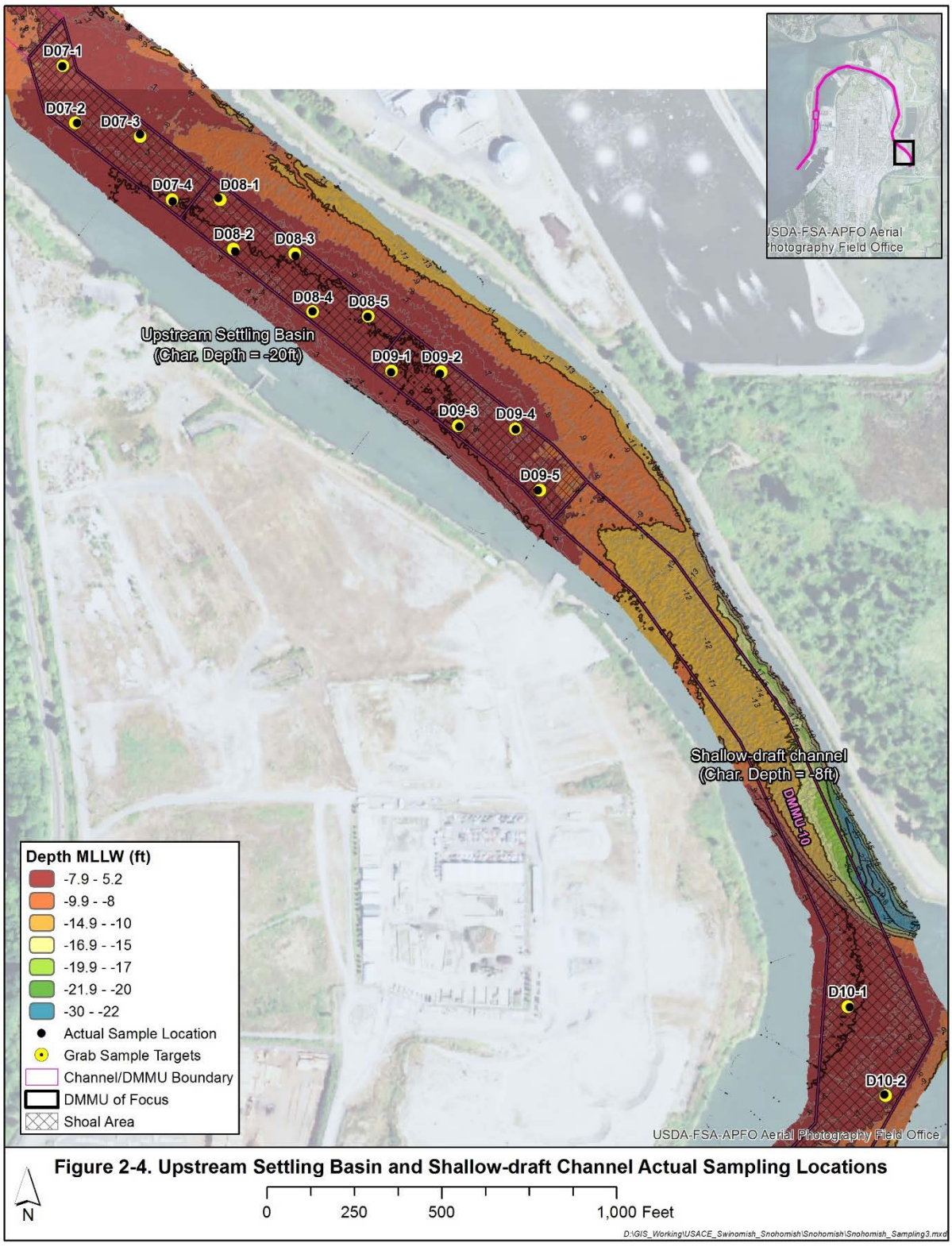


Figure 2-3. Shallow-draft Channel with DMMU-5 and 6 Actual Sampling Locations

Figure 4. Upstream Settling Basin and Shallow-draft Channel Sampling Locations (DMMUs, 7, 8, 9, and 10) (NewFields, 2018)



Attachment A
Description of Previous Sediment Characterizations
Snohomish River Federal Waterway and Navigation Channel

Note: The following information was compiled by Heather Fourie (USACE) during preparation of the scope of work for sediment characterization of the Snohomish River Federal Waterway in 2017. Sources of information included suitability determinations made under the Puget Sound Dredged Disposal Analysis (PSDDA) program and the Dredged Material Management Program (DMMP), as well as other project documentation available to the Dredged Material Management Office (DMMO). The available documentation did not always include enough detail to determine definitively what occurred. As a result, this compilation has limitations and the information included should not be considered definitive in nature.

The Everett Harbor and Snohomish River Project and maintenance dredging by the Department of the Army was adopted June 25, 1910 and modified by subsequent acts. The project consists of deep and shallow-draft navigation channels and two settling basins to serve navigation in Everett Harbor and the Snohomish River (Figure 1). Table 1 summarizes details regarding the dimensions of the project features. The USACE is responsible for dredging portions of the authorized project as needed to maintain navigation. Dredging of the lower settling basin most recently occurred in October 2016; additional planned dredging is unknown at this time. Advanced maintenance dredging is not planned.

Sedimentation in the Snohomish navigation channel and settling basins is due to input from the Snohomish River. Accreted sediment in the waterway has been characterized by USACE under the Puget Sound Dredged Disposal Analysis (PSDDA) program or Dredged Material Management Program (DMMP) six times, including four full characterizations and a dedicated characterization for dioxin. Descriptions of these characterization efforts follow.

1992 Characterization (downstream only)

Five surface (0-4 ft) sediment cores were collected from the lower Snohomish River in October 1992. Detected chemical concentrations were below the existing PSDDA screening levels (SL). The partial characterization supported a down-ranking of lower Snohomish sediment from moderate to low-moderate for the subsequent full characterization.

1993 Full Characterization (downstream only)

A total of 28 cores were collected comprising twelve composite samples (7 surface and 5 subsurface) in December 2012 in the area of the lower settling basin and lower navigation channel. Comparison to the 1993 PSDDA SLs revealed two exceedances for anthracene and one exceedance for 4-methylphenol in a total of 3 DMMUs. Anthracene was detected at 140 ug/kg d.w. (SL = 130 ug/kg) and 4=methylphenol at 150 ug/kg (SL = 120 ug/kg). (The SLs for both these chemicals were raised in 1998 to the current SLs of 906 ug/kg and 670 ug/kg for anthracene and 4-methylphenol, respectively).

Bioassays were conducted on three affected DMMUs. Although some performance problems occurred, no bioassays failed. All 462,243 CY of proposed dredged sediment were considered suitable for open-water disposal.

1996 Full Characterization (downstream only)

Full characterization of the lower settling basin and river channel occurred in 1996, resulting in 300,437 CY of sediment approved for open-water disposal. Following the previous low-moderate ranking, sediment was collected from 24 sampling locations and composited into six surface and three subsurface DMMU composite samples (total of

9 DMMUs). One PSDDA SL of diethyl phthalate (99 ug/kg; SL = 97 ug/kg) occurred in one DMMU. No other SL exceedances occurred in any DMMUs. Bioassays were not run based on the determination that phthalates are a common laboratory contaminant. Furthermore, archived sediment was analyzed and no phthalates were detected in the archive sample; therefore, all 300,437 CY were considered suitable for open-water disposal.

2003-2004 Full Characterization

In September 2003, sediment cores were collected via vibracore from the lower Snohomish Settling basin and the adjacent navigation channel. In accordance with a low-moderate rank for homogenous material, samples were composited into nine composites for analysis (9 DMMUs). No DMMP SL exceedances (detect or non-detect) occurred in any samples, and all 271,210 CY were determined to be suitable for open water disposal. TBT was included in the analyses, but was non-detect in all samples.

In March 2004, sediment cores were collected from the upper settling basin and adjacent upstream navigation channel. In accordance with a low-moderate rank for homogenous material, samples were composited into 12 composites for analysis (12 DMMUs). No DMMP SL exceedances (detect or non-detect) occurred in any samples, and all 430,000 CY of sediment were determined suitable for open water disposal. TBT analysis was not included.

2009 Dioxin Evaluation

In 2009, the Snohomish River federal navigation channel was tested for dioxin to determine the impact on maintenance dredging of the 2010 revised DMMP dioxin guidelines for open-water disposal in Puget Sound. A total of 36 sediment grab samples were collected from throughout the Snohomish River navigation channel and settling basins using a van Veen grab sampler. Composites were analyzed for conventionals and dioxins. Dioxin/furan concentrations ranged from 0.16 to 1.06 ng/kg TEQ (n = 16).

Total organic carbon (TOC) ranged from 0.14 to 1.84% with the lowest TOC concentrations in the upper settling basin and higher concentrations downstream. As expected, grain size data indicated that the percentage of fine-grained material increases downstream. DMMU1, the furthest upstream DMMU, consisted of sand and gravel. Material in the upper settling basin was greater than 90% sand, as were the shoals in the shallow navigation channel between the settling basins. The lower settling basin was approximately 70% sand with the remaining volume consisting of roughly equal parts silt and clay. The downstream deep-draft channel had the highest fines content of all the DMMUS.

2011 USACE Full Characterization

For the 2011 characterization, the DMMP agencies agreed to a one-time re-ranking of the Snohomish project. Under this agreement, 1) no testing was required of the most upstream shoal because it had been consistently shown to consist of gravel and cobble; 2) only a confirmatory level of sampling (one sample per 20,000 CY and one analysis per 100,000 CY) was required for the material in the upstream settling basin and shallow navigation channel between settling basins; and 3) the downstream settling basin was ranked low. A total of 43 grab samples were collected in 2012 for the most recent full characterization of the Snohomish River navigation channel and settling basins. The samples were composited into 9 DMMUs for analysis of all DMMP marine COCs (except TBT and dioxins; dioxins were evaluated separately in 2009). Sediment grain size results confirmed what was found previously, with all samples from the upstream settling basin and navigation channel averaging greater than 95% sand and gravel. Fines were more abundant (32-52%) in the downstream settling basin.

Only one COC, benzyl alcohol, was found at concentrations exceeding the SL in 3 DMMUs, all from the downstream settling basin. All other COCs (detect and non-detect) were below SL. Using several lines of evidence including the observed presence of woody material, the DMMP agencies determined that bioassays were unnecessary. All 651,571 CY of sediment were determined suitable for open-water disposal at the Port Gardner non-dispersive site.

Attachment 2 – Notification to Services

From:	Gardiner, Joanne C CIV USARMY CENWS (US)
To:	"keith.kirkendall@noaa.gov"
Subject:	RE: Notification of Mixing Zone Request for Maintenance Dredging in the Snohomish River Federal Navigation Channel FY 2019 – 2033
Date:	Wednesday, April 11, 2018 10:46:00 AM

Dear Mr. Kirkendall,

The timeframe of the maintenance dredging will be FY 2019-2033. My apologies for any confusion.

Thank you,

Jo Gardiner
Fisheries Biologist
Planning, Environmental and Cultural Resources Branch
U.S. Army Corps of Engineers, Seattle District
206-764-6878

From: Gardiner, Joanne C CIV USARMY CENWS (US)
Sent: Tuesday, April 10, 2018 3:00 PM
To: 'keith.kirkendall@noaa.gov' <keith.kirkendall@noaa.gov>
Subject: Notification of Mixing Zone Request for Maintenance Dredging in the Snohomish River Federal Navigation Channel FY 2018 – 2023

Dear Mr. Kirkendall,

The Washington State Department of Ecology (Ecology) has requested that we notify the NMFS that the USACE has submitted a Mixing Zone Request to Ecology for Maintenance Dredging and Disposal in the Snohomish River Federal Navigation Channel FY 2018 – 2023. Please feel free to contact me if you have any questions about this notification.

Thank you,

Jo Gardiner
Fisheries Biologist
Planning, Environmental and Cultural Resources Branch
U.S. Army Corps of Engineers, Seattle District
206-764-6878

From:	Gardiner, Joanne C CIV USARMY CENWS (US)
To:	Teachout, Emily
Subject:	RE: Notification of Mixing Zone Request for Maintenance Dredging in the Snohomish River Federal Navigation Channel FY 2019 – 2033
Date:	Wednesday, April 11, 2018 10:47:00 AM

Dear Ms. Teachout,

The timeframe of the maintenance dredging will be FY 2019-2033. My apologies for any confusion.

Thank you,

Jo Gardiner
Fisheries Biologist
Planning, Environmental and Cultural Resources Branch
U.S. Army Corps of Engineers, Seattle District
206-764-6878

From: Gardiner, Joanne C CIV USARMY CENWS (US)
Sent: Tuesday, April 10, 2018 2:58 PM
To: Teachout, Emily <emily_teachout@fws.gov>
Subject: Notification of Mixing Zone Request for Maintenance Dredging in the Snohomish River Federal Navigation Channel FY 2018 – 2023

Dear Ms.Teachout,

The Washington State Department of Ecology (Ecology) has requested that we notify the USFWS that the USACE has submitted a Mixing Zone Request to Ecology for Maintenance Dredging and Disposal in the Snohomish River Federal Navigation Channel FY 2018 – 2023. Please feel free to contact me if you have any questions about this notification.

Thank you,

Jo Gardiner
Fisheries Biologist
Planning, Environmental and Cultural Resources Branch
U.S. Army Corps of Engineers, Seattle District
206-764-6878

Appendix D
Coastal Zone Management Act Consistency Determination

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

REPLY TO
ATTENTION OF

Planning, Environmental and Cultural
Resources Branch

APR 10 2018

Ms. Loree' Randall
SEA Program
Washington Department of Ecology
PO Box 47600
Olympia, WA 98504-7600

Dear Ms. Randall:

The U.S. Army Corps of Engineers, Seattle District (Corps) is proposing to conduct maintenance dredging in the Snohomish River Federal Navigation Channel FY 2019 – 2033 at Everett, Washington. This action is required to facilitate safe navigation within the channel by maintaining the authorized depths of the two navigation channels, and the two settling basins in the Snohomish River Federal Navigation Channel, plus two feet of allowable overdepth to account for the inaccuracy of the mechanical (clamshell) bucket. The project will involve removal of up to 500,000 cubic yards of accumulated sediment per dredging event, with disposal at the Port Gardner PSDDA approved open-water site. If beneficial re-use of the dredged sediment is requested from the Port or City of Everett, the accumulated sediment will be hydraulically dredged and placed at Jetty Island, Parcel O, or other approved upland re-use sites. This work would occur between October 16 and February 14, which is within the approved in-water work window.

The Corps is requesting Individual 401 Water Quality Certification review and Coastal Zone Management (CZM) Consistency concurrence from the Washington State Department of Ecology (Ecology) for the maintenance dredging of the Snohomish River Federal Navigation Channel.

In the past, the Corps has received a letter of concurrence with the previously submitted Coastal Zone Management Act Consistency Determination (CZM-CD) from Ecology. The Corps has prepared a new CZM-CD because the amount of dredged sediment approved for disposal has increased; the Corps received a Biological Opinion from the National Marine Fisheries Service in January 2018; the USACE is currently updating the National Environmental Policy Act (NEPA) documentation; and the City of Everett updated the Shoreline Master Program in July 2016. Pursuant to the Shoreline Management Act of 1972 (RCW 90.58), the Corps finds this proposal is consistent to

the maximum extent practicable with the State of Washington Shoreline Management Program. Enclosed is additional documentation to support our request, which includes a Joint Aquatic Resources (JAR) form and attachments, a mixing zone request, and two water quality monitoring plans.

If you have any questions or need additional information, please contact Ms. Jo Gardiner at Joanne.L.Gardiner@usace.army.mil or at 206-764-6878.

Sincerely,

Evan R. Lewis
Deputy Chief, Planning, Environmental and
Cultural Resources Branch

4 Encls:
1: JAR Form
2: CZM CD
3: Request for Water Quality Mixing Zone
4: DRAFT Water Quality Monitoring Plan

COASTAL ZONE MANAGEMENT ACT

CONSISTENCY DETERMINATION

Snohomish River Federal Navigation Channel

Maintenance Dredging and Disposal FY 2019 – 2033

Everett, Washington

Submitted by the U.S. Army Corps of Engineers

Seattle District

US Army Corps
of Engineers®
Seattle District

March 2018

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1 INTRODUCTION AND PROJECT DESCRIPTION

The Coastal Zone Management Act of 1972, as amended, requires Federal agencies to carry out their activities in a manner that is consistent to the maximum extent practicable with the enforceable policies of the approved state Coastal Zone Management (CZM) Programs. The Shoreline Management Act (SMA) of 1972 (RCW 90.58) is the core of authority of Washington's CZM Program. Primary responsibility for the implementation of the SMA is assigned to the local government.

According to 15 CFR Ch. IX § 930.30, the Federal Government is directed to ensure "that all Federal agency activities including development projects affecting any coastal use or resource will be undertaken in a manner consistent to the maximum extent practicable with the enforceable policies of approved management programs." The Snohomish Federal Navigation Channel Maintenance Dredging and Disposal project for FY 2019 – 2033, occurs within the coastal zone governed by the City of Everett Shoreline Master Program (SMP), dated July 11, 2016.

On May 10, 2011, the U.S. Army Corps of Engineers (USACE) submitted a request to the Washington State Department of Ecology (WDOE) for a Section 401 Water Quality Certification and concurrence with the USACE's determination that maintenance dredging activities in the Snohomish River Federal Navigation Channel (Snohomish navigation channel) were consistent with Washington State's CZM Program. In the cover letter, the USACE stated that there are no changes to the proposed dredging and disposal program since WDOE's last review of the project. The USACE had previously received a letter of concurrence from the WDOE dated August 30, 2005, for maintenance dredging activities in the Snohomish navigation channel. In an email WDOE stated they had been advised by the National Atmospheric and Oceanic Administration (NOAA) that if a Federal Consistency Determination had been previously issued, that no additional consistency review was required as long as there were no changes in the project and project footprint, no impacts to resources not previously reviewed, then the WDOE would not need to provide a new CZM review (Attachment 1). The elements of the proposed dredging project remain the same, including the project footprint. However, since the last letter of concurrence received regarding consistency with the CZM, the amount of material proposed for dredging has increased; the USACE received a new Biological Opinion for the project from the National Marine Fisheries Service (NMFS) in January 2018; the USACE is currently updating the National Environmental Policy Act (NEPA) documentation, and the City of Everett has updated their SMP; therefore, the USACE is submitting an updated CZM Consistency Determination (CD) to WDOE.

Maintenance dredging and disposal are activities undertaken by a Federal agency; the following constitutes a Federal CD with the enforceable provisions of the Washington CZM Program.

1.1 Authority

The Everett Harbor and Snohomish River Project, of which the Snohomish navigation channel is a component, was authorized by the Rivers and Harbors Act of June 25, 1910 (House document 1108, 60th Congress, 2nd session). Subsequent Acts of 1930, 1938, 1954, 1960, and 1968 provided modifications and additional improvements (USACE 1975). The Everett Harbor and Snohomish River Project consists of navigation channels, two settling basins, and dikes to serve navigation in Everett Harbor and the Snohomish River. The authorized project features include:

- A lower channel that extends from Puget Sound up the Snohomish River one mile, -15 feet depth at mean low lower water (MLLW), and 150 to 425 feet wide.

- An upper channel that extends to river mile (RM) 6.3, -8 feet deep at MLLW, and 150 feet wide.
- Two settling basins in the navigation channel:
    - A downstream basin -20 feet deep at MLLW with 250,000 cubic yards (cy) capacity.
    - An upstream basin -40[1] feet deep at MLLW with one million cy capacity.

1.2 Action Area

The proposed action will occur within the Snohomish navigation channel at Everett in Snohomish County, Washington (Figures 1 and 2).

1.3 Background

The Snohomish navigation channel is located on the eastern shore of Possession Sound at Everett in Snohomish County, Washington. The Pilchuck, Skykomish, and Snoqualmie Rivers are the largest tributaries to the Snohomish River and the primary sources of sediment in the navigation channel. The settling basins were created to catch sediment and reduce the frequency of dredging in the Snohomish navigation channel. In recent years, sediment accumulation has continued to increase in the navigation channel as more sediment is mobilized in the river. This increases the rate of sediment accumulation in the settling basins and navigation channel, which in turn can pose a hazard to transiting vessels and make some areas of the channel inaccessible at low tides. During Jetty Island Days in 2017, 27 ferry trips were cancelled during low tides due to accumulated sediment (Port of Everett 2018).

2 PURPOSE

The purpose of the project is to maintain the congressionally-authorized depths of the Snohomish navigation channel and settling basins, to facilitate water-dependent transit and commerce important to the region.

3 PROPOSED ACTION

The USACE proposes to conduct routine maintenance dredging in the Snohomish navigation channel over a 15-year period from fiscal year (FY) 2019 through FY 2033. The USACE is approved to remove approximately 800,000 cubic yards (cy) of dredged sediment per dredge event; however, the USACE typically removes approximately 500,000 cy per dredge event from navigation channel. The Snohomish navigation channel includes the downstream channel and the downstream settling basin, the navigation channel in between the settling basins, and the upstream settling basin. The actual quantity of material to be dredged per event will be determined based on a full-condition survey that is conducted annually at a minimum, and typically occurs anytime during March through May of the dredging year. The condition of the settling basins and navigation channel is also confirmed by a pre-dredge survey that typically occurs one week prior to the dredging event. The volume of material to be dredged from each location and the appropriate disposal option will be finalized based on the results from these two surveys. Approximate volume and information about the types of dredging equipment and disposal options provided herein are based on previous dredging activities.

1: The upstream settling basin is maintained to a depth of up to -32 feet MLLW although its authorized depth is -40 feet MLLW.

Typically the downstream settling basin is dredged using a clamshell dredge and the dredged sediment is loaded onto a bottom-dump barge for disposal at the Puget Sound Dredged Disposal Analysis Program (PSDDA) Port Gardner open-water site (Figure 3). Due to the imprecise nature of dredging equipment, up to two feet of allowable overdepth dredged material removal may occur and has been factored into the total material to be removed. Some years there is a need for dredged sediment for beneficial re-use purposes. In the past, sediment has been placed directly at Jetty Island and Parcel O using a hydraulic dredge and pipeline (Figure 2). Each dredging event would occur within the approved in-water work window of October 16 through February 14 of each fiscal year. Dredging is typically accomplished within 60-90 days, depending on total quantity of material removed, mechanical breakdowns, and weather conditions. Typically, dredging of the settling basins is conducted every other year, along with shoaled areas in the navigation channel in the vicinity of the settling basins (e.g., the downstream settling basin one year and the upstream settling basin the following year). However, proposed dredging is dependent upon available funding.

4 JURISDICTION AND CONSISTENCY REQUIREMENTS

Washington State's CZM Program defines the coastal zone to include the 15 counties with marine shorelines, which includes Snohomish County. Primary responsibility for the implementation of the Shoreline Management Act is assigned to local governments. The Snohomish navigation channel is located within the City of Everett. The City of Everett implemented the state's Shoreline Management Act, Chapter 90.58 RCW, through preparation of the original Shoreline Master Program (SMP) in 1976 and updated on July 11, 2016.

The proposed maintenance dredging of the Snohomish navigation channel including both settling basins. In the Everett SMP, 12 shoreline designations were identified; however, there are 14 shown on Figure 4. The shoreline designations adjacent to the Snohomish navigation channel include Urban Deep Water Port, Aquatic, Aquatic Conservancy, Urban Maritime, Urban Conservancy, Urban Maritime Interim, Urban Industrial, Urban Conservancy Recreation, and Municipal Water Quality. In addition, the Snohomish navigation channel is identified as a Shoreline of Statewide Significance (Figure 5).

4.1 Consistency Requirements

The USACE is seeking State concurrence from the WDOE with the Coastal Zone Management Act (CZMA) CD for the proposed routine maintenance dredging per CZMA Section 307 (c) and 15 CFR 923.33 (a) & (b). Under Washington State's program, Federal projects that would affect land use, water use, or natural resources strive to demonstrate consistency with the policies of six laws. Each of these laws is addressed below.

4.1.1 State Environmental Policy Act (SEPA)

The proposed action is a Federal action subject to NEPA, but not SEPA as there is no state action to be taken for this project.

4.1.2 Clean Water Act

The Clean Water Act requires Federal agencies to protect waters of the United States. The Act disallows the placement of dredged or fill material into waters (and excavation) unless it can be demonstrated there are no practicable alternatives to meet the need for the proposal. The USACE has prepared a

404(b)(1) evaluation to document findings regarding this project pursuant to Section 404 of the Act. Once an internal review at USACE is complete, a Section 404 public notice will be prepared and distributed for public comment as part of the Draft Environmental Assessment (EA) prepared for this project. Dredged material is approved for placement at an approved open-water disposal site. No wetlands would be affected by the project.

Water Quality Certification under Section 401 of the Act for discharges of dredged or fill material into the waters of the U.S. assures compliance with state water quality standards. The USACE is pursuing a 401 Water Quality Certification (WQC) from WDOE and will comply with all requirements and conditions.

4.1.3 Clean Air Act

Section 176 of the Clean Air Act (CAA), 42 USC 7506(c), prohibits Federal agencies from approving any action that does not conform to an approved state or Federal implementation plan. Maintenance dredging and disposal activities will occur in an attainment zone, therefore *de minimus* thresholds and conformity determination requirements do not apply [40 CFR 93.153 (c)(2)(ix)].

4.1.4 Ocean Resources Management Act

The enforceable policies of Chapter 43.143 RCW apply to coastal waters of the Pacific Ocean. The proposed action does not include sites in or near the Pacific Ocean. There would be no significant long-term impacts to coastal or marine resources or uses of the Pacific Ocean.

1.1.5 Energy Facility Site Evaluation Council

The proposed project does not involve siting of energy facilities in Washington State and does not apply to the proposed action.

4.1.6 Shoreline Management Act

The determination of consistency with the CZMA for this proposed action is based on review of the policies and standards of the SMP for the City of Everett, Washington, as defined in RCW 90.58 and WAC Chapter 173-26. Applicable sections of the plan are presented below with the USACE's CD in bold italics.

5 CONSISTENCY DETERMINATION

5.1 City of Everett Shoreline Master Program.

The City of Everett SMP includes goals, policies and regulations. These provide direction and context for the specific policies and regulations in the SMP. Policies are broad statements of intention. In contrast, regulations are requirements that are necessary to implement the policies. Everett's SMP describes the shoreline jurisdiction consistent with state regulations as well as the shoreline environment designations that are applied to each shoreline reach. The environment designation section includes information on interpretation, purpose, management policies and general regulations. The shoreline designations determine which uses are allowed, which are conditional, and which are prohibited in shoreline areas.

Each relevant section of Everett's SMP appears below with the USACE's description of how the proposed

Federal action is consistent with the code in ***bold italic*** text.

4.13 Aquatic
Management Policies

9. Dredging should be allowed for environmental restoration, including milfoil removal, maintenance of existing water dependent uses, including recreational uses, navigation channel maintenance, and for new water dependent uses to get from the shore to the dredged navigation channel.

   New deep draft uses, if allowed, should not occur in areas requiring extensive initial or maintenance dredging.

Consistent. The purpose of the proposed dredging is to maintain the federally authorized depths of the Snohomish navigation channel, to facilitate safe transit through the channel.

4.14 Aquatic Conservancy
Management Policies

6. Dredging should only be allowed for environmental restoration, maintenance of existing water dependent uses, and for maintenance of the federal navigation channel.

Consistent. The purpose of the proposed dredging is to maintain the federally authorized depths of the Snohomish navigation channel, to facilitate safe transit through the channel.

6.4 Dredging and Dredge Material Disposal
Policies

1. Dredging and placement of dredged material should be conducted in a manner which avoids or minimizes impacts to water quality, critical areas, and ecological functions and ecosystem-wide processes.

Consistent. The USACE has initiated coordination with the WDOE for Section 401 Water Quality Certification (WQC) for routine Operations and Maintenance (O&M) dredging in the Snohomish navigation channel for FY 2019-2033, which includes a water quality monitoring plan. Dredging will occur during the authorized in-water work window to minimize potential impacts to federally listed species. When possible, the dredged sediment will be beneficially re-used by placing it along the shoreline of Jetty Island or other beach nourishment projects. The proposed dredged material has been tested and determined suitable for aquatic disposal, as found in the most recent Suitability Determination dated February 8, 2018, by the regulatory agencies that have jurisdiction over dredged material disposal in open-water sites.

3. Dredging for the purpose of establishing, expanding, or relocating navigation channels and basins should be allowed only when significant adverse impacts are minimized and when suitable mitigation is provided.

Consistent. The proposed dredging will only occur within the existing Snohomish navigation channel. No expansion or relocation of the existing navigation channel is proposed as part of this project.

4. Maintenance dredging of established navigation channels and basins should be restricted to maintaining previously dredged and/or existing authorized location, depth, and width unless necessary to improve navigation.

Consistent. The purpose of the proposed dredging is to maintain the federally authorized depths of the Snohomish navigation channel, to facilitate safe transit through the channel.

5. Depositing of dredge material in water areas should be allowed only for the improvement of habitat, or where the alternative of depositing material on land is more detrimental to the shoreline resource than depositing it in the water, or as approved by state agencies at an approved deep water disposal site.

Consistent. The proposed dredged material has been tested and determined suitable for aquatic disposal, as found in the most recent Suitability Determination dated February 8, 2018, by the regulatory agencies that have jurisdiction over dredged material disposal in open-water sites. When possible, the dredged sediment will be re-used by placing it along the shoreline of Jetty Island or other beach nourishment projects.

6. Beneficial use of dredge material for environmental remediation projects and ecological enhancement and restoration should be encouraged, and deep water disposal of dredge materials should be allowed only as a last resort after all other alternatives have been exhausted.

Consistent. When possible, the dredged sediment will be re-used by placing it along the shoreline of Jetty Island. Dredged sediment may also be stored at Parcel O, which is an approved re-handling site for beneficial re-use. The proposed dredged material has been tested and determined suitable for aquatic disposal, as found in the most recent Suitability Determination dated February 8, 2018, by the regulatory agencies that have jurisdiction over dredged material disposal in open-water sites.

7. Land disposal of dredge material in diked areas should be conducted in a manner which minimizes the potential adverse effects on the adjacent water body. Design of the disposal ponds, dikes, or lagoon will consider location of the inlet and outlet to prevent short circuiting; installing adequate discharge controls; providing a capacity and a detention time based on the settling characteristics.

Consistent. Upland placement of dredged sediment is authorized at Parcel O, which is an approved re-handling site for beneficial re-use. The USACE Navigation Branch monitors and tracks all upland disposals.

8. The City should work with the Port of Everett, the Corps of Engineers, and appropriate state agencies to develop a long-range plan for the deposit and use of dredge material on land and in water areas.

Consistent. The Dredged Material Management Program (DMMP) monitors all PSDDA sites. The USACE Navigation Branch monitors and tracks all upland disposals. The USACE meets regularly with the Port to discuss sediment placement strategies, and the Port meets regularly with the City of Everett.

9. Dredging of bottom materials for the single purpose of obtaining fill material should be prohibited.

Consistent. The purpose of the proposed dredging is to maintain the federally authorized depths of the Snohomish navigation channel, to facilitate safe transit through the channel.

10. Dredge material re-handling/transfer sites which can be used on a continuing basis are encouraged.

Consistent. Upland placement of dredged sediment is authorized at Parcel O, which is an approved re-handling site for beneficial re-use.

6.4 Dredging and Dredge Material Disposal Regulations

4. In designating areas for the placement of dredge materials or in approving placement of dredge materials at a specific site, consideration shall be given, but not limited to, the following:

    a. Existing and proposed use of the site.

    b. Project phasing.

    c. Impacts on c critical areas, ecological functions and ecosystem-wide processes.

Consistent. Upland placement of dredged sediment is authorized at Parcel O, which is an approved re-handling site for beneficial re-use. The proposed dredged material has been tested and determined suitable for aquatic disposal, as found in the most recent Suitability Determination dated February 8, 2018, by the regulatory agencies that have jurisdiction over dredged material disposal in open-water sites. When possible, the dredged sediment will be re-used by placing it along the shoreline of Jetty Island.

5. Dredging and dredge material placement shall be scheduled to avoid conflicts with commercial fisheries.

Consistent. Dredging will occur during the authorized in-water work window to minimize potential impacts to federally listed species. The dredging contractor issues a notice to mariners and the U.S. Coast Guard prior to dredging activities, and the USACE and the Port issue a joint public release about upcoming dredging activities.

6. Proposals for dredging and dredge materials placement shall include all feasible mitigating measures, including scheduling, to protect marine, riverine, and lacustrine habitats and to minimize adverse impacts such as turbidity, adverse modifications on littoral drift, release of nutrients, heavy metals, sulfides, organic material or toxic substances, dissolved oxygen depletion, disruption of food chains, loss of benthic productivity, and disturbance of fish migration and important localized biological communities.

Consistent. As part of the Section 401 WQC process, the USACE prepared and submitted a Joint Aquatic Resources form to WDOE for the project. As part of the NEPA process, a Draft Environmental Assessment (EA) has been prepared for the project.

7. Dredging and dredge material placement shall be prohibited on or in archaeological sites which are on-record with the Washington State Office of Archaeology and Historic Preservation until such time as they are released by the state.

Consistent. As part of the NEPA process the USACE has conducted an archeological review for the project and will complete per National Historic Preservation Act.

8. Except for open water disposal of dredge material at a PSDDA site, all dredge materials placement shall comply with the landfill regulations and shoreline stabilization regulations, as applicable. In addition, upland hydraulic dredge material disposal activities shall adhere to the following conditions:
    a. Containment dikes shall be built and maintained so as to prevent the return of settleable solids into a water body.
    b. An adequate settling basin shall be built and maintained so that the site's discharge water carries a minimum of suspended sediment. Basins shall be designed to maintain at least one (1) foot of standing water at all times to encourage proper settling.
    c. Runoff water from dredge materials deposit must enter the waterway through an outfall at a location that maximizes circulation and flushing, and minimizes erosion.
    d. The outside face of dikes shall be sloped at 1-1/2 to 1 (horizontal to vertical) or flatter, and protected from erosion by revegetating the slope (i.e. grass or native vegetation). Landscaping and buffer areas may be required.

Consistent. Upland placement of dredged sediment is authorized at Parcel O, which is an approved re-handling site for beneficial re-use. The USACE Navigation Branch monitors all upland disposals at Parcel O.

9. Unconfined, open-water disposal of dredged material in Puget Sound shall only occur at permitted PSDDA sites as a last resort if no other options are available. Any party utilizing the PSDDA site must comply with all PSDDA requirements.

Consistent. The proposed dredged material has been tested and determined suitable for aquatic disposal, as found in the most recent Suitability Determination dated February 8, 2018, by the regulatory agencies that have jurisdiction over dredged material disposal in open-water sites. Dredged sediment can be disposed of at the PSDDA approved Port Gardner site, or placed at Parcel O, and/or Jetty Island.

10. Dredge material placement in shoreline areas shall not impair scenic views. When necessary, sites shall be adequately screened from view, except for short-term preloading/stockpiling.

Consistent. Upland placement of dredged sediment is authorized at Parcel O, which is an approved re-handling site for beneficial re-use.

11. Dredge material placement shall have highest priority in the Urban Industrial Environment. Dredge material placement shall also be permitted in the Urban Deep Water Port, Urban

Mixed-Use Industrial, Urban Maritime, Urban Multi-Use, Urban Conservancy – Recreation, and Municipal Water Quality Environments.

Consistent. Parcel O is designated as Urban Industrial.

12. Except for ecological restoration and enhancement activities, dredge material placement in the Urban Conservancy, Municipal Watershed, Aquatic and Aquatic Conservancy Environments shall require a shoreline conditional use permit.

Consistent. Parcel O is designated as Urban Industrial.

13. Dredge material placement shall be prohibited in the Urban Residential Environment.

Consistent. Parcel O is designated as Urban Industrial.

References

1975 USACE (U.S. Army Corps of Engineers). Final Environmental Statement. Everett Harbor and Snohomish River Navigation Project, Everett, Washington. 116 p without appendices.

2018 Port of Everett. Dredging http://www.portofeverett.com/your-port/environment accessed March 3, 2018.

From:	Randall, Loree" (ECY)
To:	Donnelly, Robert F NWS
Cc:	Inouye, Laura (ECY); Kerry Kehoe
Subject:	RE: CZM consistency documents (UNCLASSIFIED)
Date:	Wednesday, June 27, 2012 8:21:21 AM

NOAA has advised Ecology in the past that for projects that Coastal Zone Management (CZM) review and a Federal Consistency determination has been issued no additional review is trigger, unless a project is going to impact a coastal resource not previously reviewed, or if the footprint for this project is different from that reviewed in the previous project. Therefore, Ecology has taken the position that if a project has been issued Federal Consistency in the past and nothing has changed then Ecology does not need to provide any additional CZM review. Please let me know if you have any questions.

Thanks
Loree' Randall

-----Original Message-----
From: Donnelly, Robert F NWS [mailto:Robert.F.Donnelly@usace.army.mil]
Sent: Tuesday, June 26, 2012 3:44 PM
To: Randall, Loree' (ECY)
Cc: Inouye, Laura (ECY)
Subject: RE: CZM consistency documents (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Good afternoon Loree'

This is a reminder. Several days ago in a phone conversation (Kevin McKeag and John Pell were also here) you indicated you would provide us with a written statement that once a CZM consistency document was accepted by Ecology there was no need to do new ones for repeat projects (i.e. O & M projects) unless there were substantial changes in the project(s) and/or updates to the shoreline Management Plans. I hope this is true because it will reduce the work load for all concerned.

Thank you for your attention to this matter.

Cheers,
Bob Donnelly

Classification: UNCLASSIFIED
Caveats: NONE

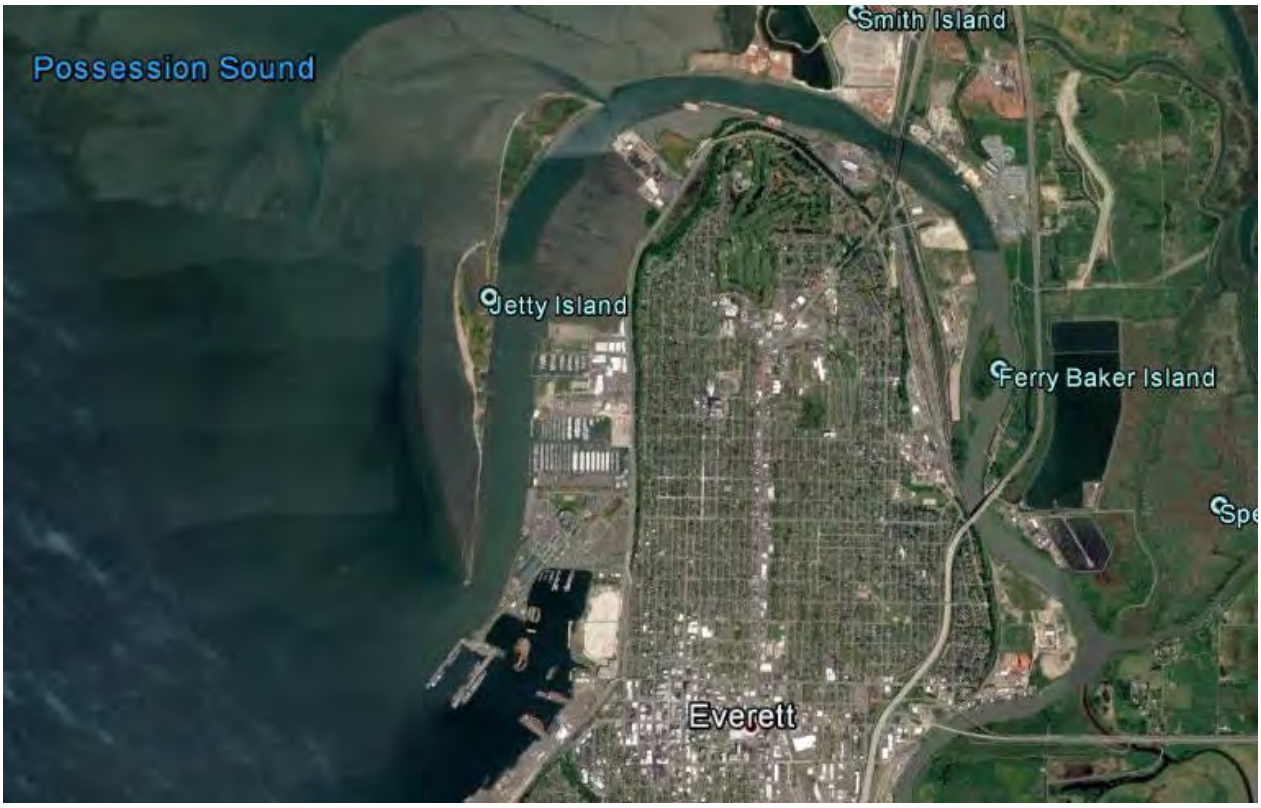


Figure 1. Vicinity map showing project location at Everett, Washington.

Figure 2. Overview of the Snohomish River Navigation Channel and two beneficial re-use sites, Jetty Island and Parcel O.

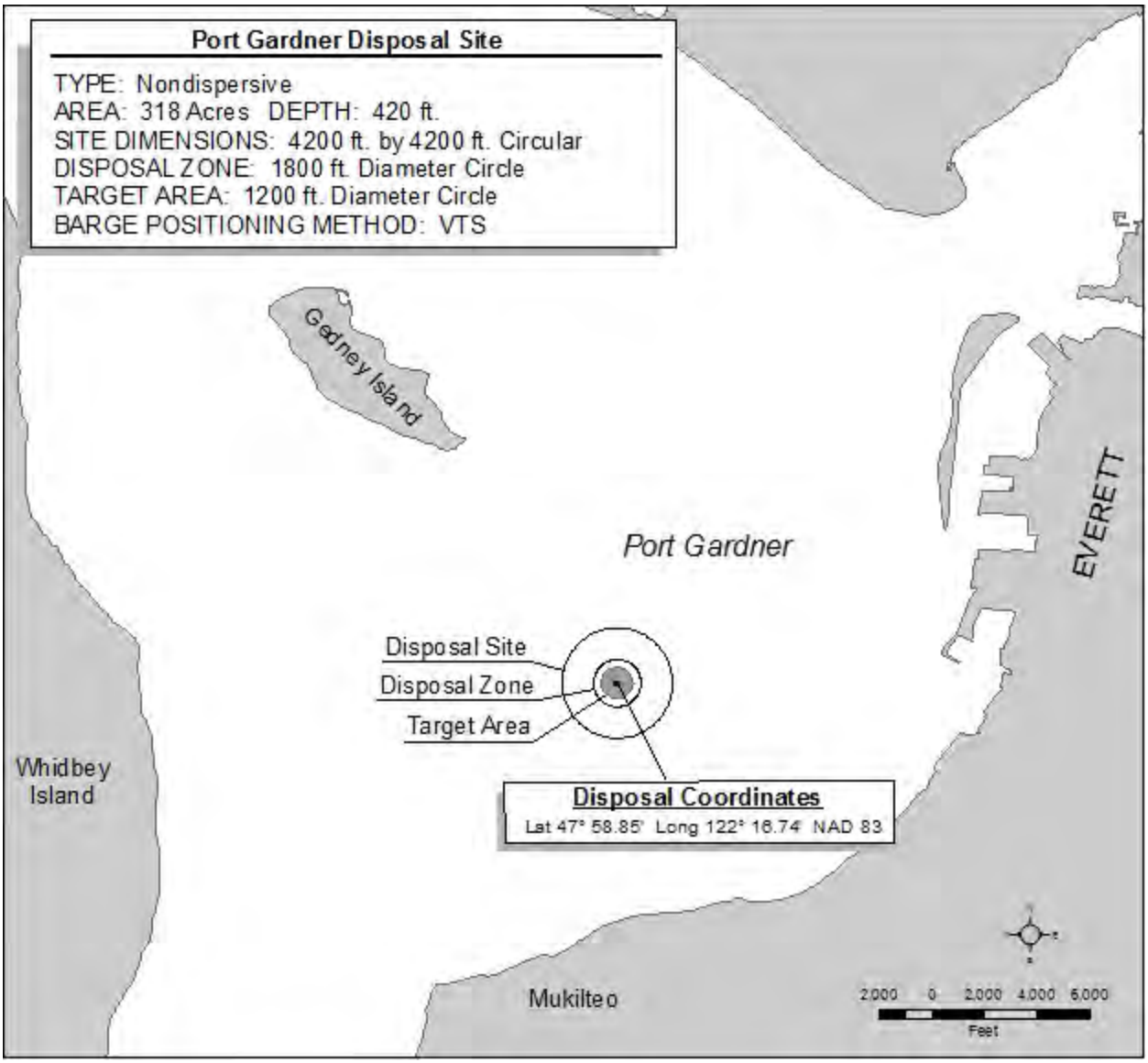


Figure 3. The Port Gardner PSDDA (Puget Sound Dredged Disposal Analysis Program) non-dispersive open-water disposal site.

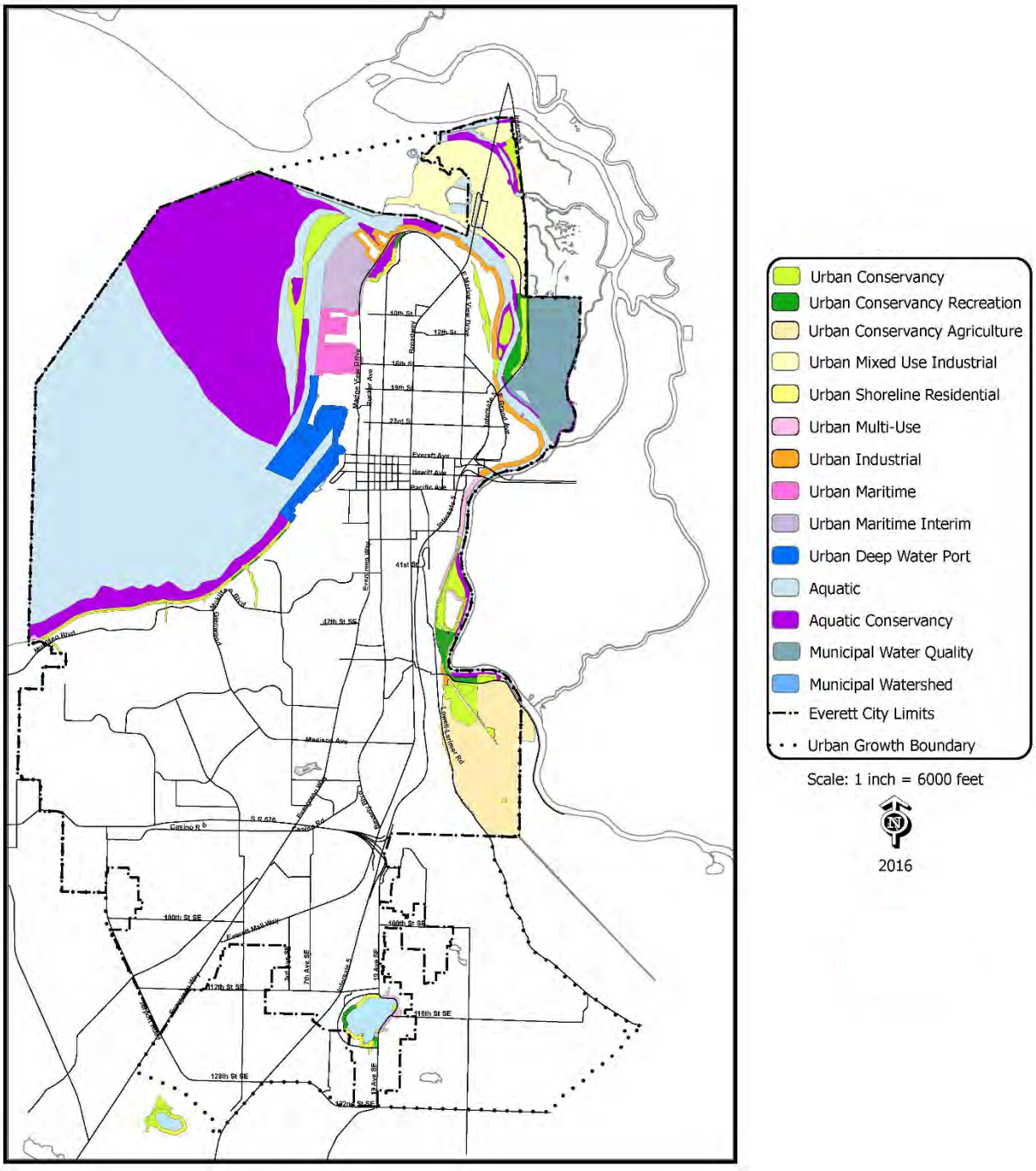


Figure 4. City of Everett environmental designations in the Snohomish navigation channel.

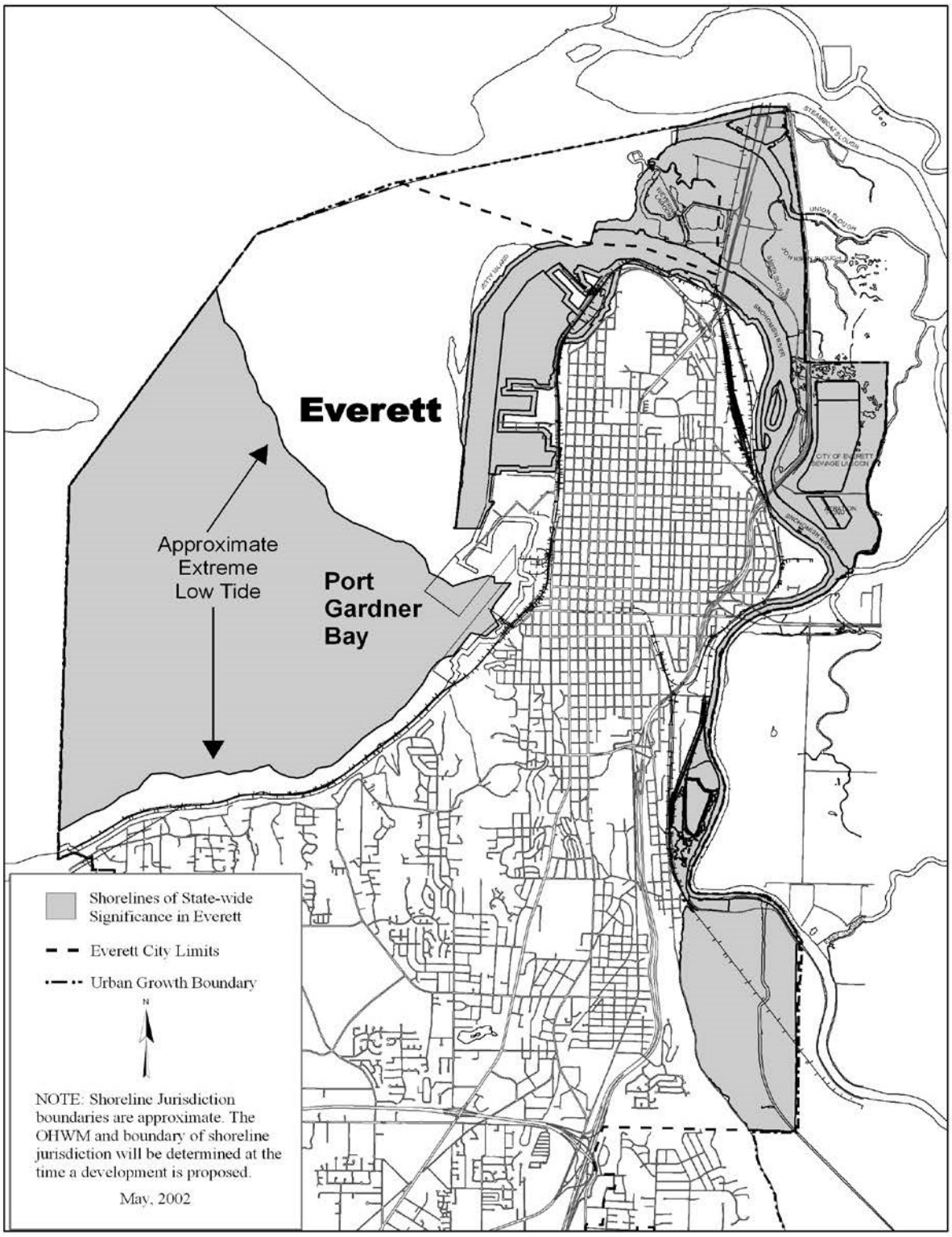


Figure 5. Shoreline of Statewide Significance in the Snohomish navigation channel.

Appendix E
Endangered Species Act Consultation Agency Approval Letters

Biological opinions issued by NMFS for the proposed action during ESA consultation may be found by searching for the following consultation numbers in the Public Consultation tracking System (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts):

- WCR-2016-6057 (25-Year Maintenance Dredging Program for Eight Federal Channels in Washington)
- WCR-2015-2975 (Multiuser Dredged Material Disposal Sites)

Letters of concurrence from the USFWS and cover letters for the NMFS biological opinions are included in this appendix.

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion, Section 7(a)(2) "Not Likely to Adversely Affect" Determination, Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation, and Fish and Wildlife Coordination Act Recommendations

Continued use of multi-user dredged material disposal sites in Puget Sound and Grays Harbor (Fourth Field HUCs 17110020 Dungeness-Elwha, 17110002 Strait of Georgia, 1711019 Puget Sound, and 17100105 Grays Harbor) Washington

NMFS Consultation Number: WCR-2015-2975

Action Agency: U.S. Army Corps of Engineers

Affected Species and Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Puget Sound/Georgia Basin yelloweye rockfish (*Sebastes ruberrimus*)	Threatened	Yes	No	No
Puget Sound/Georgia Basin canary rockfish (*S. pinniger*)	Threatened	Yes	No	No
Puget Sound/Georgia Basin bocaccio (*S. paucispinis*)	Endangered	Yes	No	No
Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*)	Threatened	*No		
Lower Columbia River Chinook salmon (*O. tshawytscha*)	Threatened	*No		
Upper Willamette River Chinook salmon (*O. tshawytscha*)	Threatened	*No		
Hood Canal summer-run chum salmon *(O. keta*)	Threatened	*No		
Columbia River chum salmon (*O. keta*)	Threatened	*No		
Lower Columbia River coho salmon (*O. kisutch*)	Threatened	*No		
Puget Sound steelhead (*O. mykiss*)	Threatened	*No		
Southern North American green sturgeon (*Acipenser medirosris)*	Threatened	*No		
Southern Pacific eulachon (*Thaleichthys pacificus*)	Threatened	*No		
Southern Resident killer whale (*Orcinus orca*)	Endangered	*No		
Humpback whale (*Megaptera novaeangliae*)	Endangered	*No		
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered			*No

*Please refer to section 2.11 for the analysis of species or critical habitat that are not likely to be adversely affected.

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

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

Issued By:

FOR William W. Stelle, Jr.
Regional Administrator

Date: December 17, 2015

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

JUL 28 2015

In Reply Refer To:
01EWFW00-2015-I-0724

Evan Lewis, Chief
Environmental and Cultural Resources Branch
Seattle District, U.S. Army Corps of Engineers
ATTN: ERS Branch (Laufle)
P.O. Box 3755
Seattle, Washington 98124-3755

Dear Mr. Lewis:

Subject: Continued Use of Multiuser Dredged Material Disposal Sites in Puget Sound and Grays Harbor

This letter is in response to your June 2015 request for our concurrence with your determination that the proposed action in Puget Sound and Grays Harbor, Washington, "may affect, but is not likely to adversely affect" federally listed species. We received your letter, and Biological Evaluation, providing information in support of "may affect, not likely to adversely affect" determinations, on June 22, 2015.

Project Description

The Army Corps of Engineers (Corps) and the Dredged Material Management Program (DMMP) agencies propose to manage the operation and monitoring of ten open-water dredged material disposal sites, eight in Puget Sound and two in Grays Harbor. The disposal sites will be used by federal and non-federal entities for disposal of material that is suitable for open-water disposal. Three of the Puget Sound sites and both of the Grays Harbor sites will be used for dispersive disposal – currents will carry released dredged material so that sediments are dispersed. The remaining five Puget Sound sites will be used as non-dispersive sites – released dredged material will remain localized beneath the release site.

Specifically, you requested informal consultation pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) for the federally listed species and critical habitat identified below.

- Bull trout (*Salvelinus confluentus*)
- Bull trout critical habitat
- Marbled murrelet (*Brachyramphus marmoratus*)

We believe that sufficient information has been provided to determine the effects of the proposed action and to conclude whether it would adversely affect federally listed species and/or designated critical habitat. Our concurrence is based on information provided by the action agency, best available science, and complete and successful implementation of agreed-upon conservation measures.

EFFECTS TO BULL TROUT

Effects and Disturbance

Temporary and/or long-term effects from the action are not expected to measurably disrupt normal bull trout behaviors (i.e., the ability to successfully feed, move, and/or shelter), and are therefore considered insignificant and/or discountable:

- The action will result in temporary impacts to water quality, including potential temporary increases in elevated levels of turbidity and contaminants, although the threat of increased contaminants will be decreased by testing dredged material prior to disposal to ensure it does not have the potential to adversely affect biological resources. These effects will be intermittent and limited in physical extent and duration.
- Long-term use and operations of the dredged material disposal sites will not disrupt normal bull trout behaviors (i.e., the ability to successfully feed, loaf, move, and/or shelter).

Effects to Bull Trout Habitat and Prey Sources

With successful implementation of the agreed-upon conservation measures, we expect that temporary impacts from the action will not measurably degrade or diminish habitat functions or prey resources in the action area, and effects are therefore considered insignificant and/or discountable:

- Construction methods and proposed permanent features may impact habitat that supports bull trout and/or their prey sources. These impacts will be limited in physical extent and/or duration, and will not measurably degrade habitat functions, including prey resources, that are important to bull trout within the action area:
    - Use of the dredged material disposal sites may result in periodic and/or temporary impacts to water quality through elevated levels of turbidity and contaminants, although the threat of increased contaminants will be decreased by testing dredged material prior to disposal to ensure it does not have the potential to adversely affect biological resources; and these effects will be intermittent and of short duration.
    - Any in-water disposal of dredged material will comply with a current, valid Site Use Authorization approved under the Dredged Material Management Program. The action will not degrade habitat functions that are important to bull trout or their prey resources, including diminishing forage fish or salmonid production.

EFFECTS TO BULL TROUT CRITICAL HABITAT

The final revised rule designating bull trout critical habitat (75 FR 63898 [October 18, 2010]) identifies nine Primary Constituent Elements (PCEs) essential for the conservation of the species. The proposed action may affect the PCEs listed below; however, effects to these PCEs are not expected measurably affect them and are therefore considered insignificant or discountable:

PCE 2: *Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.*

- The DMMP disposal sites are all greater than 50 feet in depth. Concentration of suspended sediment in nearshore areas is not expected to reach levels that would impede migration.

PCE 3: *An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.*

- The DMMP disposal sites are located offshore in deep water either where prey are not located or where the dredged material will rapidly disperse, not significanly altering the disposal area.

PCE 4: *Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.*

- The action will have no effect on this PCE.

PCE 5: *Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.*

- The action will have no effect on this PCE.

PCE 8: *Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.*

- The action may impact water quantity and/or quality. However, the effects will be temporary; components of the project design include actions to avoid, reduce, or compensate for the effects from the impacts; and/or we would be unable to meaningfully measure, detect, or evaluate the effects.

EFFECTS TO MARBLED MURRELET

Effects - Marine Environment

Temporary exposures and effects from the action are not expected to measurably disrupt normal marbled murrelet behaviors (i.e., the ability to successfully feed, move, and/or shelter) and are therefore considered insignificant and/or discountable:

- The action will result in temporary impacts to water quality, including potential temporary increases in elevated levels of turbidity and contaminants, although the threat of increased contaminants will be decreased by testing dredged material prior to disposal to ensure it does not have the potential to adversely affect biological resources. These effects would be intermittent and limited in physical extent and duration.

- Long-term use and operations of the dredged material disposal sites may result in increased sound levels or other temporary stressors that could disturb marbled murrelets. However, due to the present level of development and activity in the vicinity, the action is not expected to disrupt normal marbled murrelet behaviors (i.e., the ability to successfully feed, loaf, move, and/or shelter).

Effects to Marbled Murrelet Foraging Habitat and Prey Sources

With successful implementation of the included conservation measures, we expect that temporary impacts from the action will not measurably degrade or diminish habitat functions or prey resources in the action area, and effects are therefore considered insignificant and/or discountable:

- Construction methods and proposed permanent features may impact habitat that supports marbled murrelets and/or their prey sources. These impacts will be limited in physical extent and/or duration and will not measurably degrade habitat functions, including prey resources that are important to marbled murrelets within the action area:
    - Use of the dredged material disposal sites may result in periodic impacts to water quality through elevated levels of turbidity and contaminants, although the threat of increased contaminants will be decreased by testing dredged material prior to disposal to ensure it does not have the potential to adversely affect biological resources; and these effects will be intermittent and short duration.
    - Any in-water disposal of dredged material will comply with a current, valid Site Use Authorization approved under the Dredged Material Management Program. The action will not degrade habitat functions that are important to marbled murrelets or their prey resources, including diminishing forage fish.

Conclusion

This concludes consultation pursuant to the regulations implementing the Endangered Species Act (50 CFR 402.13). Our review and concurrence with your effect determination is based on the implementation of the project as described. It is the responsibility of the Federal action agency to ensure that projects that they authorize or carry out are in compliance with the regulatory permit and/or the Endangered Species Act, respectively. If a permittee or the Federal action agency deviates from the measures outlined in a permit or project description, the Federal action agency has the obligation to reinitiate consultation and comply with section 7(d).

This project should be re-analyzed and re-initiation may be necessary if 1) new information reveals effects of the action that may affect listed species or critical habitat in a manner, or to an extent, not considered in this consultation, 2) if the action is subsequently modified in a manner

that causes an effect to a listed species or critical habitat that was not considered in this consultation, and/or 3) a new species is listed or critical habitat is designated that may be affected by this project.

This letter and its enclosures constitute a complete response by the U.S. Fish and Wildlife Service to your request for informal consultation. A complete record of this consultation is on file at the Washington Fish and Wildlife Office, in Lacey, Washington. If you have any questions about this letter or our joint responsibilities under the Endangered Species Act, please contact the consulting biologist identified below.

U.S. Fish and Wildlife Service Consultation Biologist(s):
Lee Corum (360-753-5835)

Sincerely,

Martha L. Jensen

for Eric V. Rickerson, State Supervisor
Washington Fish and Wildlife Office

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

Refer to NMFS No.:
WCR-2016-6057

January 26, 2018

Evan R. Lewis, Chief
Environmental and Cultural Resources Branch
Corps of Engineers, Seattle District
Post Office Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for U.S Army Corps of Engineers' (COE) proposed 25-year maintenance dredging program for eight Federally-Authorized Navigation Channels in western Washington State.

Dear Mr. Lewis:

Thank you for your letter of December 16, 2016, 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 U.S Army Corps of Engineers' (COE) maintenance dredging program for eight federally-authorized navigation channels around the Puget Sound and along the west coast of Washington State. 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.

The enclosed document contains the biological opinion (Opinion) prepared by NMFS pursuant to section 7(a)(2) of the ESA on the effects of the proposed action. In this Opinion, NMFS concludes that the proposed action is likely to adversely affect but not likely to jeopardize the continued existence of Puget Sound Chinook salmon, Puget Sound steelhead, Southern eulachon, and Southern green sturgeon. NMFS also concludes that the proposed action is likely to adversely affect designated critical habitat for Puget Sound Chinook salmon, Hood Canal summer-run chum salmon, Puget Sound steelhead, Puget Sound/Georgia Basin bocaccio, and Southern green sturgeon but is not likely to result in the destruction or adverse modification of those designated critical habitats. In this Opinion, we also conclude that the proposed action is not likely to adversely affect any ESA-listed salmon from the Columbia and Willamette River evolutionarily significant units, and their designated critical habitats; Hood Canal Summer-run chum salmon; Puget Sound/Georgia Basin (PS/GB) bocaccio; PS/GB yelloweye rockfish and its designated critical habitat; seven ESA-listed marine mammal species; designated critical habitat for southern resident killer whales; four ESA-listed marine turtles; and designated critical habitat for leatherback turtles.

As required by section 7 of the ESA, NMFS has provided an incidental take statement with this 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, and sets forth nondiscretionary terms and conditions that the COE must comply with to meet those 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.

This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to Section 305(b) of the MSA. NMFS reviewed the likely effects of the proposed action on EFH, and concluded that the action would adversely affect designated EFH for Pacific Coast Salmon, Pacific Coast Groundfish, and Coastal Pelagic Species. Therefore, we have included the results of that review in Section 3 of this document.

Please contact Donald Hubner in the North Puget Sound Branch of the Oregon/Washington Coastal Office at (206) 526-4359, or by electronic mail at Donald.Hubner@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Barry A. Thom
Regional Administrator

cc: Nancy Gleason, COE

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

for the

Maintenance Dredging Program for Eight Federally-Authorized Navigation Channels
Puget Sound and along the West Coast of Washington State

NMFS Consultation Number: WCR-2017-6057

Action Agency: U.S. Army Corps of Engineers

Affected Species and 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?
Chinook salmon (*Oncorhynchus tshawytscha*)					
Lower Columbia River	Threatened	No	No	N/A	N/A
Puget Sound (PS)	Threatened	Yes	No	Yes	No
Upper Willamette River	Threatened	No	No	N/A	N/A
chum salmon (*O. keta*)					
Columbia River	Threatened	No	No	N/A	N/A
Hood Canal Summer-run (HCSR)	Threatened	No	No	Yes	No
steelhead (*O. mykiss*) PS	Threatened	Yes	No	Yes	No
bocaccio (*Sebastes paucispinis*) Puget Sound /Georgia Basin (PS/GB)	Endangered	No	No	Yes	No
yelloweye rockfish (*S. ruberrimus*) PS/GB	Threatened	No	No	No	No
eulachon (*Thaleichthys pacificus*) Southern	Threatened	Yes	No	N/A	N/A
green sturgeon (*Acipenser medirostris*) Southern	Threatened	Yes	No	Yes	No
blue whales (*Balaenoptera musculus*)	Endangered	No	No	N/A	N/A
fin whale *(B. physalus)*	Endangered	No	No	N/A	N/A
humpback whales (*Megaptera novaeanglia*)					
Central America	Endangered	No	No	N/A	N/A
Mexico	Threatened	No	No	N/A	N/A
killer whales (*Orcinus orca*) Southern resident	Endangered	No	No	No	No
sei whales (*B. borealis*)	Endangered	No	No	N/A	N/A
sperm whales (*Physeter macrocephalus*)	Endangered	No	No	N/A	N/A
green sea turtle (*Chelonia mydas*) East Pacific	Threatened	No	No	N/A	N/A
leatherback sea turtles (*Dermochelys coriacea*)	Endangered	No	No	No	No

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?
loggerhead sea turtle (*Caretta caretta*) North Pacific Ocean	Endangered	No	No	N/A	N/A
olive Ridley sea turtles (*Lepidochelys olivacea*)	Threatened	No	No	N/A	N/A

N/A = not applicable. The action area is outside designated critical habitat, or critical habitat has not been designated.

Affected Essential Fish Habitat (EFH) and NMFS' Determinations:

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

Consultation Conducted By: National Marine Fisheries Service
West Coast Region

Issued By:

Barry A. Thom
Regional Administrator

Date: January 26, 2018

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

MAY 24 2017

In Reply Refer To:
01EWFW00-2017-I-0277
X Ref: 13410-2008-I-0368-R001
13410-2008-I-0466
13410-2011-I-0125
13410-2011-I-0340
13410-2011-I-0383
01EWFW00-2014-I-0444

Evan Lewis
Chief, Environmental and Cultural Resources Branch
Attn: N. Gleason
Corps of Engineers, Seattle District
P.O. Box 3755
Seattle, Washington 98124-3755

Dear Mr. Lewis:

Subject: Maintenance Dredging Programmatic of Selected Federal Authorized Navigational Channels with Disposal of Dredged Material at Designated Disposal Sites

This letter is in response to your December 16, 2016, request for the U.S. Fish and Wildlife Service's (Service) concurrence with your determination that the Maintenance Dredging Programmatic "may affect, but is not likely to adversely affect" bull trout (*Salvelinus confluentus*), designated bull trout critical habitat, marbled murrelet (*Brachyramphus marmoratus*), streaked horned lark *(Eremophila alpestris strigata*), designated streaked horned lark critical habitat, western snowy plover *(Charadrius alexandrinus nivosus*), and designated western snowy plover critical habitat. The project involves maintenance dredging at eight locations in western Washington: Swinomish Channel, Keystone Harbor, Snohomish River, Duwamish Waterway, Port Townsend Harbor, Quillayute River, Grays Harbor Navigation Channel, and Westhaven Cove Small Boat Basin Entrance Channels and placement of sediment

at 12 beneficial disposal sites. We received your letter and Biological Assessment on December 16, 2017. On March 16, 2017, the Service received an email from the U.S. Army Corps of Engineers (Corps) adding two beneficial use sites to the Swinomish Channel dredging site. This informal consultation has been conducted in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (ESA).

The Corps proposes routine maintenance dredging in Federal Navigation Channels around Puget Sound and along the coast in Grays Harbor and the Quillayute River. The maintenance dredging program encompasses periodic removal of accumulated material from navigation channels using three methods of dredging: clamshell dredge, hydraulic pipeline dredge, or hopper dredge. Disposal of dredged material can occur at authorized multi-user open-water disposal sites, such as Dredged Material Management Program (DMMP) managed sites as well as placement in the nearshore zone for beneficial use (Table 1). Beneficial use includes placement of material to enhance beaches, replace eroded shoreline, soften armored shoreline, and provide sediment for beach renourishment and local sediment drift cells. Disposal of sediment at DMMP sites is addressed through a previous consultation (USFWS 01EWFW00-2015-I-0724). The Corps defined the duration of the project as occurring for the next 25 years (spanning from 2017 through 2042).

The project involves numerous conservation measures to minimize project impacts. Specific conservation measures to avoid, minimize, or reduce impacts to listed species include:

1) Work will occur within the approved in-water work window for each location.

2) Containment berms are constructed with on-site material to hold dredge slurry water to allow infiltration into substrate (Keystone Beach, Site A, and Point Chehalis Revetment Extension Mitigation Site).

3) Dredged material is placed in the dry at low tide (Keystone Beach, First Beach, Site B, and Point Chehalis Revetment Extension Mitigation Site).

4) Clamshell dredging operation will be conducted in a manner that minimizes spillage of excess sediments from the dredge bucket and transport barge to minimize effects to water quality.

The known occurrence of bull trout, bull trout critical habitat, marbled murrelet, streaked horned lark, streaked horned lark critical habitat, western snowy plover, and western snowy plover critical habitat, near or at the dredging and disposal sites is provided in Table 2. Some of the sites, for example the Swinomish Navigation Channel, are a couple miles long, and therefore, only a portion of the site may be in critical habitat or may have a species occurring nearby.

Table 1. The eight dredging sites, their disposal sites, and dredging method.

Dredging Site	Disposal Site(s)		Dredging Method
	In-Water Disposal	Upland Disposal	
Swinomish Channel	DMMP Site		Clamshell
	Flowlane North: -60 to -120 feet MLLW*		Clamshell or Hydraulic
	Flowlane South: -60 to -120 feet MLLW		Clamshell or Hydraulic
Keystone Harbor		Keystone Beach: supratidal and upper intertidal zone	Clamshell or Hydraulic
Snohomish River	DMMP Site		Clamshell
		Jetty Island: +15 feet to +1 feet MLLW	Hydraulic
		Parcel "O": trucked to other regional sites	Hydraulic
		Riverside: trucked to other regional sites	Hydraulic
Duwamish Waterway	DMMP Site		Clamshell
Port Townsend Harbor	DMMP Site		Clamshell
Quillayute River		Site A: trucked to other regional sites or First Beach	Hydraulic
	First Beach	First Beach: Intertidal above MLLW line	Hydraulic
	Site B	Site B: placed on crest of Quillayute Spit	Hydraulic
Grays Harbor Navigation Channel	DMMP Site		Clamshell or hopper
	Half Moon Bay: placed as close to shore as possible with a barge		Clamshell or hopper
	South Beach: placed as close to shore as possible with a barge		Clamshell or hopper
		Point Chehalis Revetment Extension Mitigation Site: Intertidal above +9 MLLW	Hopper Dredge
Westhaven Cove Small Boat Basin Entrance Channels	DMMP Site		Clamshell or hydraulic

* MLLW – mean lower low water

Table 2. The known occurrence of bull trout, bull trout critical habitat, marbled murrelet, streaked horned lark, streaked horned lark critical habitat, western snowy plover, and western snowy plover critical habitat near of at the dredging and beneficial disposal sites.

	Bull Trout	Bull Trout Critical Habitat*	Marbled Murrelet	Streaked Horned Lark	Streaked Horned Lark Critical Habitat	Western Snowy Plover	Western Snowy Plover Critical Habitat
Dredging Sites and Their Beneficial Use Disposal Sites							
Swinomish Navigation Channel	x	M	x				
• Flowlane North	x		x				
• Flowlane South	x		x				
Keystone Harbor	x		x				
• Keystone Beach			x				
Snohomish River Navigation Channel	x	M, F	x				
• Jetty Island	x	M	x				
• Riverside	x	F					
• Site "O"	x	F					
Upper Duwamish Waterway	x	F					
Port Townsend Navigation Channel	x		x				
Quillayute River	x		x				
• Site A	x		x				
• Site B	x		x				
• First Beach	x		x				
Grays Harbor Navigation Channel	x	M, F	x	x	x	x	x
• South Beach	x		x	x	x	x	x
• Half Moon Bay	x	M	x	x	x	x	x
• Point Chehalis Revetment Extension Mitigation Site	x	M	x	x	x	x	x
Westhaven Cove Entrance Channels	x	M	x	x	x	x	x

* M – marine waters. F – freshwater, lower mainstem river. Designates whether marine or freshwater Primary Constituent Elements are present at the dredging or beneficial disposal sites.

Bull Trout

The action area contains foraging, migration, and overwintering habitat for anadromous bull trout. We expect that bull trout could occur throughout the action area.

Dredging and disposal operations will result in degraded water quality and impact to benthic invertebrates. Temporary impacts to water quality, including episodic increases in turbidity, suspended sediments, and reduced dissolved oxygen concentrations, will be intermittent and will not be measurable beyond 600 feet down current of the dredging and disposal locations. The loss of benthic invertebrates would be at depths greater than that where normal bull trout foraging occurs. New sediment, placed in the supratidal and intertidal areas, will provide increased habitat for benthic invertebrates and will be rapidly colonized from the surrounding area. These effects will be intermittent and limited in physical extent and duration and will not result in injury or significant disruption to normal bull trout behavior.

In marine waters, bull trout prey species (e.g. forage fish and juvenile salmonids) concentrate in nearshore waters where organisms from lower trophic levels are abundant. Dredging and disposal activities may occur adjacent to documented forage fish spawning location. These activities may result in temporary elevated turbidity and suspended sediment levels but will not result in the long-term destruction or permanent removal of documented forage fish spawning habitat.

Because the action will maintain the authorized channel depths and contours along the ten Federal Navigational Channels which are frequently and repeatedly dredged, we do not expect the action to measurably degrade habitat function. With successful implementation of the conservation measures, we do not expect bull trout to be measurably affected by the temporary effects of the action. Further, the long term effects of the action are not expected to measurably disrupt normal bull trout behaviors (feeding, moving, and sheltering). Therefore, the effects to bull trout are considered insignificant.

Designated Bull Trout Critical Habitat

The new critical habitat regulations (81 FR 7214) replaces the term Primary Constituent Element (PCE) with physical or biological features (PBFs). This shift in terminology does not change the approach used in conducting our analysis, whether the original designation identified PCEs, PBFs, or essential features. In this letter, the term PCE is synonymous with PBF or essential features of critical habitat.

The proposed dredging and disposal at beneficial sites occurs at eight locations within Puget Sound and along the western coast of Washington at Grays Harbor and Quillayute River. Dredging occurs both within marine and tidally influenced portions of lower mainstem rivers. Table 1 identifies the dredging and beneficial disposal sites located within or near bull trout designated critical habitat.

The dredging and beneficial disposal sites within or near bull trout critical habitat provide marine and/or freshwater foraging, migrating, and overwintering habitat for subadult and adult bull trout. Of the nice PCEs, five are located within the marine waters (PCEs: #2, #3, #4, #5, and #8). In the tidally influenced rivers, all PCEs except PCE #6, spawning and rearing habitat, are present. We have examined the anticipated effects of the proposed action on the applicable PCEs below.

PCE #1 - Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.

The proposed action will have no effect on this PCE.

PCE #2: Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.

Dredging and disposal activities may affect the migratory corridor and/or habitats as a result of suspended sediment releases. Dredging will result in impacts to water quality, including episodic increases in turbidity, suspended sediments, and reduced dissolved oxygen

concentrations. Placement of sediment at beneficial disposal sites will result in increased turbidity and suspended sediments when incoming tides inundate disturbed areas. However, water quality impacts will not preclude bull trout movement through the area and any effects will be temporary. The migration habitat will not be permanently altered, destroyed, or degraded. We anticipate that any impacts are unlikely to result in a measurable effect to the function of this critical habitat as a migratory corridor. No other physical, biological, and/or water quality barriers to the migratory corridor are anticipated as a direct or indirect result of the proposed action. Therefore, effects to this PCE are considered to be insignificant.

PCE #3: An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

Dredging and disposal activities may impact the food base of bull trout through a reduction of prey individuals. Dredging will result in the loss of benthic invertebrates, however, this occurs at a depth greater than that where normal bull trout foraging occurs. Sediment disposal will result in decreased prey abundance (benthic invertebrates) due to placement of sediment within the intertidal zone as well as ground disturbance resulting from pipeline placement or method of placing sediment within the containment berms. These effects will be temporary as the new sediment will provide increased habitat for benthic invertebrates and will be rapidly colonized from the surrounding area. Therefore, effects to this PCE are expected to be insignificant.

PCE #4: Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.

The proposed action would not include any activities that would increase or decrease habitat complexity in the action area. Dredging all occurs in deep water and will not alter the shoreline aquatic environment and habitat complexity. Placement of sediment in the intertidal zone will benefit the nearshore habitat forming processes that establishes and maintains shoreline aquatic environment. No shoreline habitat features will be permanently removed, and there will be no long-term effects to processes that establish and maintain these environments. Therefore, effects to this PCE are expected to be insignificant.

PCE #5: Water temperatures ranging from 2 to 15°C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range.

The proposed action does not include any activities that would directly or indirectly alter water temperature. Therefore, the proposed action is expected to have no effect to this PCE.

PCE #7: A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.

The proposed action does not include any activities that would directly or indirectly alter the natural hydrograph. Therefore, no effects are anticipated to this PCE.

PCE #8: Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

Dredging and disposal activities will result in temporary short-term impact to water quality. As described in PCE #2, dredging will result in impacts to water quality, including episodic increases in turbidity, suspended sediments, and reduced dissolved oxygen concentrations. Placement of sediment at beneficial disposal sites will result in increased turbidity and suspended sediments when incoming tides inundate disturbed areas. However, these effects will be temporary and of short duration and therefore, the effects to this PCE will be insignificant.

PCE #9 - Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

The project is not anticipated to result in the introduction of nonnative predatory, inbreeding, or competitive species into the action area. Therefore, the proposed action will have no effect to this PCE.

Marbled Murrelets

Marbled murrelets are known to use all the marine waters within Puget Sound and also along the coast of Washington. We expect that marbled murrelets could be present in the action area.

For reasons summarized above (*see* Bull Trout), we expect that dredging and beneficial use of dredged materials will have limited impacts to water quality, substrates, and benthic invertebrates, and will have no measurable short- or long-term effect on forage fish abundance and availability. Dredging and disposal activities will result in measurable temporary increases in in-air sound levels. However, these effects will be intermittent and limited in physical extent and duration. Because the proposed action will largely maintain existing conditions, we conclude that the action will not measurably degrade marine habitat functions that are important to marbled murrelets or their prey.

With full and successful implementation of the conservation measures, effects of the proposed action are not expected to result in measurable effects to marbled murrelets and are therefore considered insignificant.

Western Snowy Plover, Western Snowy Plover Critical Habitat, Streaked Horned Lark, and Streaked Horned Lark Critical Habitat

Damon Point and the Oyhut State Wildlife Recreation Area, located along the Washington Coast in Grays Harbor County, contain suitable nesting and foraging habitats for the western snowy plover and streaked horned lark. Western snowy plover nesting has not been documented in these areas since 2006, but they are considered essential for the long-term survival and recovery of the species. A nesting population of streaked horned larks is present on Damon Point and at the Oyhut State Wildlife Recreation Area.

The Service has designated Damon Point and the Oyhut State Wildlife Recreation Area as critical habitat for both the western snowy plover (77 FR 36805; June 19, 2012; Unit WA 2 - Damon Point) and streaked horned lark (78 FR 61561; October 3, 2013; Unit 3A Damon Point/Oyhut). Western snowy plovers occupy sandy beaches, inland dune systems, salt flats, mud flats, seasonally exposed gravel bars, and dredge spoil sites. The PCEs of designated critical habitat include: (PCE #1) areas that are below heavily vegetated areas or developed areas and above the daily high tides; (PCE #2) shoreline habitat areas for feeding, with no or very sparse vegetation, that are between the annual low tide or low-water flow and annual high tide or high-water flow, subject to inundation but not constantly under water, that support essential food sources; (PCE #3) surf- or water-deposited organic debris, such as seaweed (including kelp and eelgrass) or driftwood located on open substrates, that supports and attracts food, provides cover or shelter from predators and weather, and assists in avoidance of detection for nests, chicks, and incubating adults; and (PCE #4) minimal disturbance from the presence of humans, pets, vehicles, or human-attracted predators, which provide relatively undisturbed areas for individual and population growth and for normal behavior.

Damon Point's open landscape context and sparse, low-growing vegetation provide the physical and biological features that are essential to support nesting and wintering streaked horned larks. The PCEs of designated critical habitat include: (PCE #1) areas having a minimum of 16 percent bare ground with sparse, low-stature vegetation composed primarily of grasses and forbs less than 13 inches (33 cm) in height; and (PCE #2) large (300 acre), flat (0 to 5 percent slope) areas, or smaller areas, within a landscape context that provides visual access to open water or fields.

Dredging activities within the Grays Harbor Navigation Channel and Westhaven Cove Small Boat Basin Entrance Channels and sediment disposal at the three beneficial use sites in Grays Harbor are all over 0.5 mile from Damon Point and one mile from the Oyhut State Wildlife Recreation Area where suitable western snowy plover and streaked horned lark nesting habitat is located. Based on the distance from suitable nesting habitat we do not expect measureable effects to nesting western snowy plovers, streaked horned larks, or their young. For reasons summarized above *(see* Bull Trout and Marbled Murrelets), we expect that the proposed action will have limited impacts. Because the proposed action's direct and indirect effects will not measurably degrade shoreline habitats or habitat functions that are important to the western snowy plover or the streaked horned lark, these effects are considered insignificant.

Dredging and disposal activities will result in localized impacts and will have no measurable effects on the PCEs for both western snowy plover and streaked horned lark designated critical habitat. Dredging and disposal activities will not degrade shoreline habitats or habitat functions that are important to western snowy plovers, streaked horn larks, or their prey. Damon Point and Oyhut State Wildlife Recreation Area are likely to continue changing, but we expect that they will persist and continue to function as suitable western snowy plover and streaked horned lark nesting and foraging habitat into the future. Therefore, the action's effects to the PCEs and designated western snowy plover and streaked horned lark critical habitat are considered insignificant. The proposed action will not prevent the PCEs of critical habitat from being maintained, and will not degrade the current ability to establish functioning PCEs at the scale of the action area.

This concludes informal consultation pursuant to the regulations implementing the ESA (50 CFR 402.13). This project should be re-analyzed and re-initiation may be necessary if 1) new information reveals effects of the action that may affect listed species or critical habitat in a manner, or to an extent, not considered in this consultation, 2) if the action is subsequently modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this consultation, and/or 3) a new species is listed or critical habitat is designated that may be affected by this project.

If you have any questions about this letter or our joint responsibilities under the ESA, please contact Jim Muck at (360) 753-9586 or jim_muck@fws.gov.

Sincerely,

for Eric V. Rickerson, State Supervisor
Washington Fish and Wildlife Office

Literature Cited

USFWS (U.S. Fish and Wildlife Service). 2015. Letter of Concurrence: Continued Use of Multiuser Dredged Material Disposal Site in Puget Sound and Grays Harbor. Reference No.: 01EWFW00-2015-I-0724. Washington Fish and Wildlife Office, Lacey WA.

Appendix F
Section 106 Compliance

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

March 29, 2018

Mr. Evan R. Lewis
Environmental Resources Section
Corps of Engineers – Seattle District
PO Box 3755
Seattle, Washington 98124-3755

Re: Snohomish River Federal Navigation Channel Maintenance Project
Log No.: 2018-03-01574-COE-S

Dear Mr. Lewis:

Thank you for contacting our department. We have reviewed the materials you provided for the Area of Potential Effect (APE) for the proposed Snohomish River Federal Navigation Channel Maintenance Project Dredging & Disposal FY 2018-2033 in the Snohomish River and Everett Harbor, Snohomish County, Washington

We concur with your determination of the Area of Potential Effect (APE) as described and presented in your figures and text.

We look forward to further consultations as consult you with the concerned tribal governments, provide the results of the professional cultural resources review, and your determination of effect.

We would also appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer in compliance with the Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations 36CFR800.4. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 890-2615
email: *rob.whitlam@dahp.wa.gov*

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

April 23, 2018

Mr. Evan Lewis
Environmental & Cultural Resources
Seattle District
Corps of Engineers
PO Box 3755
Seattle, Washington 98124

Re: Snohomish River Federal Navigation Channel Maintenance Project
Log No.: 2018-03-01574-COE-S

Dear Mr. Lewis:

Thank you for contacting our department. We have reviewed the materials you provided for the proposed Snohomish River Federal Navigation Channel Maintenance Dredging & Disposal FY 18-33Project, Snohomish County, Washington

We concur with your Determination of No Historic Properties Affected.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and the concerned tribe's cultural staff and cultural committee and this department notified.

These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer in compliance with the Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations 36CFR800.4. Should additional information become available, our assessment may be revised, including information regarding historic properties that have not yet been identified. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 890-2615
email: *rob.whitlam@dahp.wa.gov*

Appendix G
Public Notice

No public comments were received.

US Army Corps of Engineers
Seattle District

Public Notice

Navigation Section
PO Box 3755
Seattle, WA 98124-3755
ATTN: John Pell (OD-TS-NS)
or Kaitlin Whitlock (PMP-E)

Notice Date: June 15, 2018
Expiration Date: July 15, 2018
Reference: CENWS-PMP-18-18

US ARMY CORPS OF ENGINEERS, SEATTLE DISTRICT FY 2019 THROUGH FY 2034
EVERETT HARBOR AND SNOHOMISH RIVER FEDERAL NAVIGATION
MAINTENANCE DREDGING AND DISPOSAL, WASHINGTON

Interested parties are hereby notified that the U.S. Army Corps of Engineers, Seattle District (Corps) plans to continue routine dredging and disposal activities associated with maintenance of the Everett Harbor and Snohomish River Federal navigation channel. The maintenance program for FY 2019 through FY 2034 is described below, and the location of the proposed dredging and disposal sites are shown on the attached plans (Attachment A). The dredging would be performed within the designated period as necessitated by shoaling conditions within the navigation channel, and as permitted by the availability of Federal resources. The purpose of this Public Notice is to solicit comments from interested persons, groups and agencies on the Corps' proposal for disposal of dredged material into the waters of the U.S.

This Public Notice is being issued in accordance with rules and regulations published as 33 CFR 335 "Operation and Maintenance of Army Corps of Engineers Civil Works Projects Involving the Discharge of Dredged or Fill Material into Waters of the U.S. or Ocean Waters"; 33 CFR 336 "Factors to be Considered in Evaluation of Army Corps of Engineers Dredging Projects Involving the Discharge of Dredged Material into Waters of the U.S. and Ocean Waters"; 33 CFR 337 "Practice and Procedure"; and 33 CFR 338 "Other Corps Activities Involving the Discharge of Dredged Material or Fill into Waters of the U.S."

PURPOSE AND PROJECT OBJECTIVE

The purpose of the dredging project is to maintain congressionally-authorized project depths which provide safe navigation for ships while they traverse the lower Snohomish River from Puget Sound to the Port of Everett and local facilities near the City of Everett. This dredging maintains the ability of ocean-going vessels to enter and leave the Port of Everett and other nearby facilities safely. Operations at the Port of Everett are critical to the local economy and furthers waterborne commerce. Naval Station Everett is currently home base for five Naval Destroyers a USCG Search and Rescue Cutter, and a USCG coastal patrol boat.

AUTHORITY

The Everett Harbor and Snohomish River Project, of which the Snohomish River navigation channel is a component, was authorized by the Rivers and Harbors Act of June 25, 1910 (House document 1108, 60th Congress, 2nd session). Subsequent Acts of 1930, 1938, 1954, 1960, and 1968 provided modifications and additional improvements (USACE 1975).

FEDERAL MAINTENANCE DREDGING

The proposed work continues annual maintenance dredging by mechanical (clamshell) and hydraulic dredges of up to an estimated 500,000 CY from each settling basin and 200,000 CY from the navigation channel annually from the Everett Harbor and Snohomish River navigation project for a maximum annual volume is estimated at 1,200,000 CY over the fifteen year time period of FY 2019 – FY 2034. The tentatively preferred alternative calls for dredging to be conducted during the designated work window of 16 October through 14 February. All dredging would occur within the federally authorized footprint for the navigation channel, downstream settling basin, and upstream settling basin near the City of Everett, WA. Placement of the resulting material will be in the open-water Puget Sound Dredged Disposal Analysis (PSDDA) Port Gardner disposal site, a nearshore nourishment site on Jetty Island, and one upland site at Parcel O. The proposed dredged material has been tested and determined suitable for open water disposal, as found in the most recent suitability determination dated February 2018 by the regulatory agencies which have jurisdiction over dredged material disposal in open-water sites associated with Everett Harbor. Sediment testing includes both chemical and biological testing. All sediment testing data are available at the Corps Dredge Material Management Office (http://www.nws.usace.army.mil/Missions/CivilWorks/Dredging/SuitabilityDeterminations.aspx).

A water quality monitoring plan would be developed that is consistent with the conditions and adheres to applicable criteria issued in a water quality certification from the Washington Department of Ecology associated with the disposal of dredged material into the waters of the U.S.

MAINTENANCE MATERIAL BENEFICIAL USE/DISPOSAL

The proposed work includes disposal or placement of dredged material among three sites: one Dredge Material Management Program (DMMP) open-water disposal site (Port Gardner), one nearshore aquatic placement site (Jetty Island), and one upland placement site (Parcel O).

Typically, the downstream settling basin is dredged using a mechanical dredge (clamshell). The dredged sediment is loaded onto a bottom-dump barge for disposal at the PSDDA open-water, non-dispersal, disposal site in Port Gardner, WA. Each barge transports approximately 1,500 CY of material each trip. Once arriving at the disposal site, the bottom-dump barge drops the material into its intended location. Dredged material disposal at the non-dispersive sites is designed to maintain dispersion within a 600-foot radius target zone at each site. The barges doing the disposal are towed at the minimum speed necessary to maintain control. In most instances, material is released from the bottom of the barge which is about 10 feet down in the water column. All disposal tugs are required to record and report when and where sediment is released within the target zone. The disposal sites were originally sized so that a barge being towed at an average speed of three knots can unload completely in a few minutes.

Hydraulically dredged sediments from the upstream settling basin and adjacent channel would be directly discharged and disposed of at Parcel O. Parcel O is an upland 9-acre area in the former Kimberly Clark log yard, located on the left bank of the Snohomish River at about river mile 4. The disposal site is devoid of vegetation except for upland grasses, slopes gradually downward to the north. A slurry of hydraulically dredged sediments and water from the upstream settling basin and adjacent channel would be directly discharged and disposed of at this site. The hydraulic pipeline extends from the dredge positioned in the upper settling basin, runs along the left bank river channel, over the berm, and into the site. The slurry slowly flows downgradient toward outlet weirs and as the sediment settles out, the water continues flowing through a system of weirs and returns to the river. Turbidity levels of discharged decant water are monitored and managed in accordance with the applicable conditions of the Clean Water Act (CWA) Section 401 water quality certification issued by the Washington Department of Ecology (Ecology). The material is subsequently collected and moved via truck by the City or Port for use at other regional sites in need of fill material.

Hydraulically dredged material is typically placed at Jetty Island, which began as a wood pile jetty that was installed in 1901 to protect the Port of Everett from the open-waters of Port Gardner. Since about 1903, the Corps has disposed dredged material from the navigation channel along the west side of the wood and rock jetty. All but the southern end of the jetty is now buried, and the size of the island is now maintained by a balance between periodic disposal of dredged sediments and natural erosion. Disposal at the site is done via a hydraulic pipeline that is placed across the island, along a route that limits impacts on vegetation, and avoids a high salt marsh located at the north end of the island. Sediments are discharged at the top of the existing beach and materials are allowed to naturally disperse in the nearshore zone.

ENVIRONMENTAL COMPLIANCE

The proposed maintenance activities will be reviewed in accordance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.); the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.); Section 404 of the Clean Water Act (33 U.S.C. 1344); Coastal Zone Management Act of 1972 as amended (16 U.S.C. 1451 et seq.), and the National Historic Preservation Act of 1966 as amended (54 U.S.C. 300101 et seq.).

A Draft Environmental Assessment (EA) and 404(b)(1) evaluation have been prepared for this action and are available online as “Everett Harbor and Snohomish River Maintenance Dredging and Disposal FY 2019- FY 2034”:

http://www.nws.usace.army.mil/Missions/Environmental/Environmental-Documents/

The Draft EA’s public comment period is concurrent with the comment period for this Public Notice. The Draft EA will be available at the Everett Public Library. Once complete, the EA will be posted and available on the Seattle District web site listed above.

The USACE determined that the proposed maintenance dredging and dredged material placement at nearshore and upland sites may affect, but is not likely to adversely affect any ESA-listed species or designated critical habitat and prepared documentation of this determination (USACE 2016). The USFWS agreed with this determination and the USACE received a letter of concurrence May 24, 2017. NMFS agreed that the proposed action is not likely to adversely affect most ESA-listed species or designated critical habitat; however, NMFS concluded that

Puget Sound Chinook salmon and their critical habitat and Puget Sound steelhead and their critical habitat are likely to be adversely affected in Everett Harbor and the Snohomish River, and the USACE received a biological opinion January 26, 2018 (NMFS 2018). The USACE determined the proposed dredged material placement at the Port Gardner open-water disposal site is not likely to adversely affect any ESA-listed species or designated habitat and prepared documentation of this determination (USACE 2015). The USFWS provided a letter of concurrence July 28, 2015 (USFWS 2015) and NMFS provided a biological opinion for adverse effects to yelloweye rockfish and bocaccio in the Puget Sound/Georgia Basin December 17, 2015 (NMFS 2015). NMFS required the Corps to implement Reasonable and Prudent Measures (RPMs) in the biological opinion by following terms and conditions to minimize the level of "take" associated with the proposed action for these species. The Corps has incorporated the RPMs into the Mitigation for Adverse Environmental Effects section of the draft EA for disposal of dredged material. The USACE will comply with the reasonable and prudent measures of the biological opinions to avoid and minimize adverse impacts to ESA-listed species during maintenance dredging and dredged material placement. These include to minimize incidental take from dredging and in-water sediment disposal, minimize the exposure of listed fish to contaminants and reduced DO, and to implement monitoring and reporting to confirm that the take exemption for the proposed action is not exceeded.

The Corps is seeking a Clean Water Act Section 401 water quality certification (WQC) from the Washington Department of Ecology. In conducting activities involving the discharge of dredged material into waters of the United States, the Corps will comply with applicable provisions issued in the WQC associated with the discharge of dredged material into the waters of the United States, to minimize turbidity and other water quality impacts. The Corps has determined that the proposed work is consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Management Program. State concurrence with this determination has been requested as of April 10, 2018. The USACE initiated consultation with the Washington State Historic Preservation Office (SHPO) and affected Tribes for this project by letter on March 27, 2018. Based on the results of literature and records review, the absence of known or recorded cultural resources within the area of potential effect (APE), and consultation with the SHPO and the Tribe, the USACE anticipates submitting a finding of no historic properties. On March 29, 2018, the SHPO responded by letter concurring with the USACE APE. No response has been received from the Tribes. On April 20, 2018 the USACE sent a letter to the Washington SHPO documenting the USACE's determination of No Historic Properties Affected. The Washington SHPO responded by letter dated April 23, 2018 concurring with the USACE's determination.

PUBLIC INTEREST EVALUATION

The decision to proceed with this disposal of dredged material will be preceded by a determination of whether the proposed activity would be in the public interest. All factors which may be relevant to the proposal's public interest will be considered; among those are navigation and the Federal standard for dredged material disposal; water quality; coastal zone consistency; wetlands; endangered species; historic resources; scenic and recreation values; fish and wildlife; marine sanctuaries; applicable state/regional/local land use classifications, determinations, and/or policies; conservation; economics; shoreline erosion and accretion; safety; and considerations of property ownership.

As a foundation for its public interest determination the Corps will consider, on an equal basis, all alternatives that are both reasonable and practicable, i.e., available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. The Corps will select the alternative that represents the least costly alternative, constituting the discharge of dredged or fill material into waters of the United States in the least costly manner and at the least costly and most practicable location, that is consistent with sound engineering practices, and that meets the environmental standards established by the Clean Water Act Section 404(b)(1) evaluation process.

COMMENT AND REVIEW PERIOD

The Corps is soliciting comments from the public; Native American Nations or tribal governments; Federal, State, and local agencies and officials; and other interested parties in order to consider and evaluate the effects of this activity. To make this decision, comments are used to assess impacts on ESA listed species, historic properties, water quality, general environmental effects, and other public interest factors listed above. The proposed discharge will be evaluated for compliance with guidelines promulgated by the Environmental Protection Agency under authority of Section 404(b)(1) of the Clean Water Act. Conventional mail or e-mail comments on this Public Notice will be accepted and made part of the record and will be considered in determining wither it would be in the public interest to authorize this proposal. Submitted comments should include on the subject line the public notice number. The comment must include the commentator's name, address, and phone number. All comments whether conventional mail or e-mail must reach this office no later than the expiration date of this public notice to ensure consideration.

The District Engineer invites responses to this Public Notice from Federal, State and local agencies, historical and archeological societies, Indian Tribes and other parties likely to have knowledge of or concerns with historic properties in the area.

PUBLIC HEARING

Any person may request, in writing, within the comment period specified in this notice that a public hearing be held to consider this application. Requests for public hearings shall state, with particularity, the reasons for holding a public hearing.

COMMENTS TO THE CORPS OF ENGINEERS

Replies to this Public Notice should be mailed to reach the District Engineer, ATTN: PMP-18-18, PO Box 3755, Seattle, Washington 98124-3755, not later than July 15, 2018 to assure consideration. Requests for additional information should be directed to Mr. John Pell, Project Manager, (206) 764-3413 or via email at John.L.Pell@usace.army.mil, or Ms. Kaitlin Whitlock, Environmental Coordinator, (206) 764-3576 or via email at Kaitlin.E.Whitlock@usace.army.mil.

John Pell
Project Manager
Navigation Section

Kaitlin Whitlock
Environmental Coordinator
Planning, Environmental, and
Cultural Resources Branch

Attachment A

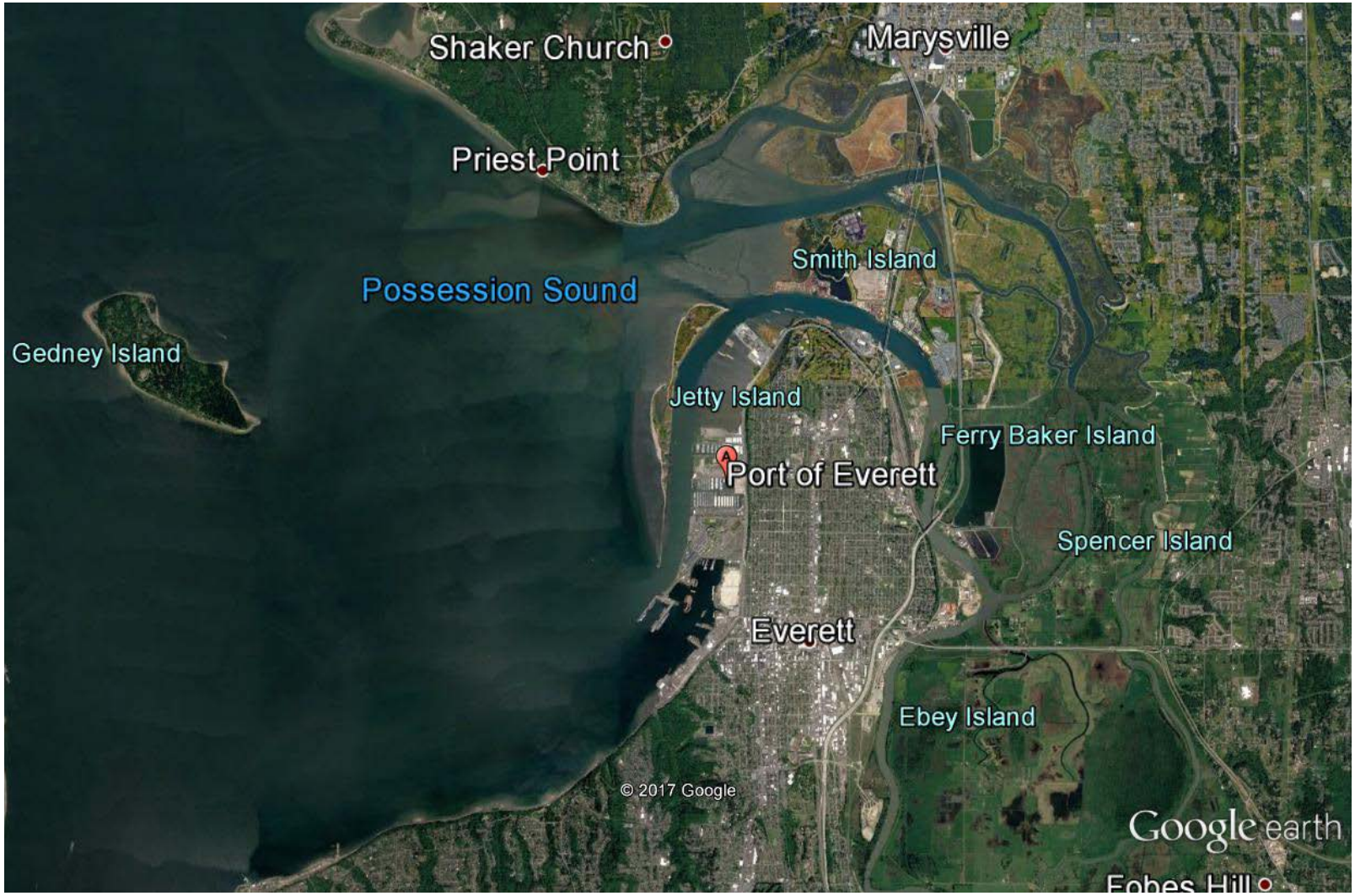


Figure 1. Vicinity map of the Port of Everett and other landmarks such as the City of Everett, Posession Sound, and Priest Point around the Snohomish River navigation channel.

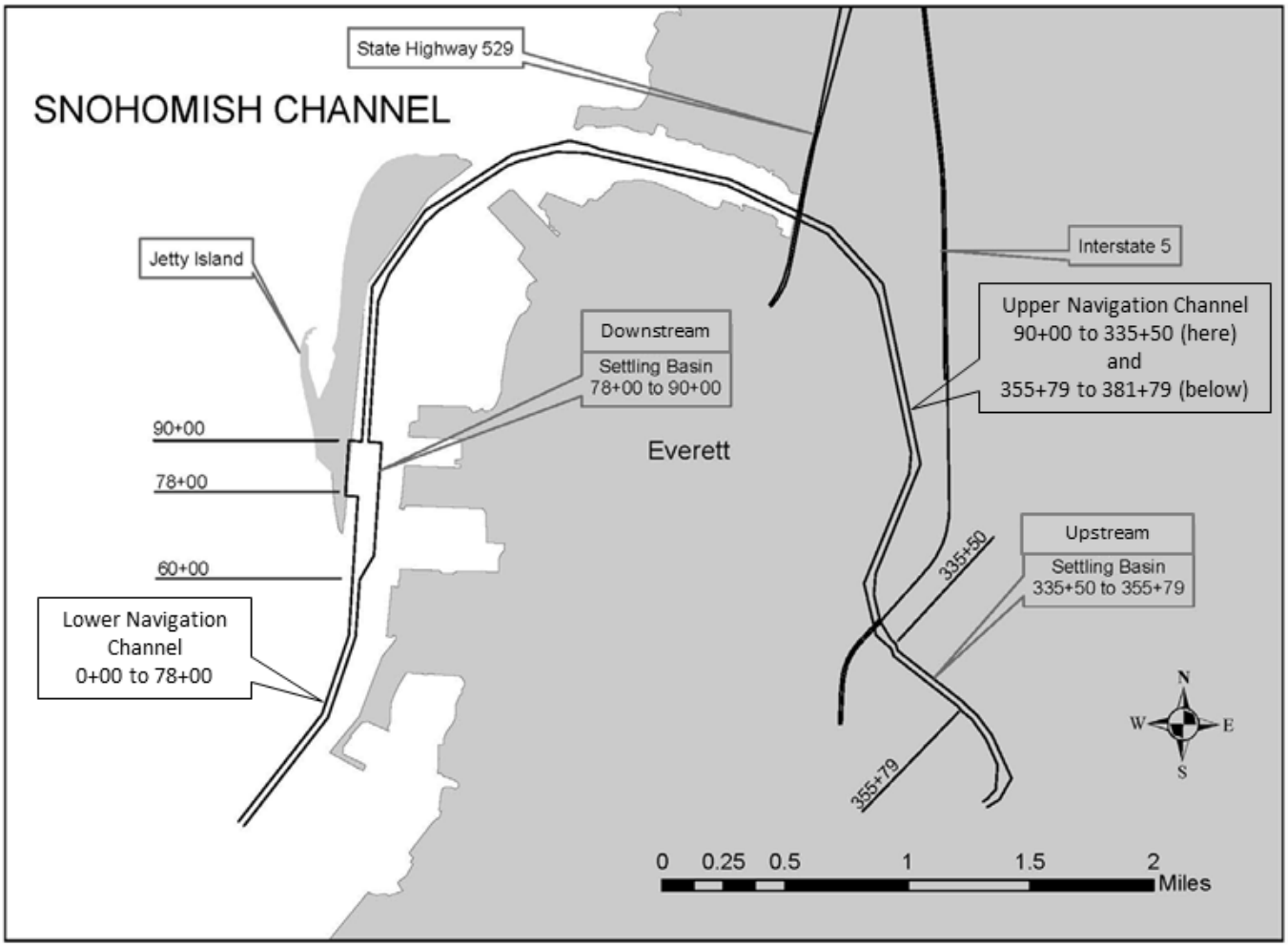


Figure 2. Snohomish River Navigation Channel with stationing.

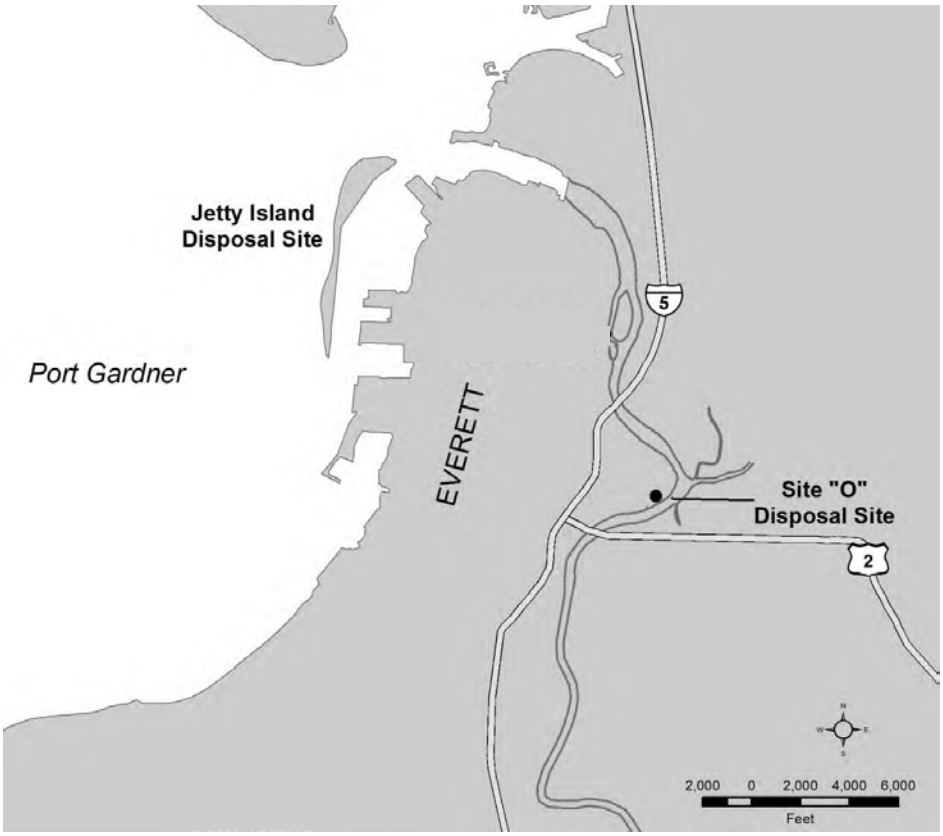


Figure 3. Everett Harbor and Snohomish River beneficial use disposal site locations at Parcel O (also called Site O) and Jetty Island disposal sites. The Jetty Island disposal site is generally the southern half of the island.

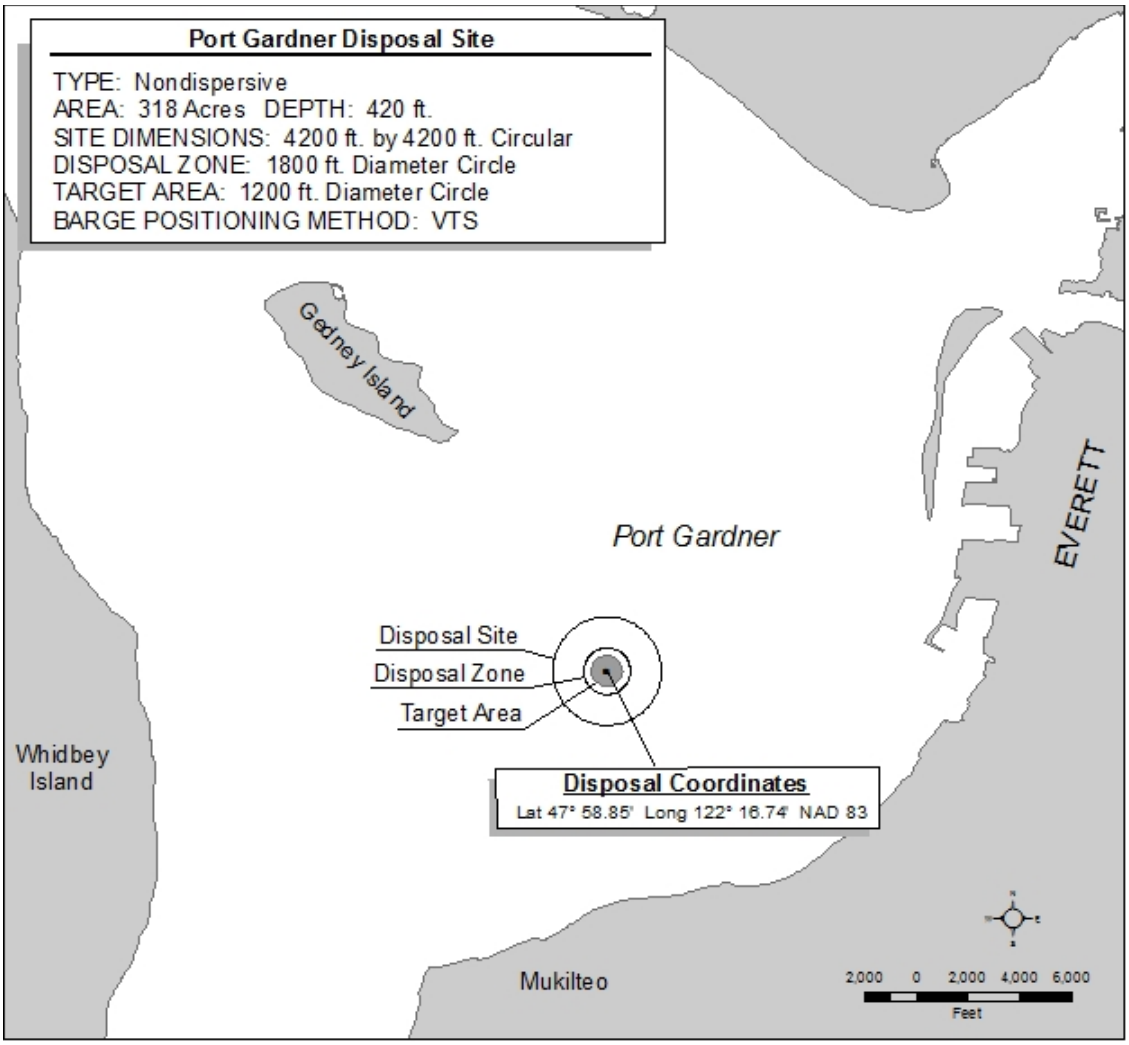


Figure 4. Port Gardner PSDDA (Puget Sound Dredged Disposal Analysis) Program Disposal Site.

Appendix H
Suitability Determination (DMMP 2018)

CENWS-ODS-ND

MEMORANDUM FOR RECORD February 8, 2018

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF DREDGED MATERIAL FROM THE SNOHOMISH RIVER, SNOHOMISH COUNTY, EVERETT, WA, EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT, FOR UNCONFINED OPEN-WATER DISPOSAL AT THE PORT GARDNER NONDISPERSIVE SITE.

1. Introduction. This memorandum reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers (USACE), Washington Departments of Ecology and Natural Resources, and the Environmental Protection Agency) regarding the suitability of 778,221 cubic yards (cy) of dredged material from the Snohomish River federal navigation channel and settling basins for disposal at the Port Gardner nondispersive open-water disposal site.

2. Background. The Everett Harbor and Snohomish River Project ("project") consists of deep and shallow-draft navigation channels and two settling basins to serve navigation in Everett Harbor and the Snohomish River. The authorized design depth varies from -8 feet (ft) Mean Lower Low Water (MLLW) in the shallow draft channel up to -40 ft MLLW in the upstream settling basin. Table 2 summarizes the project feature dimensions. The USACE Seattle District is responsible for dredging portions of the authorized project as needed to maintain navigation.

   Sedimentation in the navigation channel is due to input from the Snohomish River watershed. Sediment in the waterway has been characterized previously by the USACE under the Puget Sound Dredged Disposal Analysis (PSDDA) program or DMMP six times, including four full characterizations and a dedicated characterization for dioxins. Table 3 provides a summary of the previous characterization and survey results. A complete description can be found in Attachment A – Description of Previous Sediment Characterizations.

   A bathymetric survey of the waterway conducted by the USACE in June 2016 showed that significant sedimentation had occurred. The USACE contracted with Herrera Environmental and subcontractor NewFields to characterize the waterway to authorized depths plus 2 ft of overdepth for all areas except the upper settling basin. Characterization of the upper settling basin, which is rarely, if ever, dredged to its full authorized depth of -40 ft MLLW, was restricted to -22 ft MLLW (-20 ft plus 2 ft of overdepth).

3. Project Summary. Table 1 below includes project summary and tracking information.

Table 1. Project Summary and Tracking Information

Project ranking	Low-moderate[1]
Characterized volume (CY)	778,221
Characterized depth (plus 2 ft overdepth)	Varies; see Table 2
Draft SAP received	August 11, 2017
Draft SAP returned for revisions	August 25, 2017
2nd draft SAP received	August 28, 2017
Final SAP received	September 6, 2017
Sampling dates	September 13, 2017
Draft data report received	December 15, 2017
Comments provided on draft report	January 26, 2018
Final data report received	February 6, 2018
DMMO tracking number	EVEOM-1A-F-386
EIM Study ID	EVEOM17
Recency Determination (6 years for low-moderate)	September 2023

Notes: 1 – Although the Snohomish is technically ranked low-moderate, the DMMP agencies agreed to a special one-time "confirmatory" ranking status for this project to define the number of DMMUs and sampling density for this sediment characterization.

4. Project Ranking and Sampling Requirements. Sediments in the Snohomish River navigation channel are ranked low-moderate following the 1992 partial characterization and down-ranking. For the 2011 characterization, the DMMP agreed to a temporary ranking of "Very Low, Low and Confirmatory" based on data collected since the 1992 characterization. Results from the 2011 characterization enabled the DMMP to assign a special one-time "confirmatory" ranking for the entire navigation channel for the purposes of the 2017 sediment characterization. The confirmatory sampling volume requirements were thus uniquely defined for the 2017 sediment characterization as follows:

Maximum volume per DMMU = 100,000 CY
Maximum volume per grab sample = 20,000 CY

Based on past sampling findings, material in the navigation channel is considered homogeneous in nature. Thus, no distinction between surface and subsurface material was required, and grab samples were approved by the DMMP agencies as a representative sampling technique.

Using bathymetric survey data from March-April 2017and the characterization depths specified in Table 2, ten (10) Dredged Material Management Units (DMMUs) were defined to characterize 778,221 CY of proposed dredged material (Table 4).

In addition, a tiered approach to sampling was approved for the composite representing the most upstream DMMU (DMMU 10). Full chemical analysis would not be required if the grain size was <20% fines and total organic carbon (TOC) was <0.5%.

5. Sampling and Analysis. Sampling occurred on September 13, 2017 in accordance with the approved Sampling and Analysis Plan at the locations shown in Figures 2 through 4. All samples were collected using a stainless steel 0.2 m^2 power grab sampler attached to a winch and cable and deployed from the sampling vessel. A total of 41 sediment surface grab locations were collected and composited into 10 DMMUs (Tables 4 and 5).

   Wet sieving for grain size was conducted in the field for DMMU 10 (sample D10-C from the shallow draft channel upstream of the upper settling basin) to determine if additional chemistry analyses would be necessary. The field wet sieve results for composite DMMU 10 indicated 13 percent fines. This was under the threshold for 20 percent fines, and additional chemistry was not conducted on this sample beyond grain size and Total Organic Carbon (TOC). Conventional results later confirmed that full analysis of DMMU 10 was not required.

   The DMMU composites were submitted to ALS, located in Kelso, Washington for conventionals and chemical analyses. The Kelso laboratory performed all method analyses except for polybrominated diphenyl ether (PBDE) congeners, which were conducted by the ALS laboratory in Houston, Texas.

6. Results. The conventionals and chemistry results for the 10 DMMU composites are presented alongside the DMMP marine guidelines and Sediment Management Standards (SMS) benthic criteria in Tables 6 and 7, respectively.

   Grain Size and Sediment Conventionals. Percent fines varied from a high of 43.3% in the deep draft channel (DMMU 1) and decreased rapidly in the downstream settling basin (8.7 to 40.4% fines). The shallow draft channel and upstream settling basin contained less than 3.7% fines. TOC and sulfides followed a similar pattern, with decreasing percent/concentration upstream. DMMUs 5 through 10 had TOC concentrations less than 0.5%; thus, comparisons to OC-normalized benthic Sediment Management Standards were not performed for these sample results.

   Standard Chemicals of Concern. No chemistry results (detects and non-detects) exceeded the DMMP Screening Level (SL), Bioaccumulation Trigger (BT), or Maximum Level (ML) for the chemicals of concern (COCs). In general, concentrations were low for all chemicals of concern (COC) and correlated to percent fines and percent TOC. The downstream COC concentrations were slightly higher than those in the shallow draft channel and upstream settling basin. PCBs were non-detect in all DMMU composites.

   Dioxins/furans. Dioxin analyses were not required for this project due to existing data. Snohomish River sediments were most recently tested for dioxins in 2009; the maximum concentration measured at that time was 1.06 pptr TEQ (ND = ½ RL), which is well below the dispersive dioxin criteria of 4 pptr TEQ (DMMP, 2009).

TBT. Tributyltin (TBT) analyses were not required for this project based on results from previous monitoring.

PBDEs. Analyses for polybrominated diphenyl ethers (PBDEs) were performed on 3 of the 10 DMMU composites to fulfill the Essential Fish Habitat conservation recommendations that accompanied the National Marine Fisheries Service's biological opinion on the effects of dredged material disposal on listed rockfish species (DMMO, 2016). The three DMMU composites analyzed for PBDEs (DMMUs 1, 3, and 8) were selected to provide spatial coverage over the project area. Results from these analyses are included in Table 8. PBDE-209 was the most frequently detected congener with the highest concentration (2,660 ng/kg in D03-C). No sediment guidelines (DMMP, state, or federal) exist for PBDE congeners.

Comparison to SMS Benthic Criteria. Ecology does not recommend carbon-normalization when TOC is below 0.5 percent; therefore, only OC-normalized chemistry results from DMMUs 1 through 4 (TOC > 0.5%) were compared to Ecology's benthic criteria (Table 7). No detects or non-detects exceeded Ecology's benthic criteria.

Data Validation. All chemistry data were validated to a minimum of EPA Stage 2b; in addition, PBDE data underwent 10% Stage 4 data validation. Only minor issues were encountered during the data validation, and all data were considered usable by the data validator for the study purpose.

7. Biological Testing. Biological testing was not required; concentrations of all detected and non-detected chemicals of concern were below the DMMP screening level criteria.

8. Sediment Exposed by Dredging. Sediment exposed by dredging must either meet the State of Washington Sediment Quality Standards (SQS) (Ecology, 2013) or the State's anti-degradation standard (DMMP, 2008). Concentrations of all DMMP chemicals of concern were below the DMMP SLs; therefore, this project is in compliance with the State of Washington anti-degradation standard.

9. Debris Management. The DMMP agencies implemented a debris management requirement following the 2015 SMARM in order to prevent the disposal of debris (wood or otherwise) greater than 12 inches in any dimension at open-water disposal sites in Puget Sound (DMMP, 2015). The Snohomish River federal navigation channel is dredged almost annually to maintain navigation; little to no reported debris has been encountered during recent dredging events. However, as in past characterizations, some small woody and leafy debris was observed in the lower settling basin and deep draft channel grab samples during this characterization. The DMMP agencies concur that the dredge project area is of low concern for debris, and a 12" X 12" screening grid or grizzly is not required for this project. However, if any debris larger than 12 inches in any dimension is encountered, or man-made debris of any size, it must be segregated and disposed of in an upland landfill or other appropriate use. At no time may any debris greater than 12 inches in any dimension or man-made debris of any size, be disposed at an open-water disposal site.

10. Suitability Determination. This memorandum documents the evaluation of the suitability of sediment from the federal navigation project in the Snohomish River for unconfined open-water disposal. The data gathered were determined to be sufficient and acceptable for regulatory decision-making under the DMMP program.

    In summary, based on the results of the testing, the DMMP agencies have concluded that all 778,221 CY of dredged material are suitable for unconfined open-water disposal at the Port Gardner non-dispersive site.

    The USACE Navigation dredging program also places dredged material suitable for open-water disposal at the Site O upland rehandling site and Jetty Island beneficial use site; USACE Navigation maintains the appropriate environmental documentation to cover this activity.

11. References.

DMMP, 2008. *Quality of Post-Dredge Sediment Surfaces (Updated)*. A Clarification Paper Prepared by David Fox (USACE), Erika Hoffman (EPA and Tom Gries (Ecology) for the Dredged Material Management Program, June 2008.

DMMP, 2009. *Memorandum for Record. Supplemental Determination Regarding the Suitability, with Respect to Dioxin, of Federal Operation and Maintenance Dredged Material from the Snohomish River, Everett, Snohomish County, Washington (Public Notice CENWS-OD-TS-NS-30) Evaluated under Section 404 of the Clean Water Act for Beneficial Use or Unconfined Open-Water Disposal at the Port Gardner Nondispersive Site*. Prepared by the Seattle District Dredged Material Management Office for the Dredged Material Management Program, October 3, 2009.

DMMP, 2012. *Memorandum for Record. DMMP Suitability Determination for Proposed Maintenance Dredged Material from the Snohomish River, Everett (CENWS-OD-TS-NS-35, dated July 20, 2011) for Unconfined Open-Water Disposal at the Port Gardner Non-Dispersive Site or at an Approved Beneficial Use Upland Site.* Prepared by the Seattle District Dredged Material Management Office for the Dredged Material Management Program, January 20. 2012.

DMMO, 2016. *Statutory Response to EFH Conservation Recommendations for the Continued Use of Multi-User Dredged Material Disposal Sites in Puget Sound and Grays Harbor (Fourth Field HUCs 17110020 Dungeness-Elwha, 17110002 Strait of Georgia, 1711019 Puget Sound, and 17100105 Grays Harbor) Washington. NMFS Consultation Number: WCR-2015-2975.* Prepared by the Seattle District Dredged Material Management Office, January 2016.

DMMP, 2016. *Dredged Material Evaluation and Disposal Procedures (User Manual)*. Prepared by the Seattle District Dredged Material Management Office for the Dredged Material Management Program, August 2016.

Ecology, 2013. *Sediment Management Standards – Chapter 173-204 WAC*. Washington

State Department of Ecology, Revised February 2013.

Herrera, 2017. *Snohomish River Federal Navigation Channel and Settling Basins Dredged Material Characterization, Everett, Washington – Sampling and Analysis Plan*. Prepared by Herrera and NewFields for the U.S. Army Corps of Engineers, Seattle District, September 5, 2017.

Herrera, 2018. *Snohomish River Federal Navigation Channel and Settling Basins Dredged Material Characterization, Everett, Washington – Data Report*. Prepared by Herrera and NewFields for the U.S. Army Corps of Engineers, Seattle District, February 2018.

PSDDA, 1994. *Memorandum for Record. Supplemental Determination on the Suitability of Additional Maintenance Dredged Material under PSDDA Guidelines for US Army Corps of Engineers Everett Snohomish River Channel Maintenance Dredging Project (Reference: CENPS-OP-NP-77 dated April 9 1993) for Disposed at the PSDDA Port Gardner Open-Water Nondispersive Site*. Prepared by the Seattle District Dredged Material Management Office for the Puget Sound Dredged Disposal Analysis Program, March 11, 1994.

PSDDA, 1996. *Memorandum for Record: Suitability Determination for Dredged Material from the Everett Downstream Settling Basin and River Channel for Disposal at the PSDDA Port Gardner Open-Water Nondispersive Site (Public Notice CENPS-OP-TS-NS-99).* Prepared by the Seattle District Dredged Material Management Office for the Puget Sound Dredged Disposal Analysis Program, November 14, 1996.

10. Agency Signatures.

signed copy on file in DMMO - Seattle District office

Concur:

_____ _____
Date Heather Whitney Fourie - Seattle District Corps of Engineers

_____ _____
Date Justine Barton - Environmental Protection Agency

_____ _____
Date Laura Inouye, Ph.D. - Washington Department of Ecology

_____ _____
Date Celia Barton - Washington Department of Natural Resources

Copies furnished:

DMMP signatories
John Hicks, CENWS-ODS-NS
Elizabeth Chien, CENWS-ODS-NS
John Pell, CENWS-ODS-NS

Table 2. Project Features, Characterization Depths, and Characterization Volumes from March/April 2017 Condition Survey

Feature	Stations	Authorized Depth (ft MLLW)	Characterization Depth (ft MLLW)	Characterization Depth + 2 ft Overdepth (ft MLLW)	Characterization Depth + 2 ft Allowable Overdepth Volume (cy)
Deep-draft channel	0+00 to 78+00	-15	-15	-17	79,322
Downstream Settling Basin	78+00 to 90+00	-20	-20	-22	246,645
Shallow-draft channel	90+00 to 335+50	-8	-8	-10	159,125
Upstream Settling basin	335+50 to 355+79	-40	-20	-22	261,924
Shallow-draft channel	355+79 to 381+79	-8	-8	-10	31,205
				Total:	778,221

Table 3. Summary of Past Sediment Characterizations of Snohomish River Federal Navigation Channel (NewFields, 2017)

Characterization Event	Dredge Material Volume	Results	Suitability Determination
1992 Partial Characterization	NA	No SLs exceeded	Supported a down-ranking from moderate to low-moderate
1993 Full Characterization	462,243 cy	Two SL exceedances for anthracene and one SL exceedance for 4-methylphenol in a total of 3 DMMUs; SL exceedances passed biological testing	All material suitable for open-water disposal
1996 Full Characterization	300,347 cy	Diethyl phthalate exceeded SL in one DMMU; no biological testing was conducted	All material suitable for open-water disposal
2003-2004 Full Characterization	271,210 cy	No SLs exceeded	All material suitable for open-water disposal
2009 Dioxin Evaluation	801,849 cy	Dioxin concentrations ranged from 0.16 to 1.06 ng/kg TEQ	Sediment characterization was for planning purposes only; no dredging was performed
2011 Full Characterization	651,571 cy	Benzyl alcohol exceeded SL in 3 DMMUs of the downstream turning basin	DMMP agencies determined material suitable for open-water disposal without requiring bioassays

CY = cubic yards
SL = Screening Level
NA = not applicable
DMMP = Dredged Material Management Program
DMMU = dredged material management unit
TEQ = toxic equivalents

Table 4. Approximate Dredged Material Volumes and Field Sample Counts by DMMU (NewFields, 2017)

Feature	DMMU	Design Depth + 2 ft Allowable Overdepth Volume (cy)	Number of Field Samples
Deep-draft channel	1	79,322	4
Downstream Settling Basin	2	79,836	4
Downstream Settling Basin	3	79,094	4
Downstream Settling Basin	4	87,716	5
Shallow-draft channel	5	79,439	4
Shallow-draft channel	6	79,686	4
Upstream Settling basin	7	76,565	4
Upstream Settling basin	8	97,173	5
Upstream Settling basin	9	88,186	5
Shallow-draft channel	10	31,205	2
	Total:	778,221	41

Table 5. Sampling Locations, DMMU Composites, water depths, and mudline elevations

DMMU	Location Name	Date	State Plane WA-N, NAD83		Latitude (N) NAD83	Longitude (W) NAD 83	Water Depth (ft.)	Recorded Tidal Height (ft. MLLW)	Corrected Tidal Height (ft. MLLW)	Mudline (ft. MLLW)
			Northing	Easting						
SN17-D01-C	D01-1	9/13/17	366017.1	1299460.9	47.994963	122.225955	-16.3	2.9	3.0	-13.3
	D01-2	9/13/17	366651.5	1299618.3	47.996709	122.225358	-16.5	3.2	3.3	-13.2
	D01-3	9/13/17	367554.9	1299539.4	47.999182	122.225748	-18.5	3.5	3.6	-14.9
	D01-4	9/13/17	367639.1	1299849.7	47.999428	122.224486	-16.4	3.8	3.9	-12.5
SN17-D02-C	D02-1	9/13/17	368024.0	1299292.1	48.000455	122.226792	-14.0	4.5	4.6	-9.4
	D02-2	9/13/17	367912.6	1299539.7	48.000162	122.225773	-18.7	4.7	4.8	-13.9
	D02-3	9/13/17	368145.0	1299850.4	48.000814	122.224521	-15.1	4.8	4.9	-10.2
	D02-4	9/13/17	367874.1	1299890.8	48.000074	122.224336	-17.3	5.1	5.2	-12.1
SN17-D03-C	D03-1	9/13/17	368277.1	1299343.9	48.001151	122.226599	-17.5	5.8	5.9	-11.6
	D03-2	9/13/17	368484.3	1299525.3	48.001728	122.225874	-23.2	6.1	6.2	-17.0
	D03-3	9/13/17	368490.6	1299895.0	48.001764	122.224364	-15.4	6.4	6.5	-8.9
	D03-4	9/13/17	368259.3	1299756.4	48.001123	122.224913	-23.6	6.7	6.8	-16.8
SN17-D04-C	D04-1	9/13/17	368937.8	1299923.3	48.002991	122.224282	-14.4	7.2	7.3	-7.1
	D04-2	9/13/17	368656.7	1299867.4	48.002218	122.224489	-16.3	7.3	7.4	-8.9
	D04-3	9/13/17	368843.0	1299724.5	48.002721	122.225087	-22.5	7.6	7.7	-14.8
	D04-4	9/13/17	368956.0	1299365.1	48.003013	122.226563	-21.1	7.8	7.9	-13.2
	D04-5	9/13/17	368729.9	1299523.0	48.002401	122.225902	-24.2	8.1	8.2	-16.0
SN17-D05-C	D05-1	9/13/17	369906.1	1299743.5	48.005636	122.225088	-14.7	8.3	8.4	-6.3
	D05-2	9/13/17	370882.3	1299846.0	48.008317	122.224741	-14.7	8.5	8.6	-6.1
	D05-3	9/13/17	372300.5	1300003.8	48.012212	122.224201	-16.5	8.6	8.7	-7.8
	D05-4	9/13/17	373034.4	1300366.1	48.014242	122.222776	-17.4	9.0	9.1	-8.3
SN17-D06-C	D06-1	9/13/17	374795.2	1306774.8	48.019382	122.196723	-16.6	9.1	9.2	-7.4
	D06-2	9/13/17	371439.3	1310953.4	48.010385	122.179411	-16.8	9.2	9.3	-7.5
	D06-3	9/13/17	368896.3	1311430.7	48.003438	122.177280	-16.8	9.3	9.4	-7.4
	D06-4	9/13/17	364753.0	1310942.6	47.992058	122.178978	-16.9	9.4	9.5	-7.4
SN17-D07-C	D07-1	9/13/17	364490.2	1311102.6	47.991345	122.178305	-16.7	9.4	9.5	-7.2
	D07-2	9/13/17	364327.9	1311144.9	47.990902	122.178121	-16.6	9.4	9.5	-7.1
	D07-3	9/13/17	364294.8	1311324.5	47.990820	122.177385	-18.3	9.4	9.5	-8.8
	D07-4	9/13/17	364102.9	1311418.2	47.990298	122.176989	-15.1	9.5	9.6	-5.5
SN17-D08-C	D08-1	9/13/17	364112.9	1311547.7	47.990332	122.176461	-16.4	9.4	9.5	-6.9
	D08-2	9/13/17	363959.4	1311596.9	47.989914	122.176249	-14.6	9.3	9.4	-5.2
	D08-3	9/13/17	363947.9	1311769.3	47.989891	122.175544	-15.4	9.3	9.4	-6.0
	D08-4	9/13/17	363788.8	1311817.9	47.989457	122.175335	-14.6	9.2	9.3	-5.3
	D08-5	9/13/17	363772.7	1311975.7	47.989420	122.174689	-14.8	9.2	9.3	-5.5
SN17-D09-C	D09-1	9/13/17	363614.3	1312042.4	47.988989	122.174405	-14.8	9.0	9.1	-5.7
	D09-2	9/13/17	363609.3	1312183.0	47.988982	122.173831	-14.7	8.9	9.0	-5.7
	D09-3	9/13/17	363458.8	1312237.9	47.988572	122.173596	-14.9	8.4	8.5	-6.4
	D09-4	9/13/17	363451.1	1312399.2	47.988559	122.172937	-15.8	8.8	8.9	-6.9
	D09-5	9/13/17	363275.8	1312463.2	47.988082	122.172663	-14.8	8.7	8.8	-6.0
SN17-D10-C	D10-1	9/13/17	361797.8	1313354.4	47.984073	122.168919	-14.1	8.5	8.6	-5.5
	D10-2	9/13/17	361547.5	1313453.9	47.983391	122.168495	-16.3	8.4	8.5	-7.8

Table 6. Snohomish River Navigation Channel Chemistry and Conventionals Results

	SL	ML	BT	SN17-D01-C 9/13/2017	LQ	VQ	SN17-D02-C 9/13/2017	LQ	VQ	SN17-D03-C 9/13/2017	LQ	VQ	SN17-D04-C 9/13/2017	LQ	VQ	SN17-D05-C 9/13/2017	LQ	VQ	SN17-D06-C 9/13/2017	LQ	VQ	SN17-D07-C 9/13/2017	LQ	VQ	SN17-D08-C 9/13/2017	LQ	VQ	SN17-D09-C 9/13/2017	LQ	VQ	SN17-D10-C 9/13/2017	LQ	VQ
Conventionals																																	
Total Solids (%)	--	--	--	57.2			60.3			69.6			73.5			74.3			85.4			87.2			89.7			91.7			89.5		
Total Organic Carbon (%)	--	--	--	1.41			1.55			1.54			0.957			0.168			0.15			0.097			0.107			0.094			0.109		
Sulfides (mg/kg)	--	--	--	286			132			85			71			0.67	U		0.59	U		0.57	U		0.56	U		0.55	U		--		
Ammonia (mg/kg)	--	--	--	8.2		J	10.9			10.3			5.13			1.07			0.12	J		0.55	U		0.55	U		0.53	U		--		
Total Volatile Solids (%)	--	--	--	4.8			4.6			3.8			3.2			1.4			1.3			1.3			1.3			1.3			--		
Grain Size (%)																																	
Gravel (>2,000 µm)	--	--	--	0.51			0.16			0.22			1.25			1.36			0.24		J	0		J	0.92			0.46			4.52		
Very Coarse Sand	--	--	--	0.54			0.41			0.34			1.07			5.44			2.31		J	0.68		J	7.04			6.03			8.35		
Coarse Sand	--	--	--	0.65			0.67			1.18			8.8			39.34			14.26		J	29.03		J	40.32			46.68			31.04		
Medium Sand	--	--	--	2.44			4.32			22.76			22.36			53.21			32.09		J	60.89		J	43.02			40.97			47.78		
Fine Sand	--	--	--	28.24			24.88			30.36			40.27			8.03			34.72		J	5.76		J	4.5			3.12			5.18		
Very Fine Sand	--	--	--	27.5			26.99			25.92			15.45			0.29			3.57		J	0.08		J	0.1			0.06			0.21		
Sand (62.5 to 2,000 µm)	--	--	--	59.37			57.27			80.56			87.95			106.31			86.95			96.44			94.98			96.86			92.56		
Silt (3.9 to 62.5 µm)	--	--	--	36.01			32.74			13.23			6			2			0.62		J	0.01		J	0.09			0.05			0.33		
Clay (0 to 3.9 µm)	--	--	--	7.27			7.7			4.25			2.71			1.65			0.82		J	0.56		J	0.4			0.31			0.19		
Percent Fines[a]	--	--	--	43.28			40.44			17.48			8.71			3.65			1.44		J	0.57		J	0.49			0.36			0.52		
Metals (mg/kg)																																	
Antimony	150	200	--	3.3		J	4.1		U	3.9		U	3.4		U	3.8		U	3.5		U	3.8		U	3.6		UJ	3.7		U	--		
Arsenic	57	700	507.1	11.3			10.2			9.8			7.4			6			5.7			5.5			4.9			5.8			--		
Cadmium	5.1	14	--	0.28		U	0.21		U	0.19		U	0.17		U	0.19		U	0.18		U	0.19		U	0.18		U	0.19		U	--		
Chromium	260	--	--	41.1			38.1			31.8			29			23.6			23.1			21.6			18.5			19.9			--		
Copper	390	1300	--	38.5			36.6			27.5			21.9			17.1			16.9			18.4			29.5		J	18.8			--		
Lead	450	1200	975	7.6			6.4			5.8			5.1			4			3.6			3.5			3.5			3.5			--		
Mercury	0.41	2.3	1.5	0.047			0.049			0.034			0.022			0.019		J	0.014		J	0.014		J	0.017		J	0.013		J	--		
Selenium	--	--	3	0.17			0.14			0.118			0.054		J	0.086		U	0.031		J	0.095		U	0.088		U	0.09		U	--		
Silver	6.1	8.4	--	1.1		U	0.82		U	0.77		U	0.69		U	0.76		U	0.71		U	0.76		U	0.71		U	0.74		U	--		
Zinc	410	3800	--	62.2			58.4			50.9			45			40.6			40.4			40.7			37.6			40.5			--		
PAHs (ug/kg)																																	
Naphthalene	2100	2400	--	9.6			10			13			11			6.8		U	6		U	4.1		J	4.4		J	3.7		J	--		
Acenaphthylene	560	1300	--	8.7		U	8.3		U	7.2		U	6.8		U	6.8		U	6		U	6		U	6		U	6		U	--		
Acenaphthene	500	2000	--	3.6		J	3.9		J	3.8		J	6.8		U	6.8		U	6		U	6		U	6		U	6		U	--		
Fluorene	540	3600	--	5.7		J	8.3		U	4.6		J	3.3		J	6.8		U	6		U	6		U	6		U	6		U	--		
Phenanthrene	1500	21000	--	20			9.7			15			14			6.8		U	6		U	6		U	6		U	6		U	--		
Anthracene	960	13000	--	21			8.3		U	3.3		J	8.9			6.8		U	6		U	6		U	6		U	6		U	--		
2-Methylnaphthalene	670	1900	--	3.9		J	3.1		J	4.3		J	3.2		J	6.8		U	6		U	6		U	6		U	6		U	--		
Total LPAHs[b]	5200	29000	--	59.9			23.6			39.7			37.2			6.8		U	6		U	4.1		J	4.4		J	3.7		J	--		
Fluoranthene	1700	30000	4600	18			16			23			20			6.8		U	6		U	6		U	6		U	6		U	--		
Pyrene	2600	16000	11980	15			13			25			17			6.8		U	6		U	6		U	6		U	6		U	--		
Benzo(a)anthracene	1300	5100	--	7.8		J	5.3		J	11			4.7		J	6.8		U	6		U	6		U	6		U	6		U	--		
Chrysene	1400	21000	--	16			5.6		J	9.7			7.6			6.8		U	6		U	6		U	6		U	6		U	--		
Benzofluoranthenes	3200	9900	--	10			6.9			12			7			6.8		U	6		U	6		U	6		U	6		U	--		
Benzo(a)pyrene	1600	3600	--	5.2		J	4.4		J	7.4			4		J	6.8		U	6		U	6		U	6		U	6		U	--		
Indeno(1,2,3-cd)pyrene	600	4400	--	3.2		J	8.3		U	3.4		J	6.8		U	6.8		U	6		U	6		U	6		U	6		U	--		
Dibenzo(a,h)anthracene	230	1900	--	8.7		U	8.3		U	7.2		U	6.8		U	6.8		U	6		U	6		U	6		U	6		U	--		
Benzo(g,h,i)perylene	670	3200	--	8.7		U	8.3		U	7.2		U	6.8		U	6.8		U	6		U	6		U	6		U	6		U	--		
Total HPAHs[c]	12000	69000	--	75.2			51.2			91.5			60.3			6.8		U	6		U	4.1		J	4.4		J	3.7		J	--		
Phenols (ug/kg)																																	
2,4-Dimethylphenol[g]	29	210	--	6.3		U	6.3		U	6.3		U	6.3		U	6.3		U	6.3		U	6.3		U	6.3		U	6.3		U	--		
2-Methylphenol	63	77	--	8.7		U	8.3		U	7.2		U	6.8		U	6.8		U	6		U	6		U	6		U	6		U	--		
4-Methylphenol	670	3600	--	26			10			11			7			6.8		U	6		U	6		U	6		U	6		U	--		
Pentachlorophenol	400	690	504	87		U	83		U	72		U	68		U	68		U	36		U	58		U	56		U	55		U	--		
Phenol	420	1200	--	3.6		J	3.9		J	4.5		J	21		U	21		U	11		U	18		U	17		U	17		U	--		
Phthalates (ug/kg)																																	
Butyl benzyl phthalate	63	970	--	41			11			18			15			6.8		U	16			6		U	6		U	6		U	--		

	SL	ML	BT	SN17-D01-C 9/13/2017	LQ	VQ	SN17-D02-C 9/13/2017	LQ	VQ	SN17-D03-C 9/13/2017	LQ	VQ	SN17-D04-C 9/13/2017	LQ	VQ	SN17-D05-C 9/13/2017	LQ	VQ	SN17-D06-C 9/13/2017	LQ	VQ	SN17-D07-C 9/13/2017	LQ	VQ	SN17-D08-C 9/13/2017	LQ	VQ	SN17-D09-C 9/13/2017	LQ	VQ	SN17-D10-C 9/13/2017	LQ	VQ
Dibutyl phthalate	1400	5100	--	18	U		17	U		15	U		14	U		14	U		7.2	U		12	U		12	U		11	U		--		
Di-n-Octyl phthalate	6200	6200	--	9.4			7.4	J		7.2	U		8.4			7.9			6	U		4.8	J		4.7	J		7.6			--		
Diethyl phthalate	200	1200	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
Dimethyl phthalate	71	1400	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
Bis(2-Ethylhexyl) Phthalate	1300	8300	--	16	J		13	J		11	J		11	J		68	U		36	U		9.8	J		9.2	J		55	U		--		
Other SVOCs (ug/kg)																																	
Dibenzofuran	540	1700	--	3.9	J		8.3	U		3.7	J		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
Benzoic Acid	650	760	--	350	U	UJ	330	U	UJ	290	U	UJ	270	U	UJ	270	U	UJ	200	U	UJ	230	U	UJ	230	U	UJ	220	U	UJ	--		
Benzyl Alcohol	57	870	--	15	J		6.4	J		6	J		5.8	J		14	U		7.2	U		12	U		12	U		11	U		--		
1,2-Dichlorobenzene	35	110	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
1,4-Dichlorobenzene	110	120	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
Hexachlorobenzene	22	230	168	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
Hexachlorobutadiene	11	270	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
N-Nitrosodiphenylamine	28	130	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
1,2,4-Trichlorobenzene	31	64	--	8.7	U		8.3	U		7.2	U		6.8	U		6.8	U		6	U		6	U		6	U		6	U		--		
PCB Aroclors (ug/kg)																																	
Aroclor 1016	--	--	--	16	U		14	U		13	U		14	U		12	U		12	U		11	U		11	U		10	U		--		
Aroclor 1221	--	--	--	31	U		27	U		25	U		27	U		23	U		23	U		22	U		21	U		19	U		--		
Aroclor 1232	--	--	--	16	U		14	U		13	U		14	U		12	U		12	U		11	U		11	U		10	U		--		
Aroclor 1242	--	--	--	16	U		14	U		13	U		14	U		12	U		12	U		11	U		11	U		10	U		--		
Aroclor 1248	--	--	--	16	U		14	U		13	U		14	U		12	U		12	U		11	U		11	U		10	U		--		
Aroclor 1254	--	--	--	16	U		14	U		13	U		14	U		12	U		12	U		11	U		11	U		10	U		--		
Aroclor 1260	--	--	--	16	U		14	U		13	U		14	U		12	U		12	U		11	U		11	U		10	U		--		
Total PCBs[d]	130	3100	--	31	U		27	U		25	U		27	U		23	U		23	U		22	U		21	U		19	U		--		
Total PCBs[d] (mg/kg carbon)			38	2.2	U		1.74	U		1.62	U		2.82	U		13.7	U		15.3	U		22.7	U		19.6	U		20.2	U		--		
Pesticides (ug/kg)																																	
Heptachlor[g]	1.5	270	--	0.6	U		0.53	U		0.48	U		0.51	U		0.44	U		0.44	U		0.43	U		0.4	U		0.39	U		--		
Aldrin	9.5	--	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
Dieldrin	1.9	1700	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
4,4'-DDE	9	--	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
4,4'-DDD	16	--	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
4,4'-DDT	12	--	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
Total DDTs[e]	--	69	50	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
Oxychlordane	--	--	--	1.7	U		0.39	J		1.4	Ui	U	1.2	U		1.1	U		1.2	U		1.2	U		1	U		1	U		--		
cis-Nonachlor	--	--	--	1.7	U		1.3	U		1.4	U		1.2	U		1.1	U		1.2	U		1.2	U		1	U		1	U		--		
trans-Nonachlor	--	--	--	1.7	U		1.3	U		1.4	U		1.2	U		1.1	U		1.2	U		1.2	U		1	U		1	U		--		
gamma-Chlordane	--	--	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
cis-Chlordane	--	--	--	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		
Total chlordane[f]	2.8	--	37	1.6	U		1.4	U		1.3	U		1.4	U		1.2	U		1.2	U		1.1	U		1.1	U		1	U		--		

Notes: LQ: laboratory qualifier VQ: validation qualifier SL: screening level ML: maximum level BT: bioaccumulation trigger
U the analyte was analyzed for, but not detected
i the LOQ is elevated due to chromatographic interference
J the result is estimated
--not targeted for analysis
a. sum of silt and clay fractions
b. sum of detected values of naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene
c. sum of detected values of fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzofluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, and benzo(ghi)perylene
d. sum of detected PCB Aroclors
e. sum of 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT
f. sum of gamma-chlordane, cis-chlordane, cis-nonachlor, trans-nonachlor, and oxychlordane
g. non-detect results reported at the method detection limit

Table 7. Snohomish River Carbon-Normalized Chemistry Results Compared to SQS

	SQS	CSL	SN17-D01-C 9/13/2017	LQ	VQ	SN17-D02-C 9/13/2017	LQ	VQ	SN17-D03-C 9/13/2017	LQ	VQ	SN17-D04-C 9/13/2017	LQ	VQ
Conventionals														
Total Organic Carbon (%)	--	--	1.41			1.55			1.54			0.957		
PAHs (ug/kg)														
Naphthalene	99	170	0.681			0.645			0.844			1.15		
Acenaphthylene	66	66	0.617	U		0.535	U		0.468	U		0.711	U	
Acenaphthene	16	57	0.255	J		0.252	J		0.247	J		0.711	U	
Fluorene	220	1200	0.404	J		0.535	U		0.299	J		0.345	J	
Phenanthrene	23	79	1.42			0.626			0.974			1.46		
Anthracene	100	480	1.49			0.535	U		0.214	J		0.93		
2-Methylnaphthalene	38	64	0.277	J		0.2	J		0.279	J		0.334	J	
Total LPAHs	370	780	4.25			1.52			2.58			3.89		
Fluoranthene	160	1200	1.28			1.03			1.49			2.09		
Pyrene	1000	1400	1.06			0.839			1.62			1.78		
Benzo(a)anthracene	110	270	0.553	J		0.342	J		0.714			0.491	J	
Chrysene	110	460	1.13			0.361	J		0.63			0.794		
Benzo(b)fluoranthene	--	--	0.709			0.445	J		0.779			0.731		
Benzo(k)fluoranthene	--	--	0.617	U		0.535	U		0.468	U		0.711	U	
Benzofluoranthene	230	450	0.709			0.445			0.779			0.731		
Benzo(a)pyrene	99	210	0.369	J		0.284	J		0.481			0.418	J	
Indeno(1,2,3-cd)pyrene	34	88	0.227	J		0.535	U		0.221	J		0.711	U	
Dibenzo(a,h)anthracene	12	33	0.617	U		0.535	U		0.468	U		0.711	U	
Benzo(g,h,i)perylene	31	78	0.617	U		0.535	U		0.468	U		0.711	U	
Total HPAHs	960	5300	5.33			3.3			5.94			6.3		
Phthalates (ug/kg)														
Butyl benzyl phthalate	4.9	64	2.91			0.71			1.17			1.57		
Dibutyl phthalate	220	1700	1.28	U		1.1	U		0.974	U		1.46	U	
Di-n-Octyl phthalate	58	4500	0.667			0.477	J		0.468	U		0.878		
Diethyl phthalate	61	110	0.617	U		0.535	U		0.468	U		0.711	U	
Dimethyl phthalate	53	53	0.617	U		0.535	U		0.468	U		0.711	U	
Bis(2-Ethylhexyl) Phthalate	47	78	1.13	J		0.839	J		0.714	J		1.15	J	
Other SVOCs (ug/kg)														
Dibenzofuran	15	58	0.277	J		0.535	U		0.24	J		0.711	U	
1,2-Dichlorobenzene	2.3	2.3	0.617	U		0.535	U		0.468	U		0.711	U	
1,4-Dichlorobenzene	3.1	9	0.617	U		0.535	U		0.468	U		0.711	U	
Hexachlorobenzene	0.38	2.3	0.234	U		0.213	U		0.214	U		0.345	U	
Hexachlorobutadiene	3.9	6.2	0.617	U		0.535	U		0.468	U		0.711	U	
N-Nitrosodiphenylamine	11	11	0.617	U		0.535	U		0.468	U		0.711	U	
1,2,4-Trichlorobenzene	0.81	1.8	0.617	U		0.535	U		0.468	U		0.711	U	
PCB Aroclors (ug/kg)														
Total PCBs	12	65	2.2	U		1.74	U		1.62	U		2.82	U	

Notes:
Non-detect result exceeding either the SQS or CSL criteria
LQ: laboratory qualifier VQ: validation qualifier SQS: sediment quality standard CSL: cleanup screening level OC: organic carbon normalized
U the analyte was analyzed for, but not detected
J the result is estimated
a. sum of detected values of naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene
b. sum of detected values of fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzofluoranthene, benzo(a)pyrene, indeno(1,2,3-cd) pyrene, dibenzo(a,h)anthracene, and benzo(ghi)perylene
c. sum of detected PCB Aroclors

Table 8. Polybrominated Diphenyl Ether Results

	SN17-D01-C	LQ	VQ	SN17-D03-C	LQ	VQ	SN17-D08-C	LQ	VQ
PBDEs (ng/kg)									
PBDE-008/011	1.58	J		1.36	J		0.037	U	
PBDE-015	2.13	J		1.47	J		0.416	J	
PBDE-017/025	16.4			9.55			0.361	J	
PBDE-028/033	5.1			2.85	J		0.605	J	
PBDE-032	0.21	MJR	U	2.78	J		0.067	U	
PBDE-035	0.33	JR	U	0.22	MJR	U	0.06	U	
PBDE-037	0.51	JR	U	0.3	JR	U	0.12	MJR	U
PBDE-047	79.9			44.4			8.92		J
PBDE-049	33.4			15.4			1.15	MJ	
PBDE-051	3.01	J		1.39	J		0.059	U	
PBDE-066	4.91			2.63	J		0.48	JR	U
PBDE-071	3.74			1.84	J		0.12	MJR	U
PBDE-075	0.22	MJR	U	0.16	U		0.08	U	
PBDE-077	0.17	U		0.13	U		0.069	U	
PBDE-079	0.17	U		0.13	U		0.067	U	
PBDE-085	2.32	J		0.95	J		0.35	MJ	J
PBDE-099	74.6			35.5			7.57		J
PBDE-100	20			9.83			1.55	J	
PBDE-105	0.41	U		0.25	U		0.18	U	
PBDE-118	0.41	U		0.25	U		0.18	U	
PBDE-119/120	0.38	U		0.24	U		0.17	U	
PBDE-126	0.3	MJ		0.15	U		0.11	U	
PBDE-128	0.92	U		0.68	U		0.69	U	
PBDE-138/166	2.2	MJ		0.52	U		0.53	U	
PBDE-140	0.97	JR	U	0.33	U		0.34	U	
PBDE-153	9.6			3.66	J		0.62	JR	UJ
PBDE-154	8.83	M		3.86	MJ		0.76	J	
PBDE-155	1.16	J		0.41	MJ		0.24	U	
PBDE-156	1	U		0.77	U		0.78	U	
PBDE-181	0.43	U		0.27	U		0.37	U	
PBDE-183	2.96	J		1.89	MJ		0.22	U	
PBDE-184	1.1	JR	U	0.46	MJ		0.19	U	
PBDE-190	0.6	U		0.37	U		0.51	U	
PBDE-191	1.36	MJ		0.3	U		0.42	U	
PBDE-196	2.7	JR	U	2.88	J		0.24	U	
PBDE-197	2.9	JR	U	2.96	J		0.19	U	
PBDE-203	4.33	J		6.09	J		0.26	U	
PBDE-206	19.1	J		60.7			1.51	J	
PBDE-207	21.3	J		54.5			0.78	JR	U
PBDE-208	18.7	J		39.2			0.39	MJR	U
PBDE-209	422			2660			57.6		J

Notes:
LQ: laboratory qualifier VQ: validation qualifier DW: dry weight BDE: brominated diphenyl ether
M a peak has been manually integrated
R the ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
J the analyte was detected below the calibrated range but above the EDL
U the analyte was not detected above the EDL

Figure 1. Snohomish River Study Area

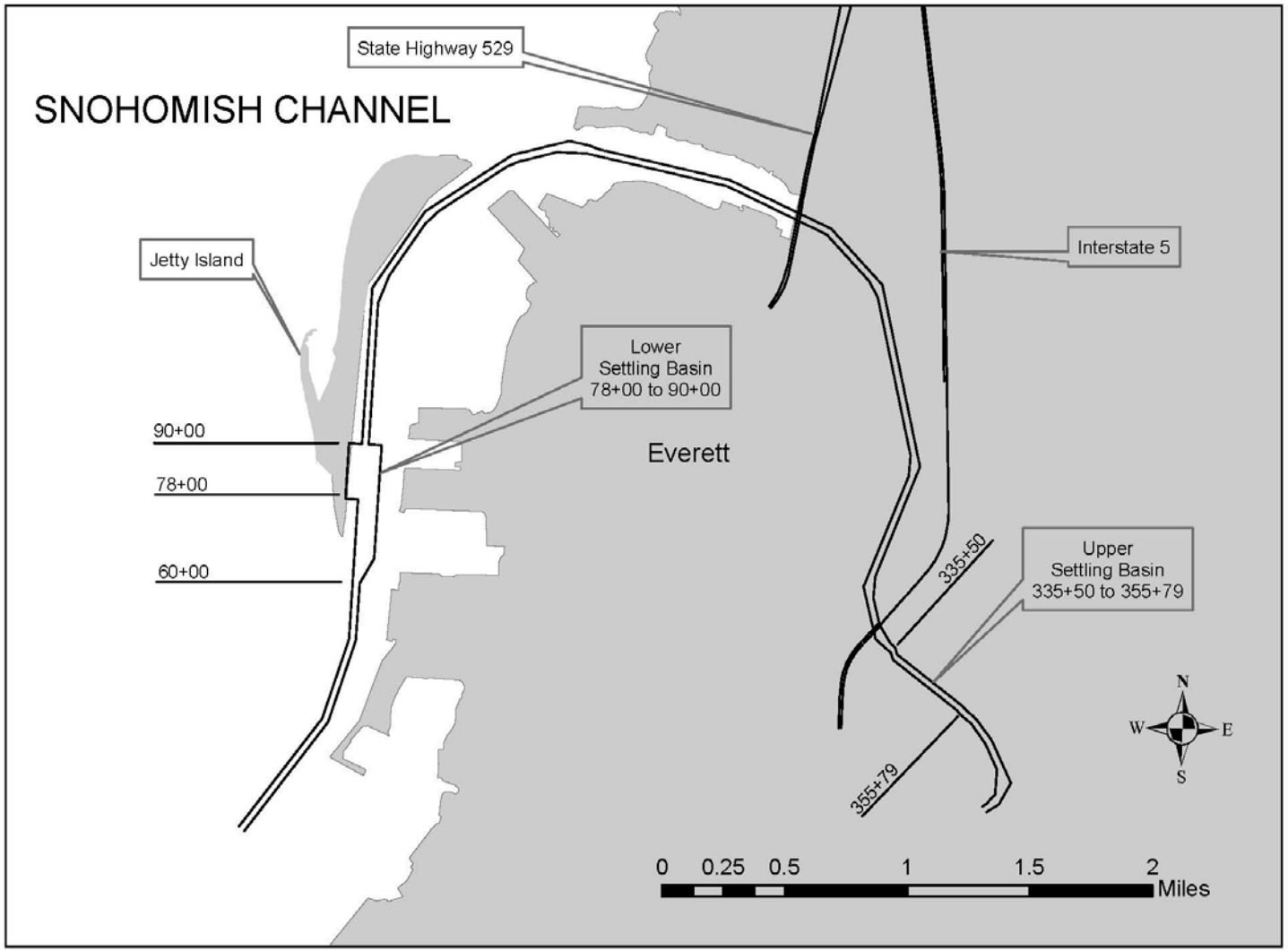


Figure 2. Deep-draft Channel and Downstream Settling Basin Sampling Locations (DMMUs 1, 2, 3, and 4) (NewFields, 2018)

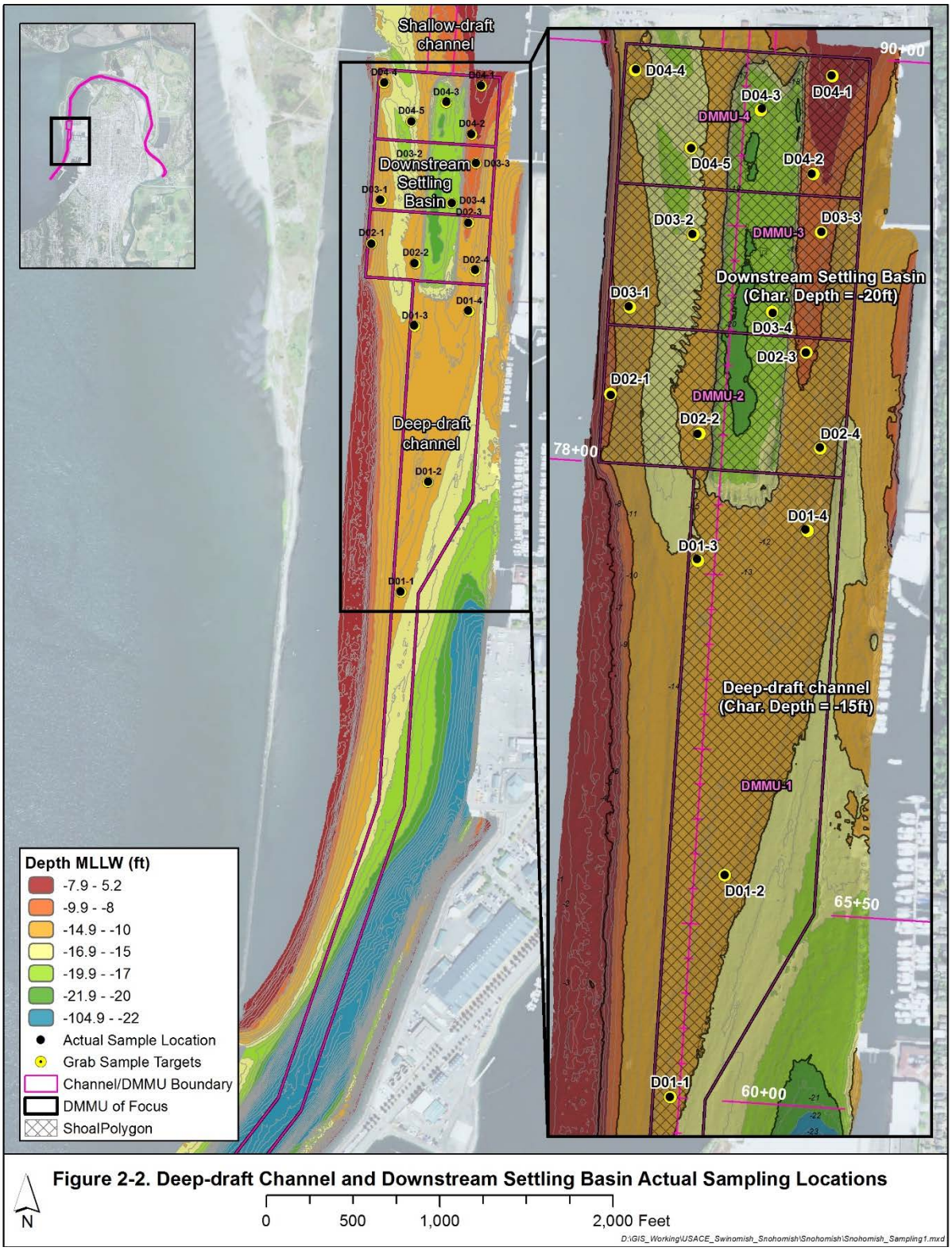


Figure 2-2. Deep-draft Channel and Downstream Settling Basin Actual Sampling Locations

Figure 3. Shallow-draft Channel Sampling Locations (DMMU 5 and 6) (NewFields, 2018)

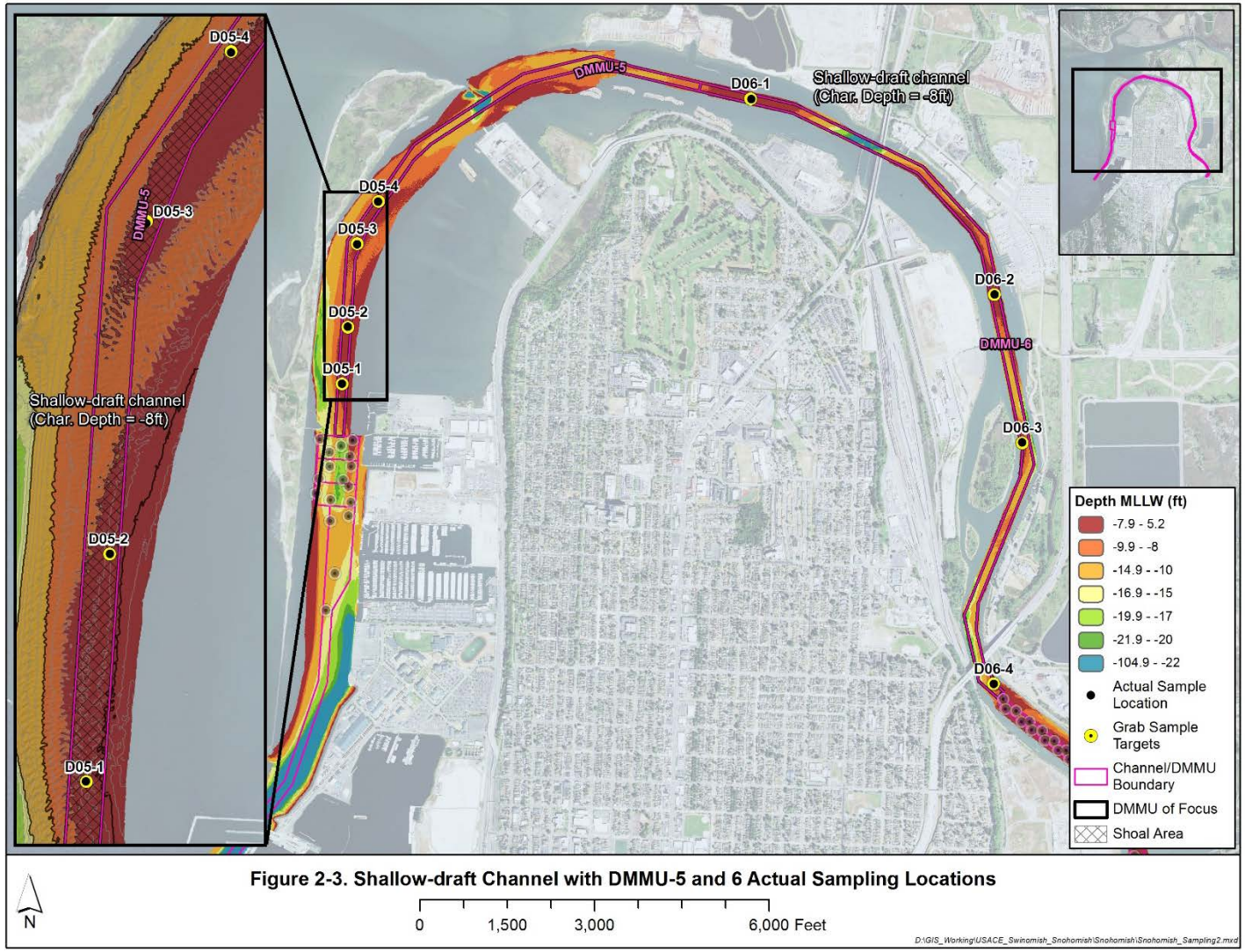
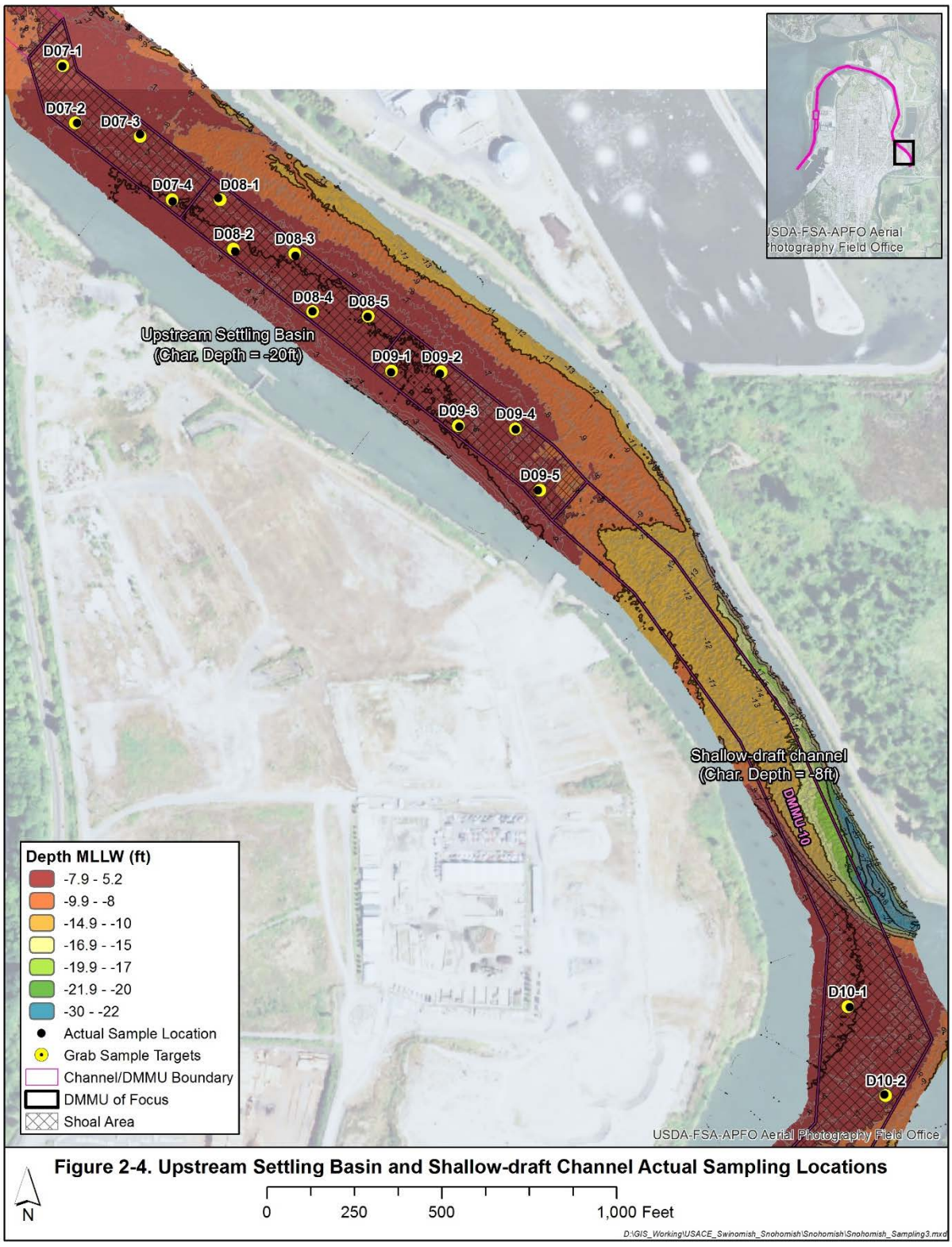


Figure 2-3. Shallow-draft Channel with DMMU-5 and 6 Actual Sampling Locations

Figure 4. Upstream Settling Basin and Shallow-draft Channel Sampling Locations (DMMUs, 7, 8, 9, and 10) (NewFields, 2018)



Attachment A
Description of Previous Sediment Characterizations
Snohomish River Federal Waterway and Navigation Channel

Note: The following information was compiled by Heather Fourie (USACE) during preparation of the scope of work for sediment characterization of the Snohomish River Federal Waterway in 2017. Sources of information included suitability determinations made under the Puget Sound Dredged Disposal Analysis (PSDDA) program and the Dredged Material Management Program (DMMP), as well as other project documentation available to the Dredged Material Management Office (DMMO). The available documentation did not always include enough detail to determine definitively what occurred. As a result, this compilation has limitations and the information included should not be considered definitive in nature.

The Everett Harbor and Snohomish River Project and maintenance dredging by the Department of the Army was adopted June 25, 1910 and modified by subsequent acts. The project consists of deep and shallow-draft navigation channels and two settling basins to serve navigation in Everett Harbor and the Snohomish River (Figure 1). Table 1 summarizes details regarding the dimensions of the project features. The USACE is responsible for dredging portions of the authorized project as needed to maintain navigation. Dredging of the lower settling basin most recently occurred in October 2016; additional planned dredging is unknown at this time. Advanced maintenance dredging is not planned.

Sedimentation in the Snohomish navigation channel and settling basins is due to input from the Snohomish River. Accreted sediment in the waterway has been characterized by USACE under the Puget Sound Dredged Disposal Analysis (PSDDA) program or Dredged Material Management Program (DMMP) six times, including four full characterizations and a dedicated characterization for dioxin. Descriptions of these characterization efforts follow.

1992 Characterization (downstream only)

Five surface (0-4 ft) sediment cores were collected from the lower Snohomish River in October 1992. Detected chemical concentrations were below the existing PSDDA screening levels (SL). The partial characterization supported a down-ranking of lower Snohomish sediment from moderate to low-moderate for the subsequent full characterization.

1993 Full Characterization (downstream only)

A total of 28 cores were collected comprising twelve composite samples (7 surface and 5 subsurface) in December 2012 in the area of the lower settling basin and lower navigation channel. Comparison to the 1993 PSDDA SLs revealed two exceedances for anthracene and one exceedance for 4-methylphenol in a total of 3 DMMUs. Anthracene was detected at 140 ug/kg d.w. (SL = 130 ug/kg) and 4=methylphenol at 150 ug/kg (SL = 120 ug/kg). (The SLs for both these chemicals were raised in 1998 to the current SLs of 906 ug/kg and 670 ug/kg for anthracene and 4-methylphenol, respectively).

Bioassays were conducted on three affected DMMUs. Although some performance problems occurred, no bioassays failed. All 462,243 CY of proposed dredged sediment were considered suitable for open-water disposal.

1996 Full Characterization (downstream only)

Full characterization of the lower settling basin and river channel occurred in 1996, resulting in 300,437 CY of sediment approved for open-water disposal. Following the previous low-moderate ranking, sediment was collected from 24 sampling locations and composited into six surface and three subsurface DMMU composite samples (total of

9 DMMUs). One PSDDA SL of diethyl phthalate (99 ug/kg; SL = 97 ug/kg) occurred in one DMMU. No other SL exceedances occurred in any DMMUs. Bioassays were not run based on the determination that phthalates are a common laboratory contaminant. Furthermore, archived sediment was analyzed and no phthalates were detected in the archive sample; therefore, all 300,437 CY were considered suitable for open-water disposal.

2003-2004 Full Characterization

In September 2003, sediment cores were collected via vibracore from the lower Snohomish Settling basin and the adjacent navigation channel. In accordance with a low-moderate rank for homogenous material, samples were composited into nine composites for analysis (9 DMMUs). No DMMP SL exceedances (detect or non-detect) occurred in any samples, and all 271,210 CY were determined to be suitable for open water disposal. TBT was included in the analyses, but was non-detect in all samples.

In March 2004, sediment cores were collected from the upper settling basin and adjacent upstream navigation channel. In accordance with a low-moderate rank for homogenous material, samples were composited into 12 composites for analysis (12 DMMUs). No DMMP SL exceedances (detect or non-detect) occurred in any samples, and all 430,000 CY of sediment were determined suitable for open water disposal. TBT analysis was not included.

2009 Dioxin Evaluation

In 2009, the Snohomish River federal navigation channel was tested for dioxin to determine the impact on maintenance dredging of the 2010 revised DMMP dioxin guidelines for open-water disposal in Puget Sound. A total of 36 sediment grab samples were collected from throughout the Snohomish River navigation channel and settling basins using a van Veen grab sampler. Composites were analyzed for conventionals and dioxins. Dioxin/furan concentrations ranged from 0.16 to 1.06 ng/kg TEQ (n = 16).

Total organic carbon (TOC) ranged from 0.14 to 1.84% with the lowest TOC concentrations in the upper settling basin and higher concentrations downstream. As expected, grain size data indicated that the percentage of fine-grained material increases downstream. DMMU1, the furthest upstream DMMU, consisted of sand and gravel. Material in the upper settling basin was greater than 90% sand, as were the shoals in the shallow navigation channel between the settling basins. The lower settling basin was approximately 70% sand with the remaining volume consisting of roughly equal parts silt and clay. The downstream deep-draft channel had the highest fines content of all the DMMUS.

2011 USACE Full Characterization

For the 2011 characterization, the DMMP agencies agreed to a one-time re-ranking of the Snohomish project. Under this agreement, 1) no testing was required of the most upstream shoal because it had been consistently shown to consist of gravel and cobble; 2) only a confirmatory level of sampling (one sample per 20,000 CY and one analysis per 100,000 CY) was required for the material in the upstream settling basin and shallow navigation channel between settling basins; and 3) the downstream settling basin was ranked low. A total of 43 grab samples were collected in 2012 for the most recent full characterization of the Snohomish River navigation channel and settling basins. The samples were composited into 9 DMMUs for analysis of all DMMP marine COCs (except TBT and dioxins; dioxins were evaluated separately in 2009). Sediment grain size results confirmed what was found previously, with all samples from the upstream settling basin and navigation channel averaging greater than 95% sand and gravel. Fines were more abundant (32-52%) in the downstream settling basin.

Only one COC, benzyl alcohol, was found at concentrations exceeding the SL in 3 DMMUs, all from the downstream settling basin. All other COCs (detect and non-detect) were below SL. Using several lines of evidence including the observed presence of woody material, the DMMP agencies determined that bioassays were unnecessary. All 651,571 CY of sediment were determined suitable for open-water disposal at the Port Gardner non-dispersive site.