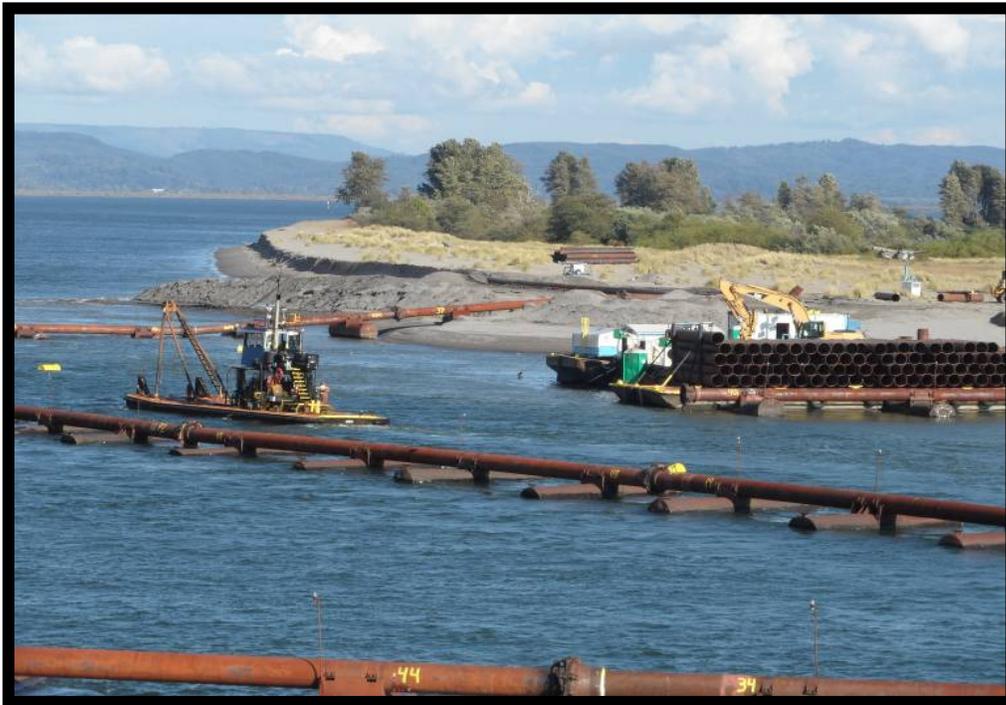




**US Army Corps
of Engineers** ®
Portland District

DRAFT Environmental Assessment

Columbia River Federal Navigation Channel Operations and Maintenance Dredging and Dredged Material Placement Network Update, River Miles 3 to 106.5, Washington and Oregon



Dredge OREGON at Miller Sands Island conducting beach nourishment

The environmental review, consultation, and other actions required in accordance with applicable Federal laws for this project is being, or has been, carried-out by the U.S. Army Corps of Engineers, Portland District, under its assumption of responsibility pursuant to 33 CFR 230.

3 April 2014

Executive Summary

This draft Environmental Assessment (EA), prepared by the U.S. Army Corps of Engineers, Portland District (Corps), is submitted for public review under applicable laws and regulations, including the National Environmental Policy Act (NEPA). The purpose of this draft EA is to inform members of the public about, and solicit comments on, the proposed updates and existing to the Operations and Maintenance (O&M) program for the 43-foot (ft) deep-draft Columbia River Federal Navigation Channel (CR FNC) from River Mile (RM) +3.0 to 106.5 of the Columbia River. The purpose of continued O&M program of the CR FNC between RM +3.0 and 106.5 is to provide a continuous, safe, reliable commercial shipping channel by periodically removing unsafe and restricting shoals. In order to maintain the channel at its authorized depth, material from maintenance dredging is placed in-water or within the Dredged Material Placement Site Network (Network). The Network consists of dredged material placement sites used for upland and/or beach nourishment/shoreline placement. Management of dredged material is dependent on geographic and temporal variability of shoal development within the CR FNC. The need for an updated Network is recognized as a key element for successful continual maintenance of the CR FNC. Specific project actions include:

- 1) Improving flexibility by updating planned placement volumes for the Network based on present site capacity.
- 2) Adding shoreline placement to rebuild and protect an existing upland placement site (Pillar Rock Island, RM 27.2).
- 3) Maximizing efficiency of upland dredged material placement at the Puget Island upland site through the addition of an in-water temporary material storage (sump) near Puget Island (RM 44).
- 4) Facilitating the placement of dredged materials to minimize impacts to natural and human environments.

The updated Network would be used after the Corps has received all required environmental clearances, and assuming that the Corps makes a Finding of No Significant Impact (FONSI) for the Proposed Action. The Corps is the lead federal agency for this draft EA.

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ABBREVIATIONS AND ACRONYMS

ACHP	Advisory Council on Historic Preservation
AMD	Advanced Maintenance Dredging
ARPA	Archaeological Resources Protection Act
BA	Biological Assessment
BiOp	Biological Opinion
BMP	Best Management Practice
C&LW	Columbia and Lower Willamette Rivers
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CR	Columbia River
Corps	U.S. Army Corps of Engineers
CRD	Columbia River Datum
CRCIP	Columbia River Channel Improvement Project
CWA	Clean Water Act
CY	cubic yard(s)
CZMA	Coastal Zone Management Act
DEQ	Oregon Department of Environmental Quality
DLCD	Oregon Department of Land and Conservation
DMEF	Dredged Material Evaluation Framework
DNR	Washington Department of Natural Resources
DOE	Washington Department of Ecology
DPS	Distinct Population Segment
DSL	Oregon Department of State Lands
DWS	Deep Water Site
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	U. S. Environmental Protection Agency
ER	Engineering Regulation
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FNC	Federal Navigation Channel
FONSI	Finding of No Significant Impact
FR	Federal Register
ft	foot or feet
FWCA	Fish and Wildlife Coordination Act
IWW	in-water-work
kcfs	thousand cubic feet per second
MBTA	Migratory Bird Treaty Act
MCR	Mouth of the Columbia River Project
MCY	million cubic yard(s)
MHHW	mean higher high water

MLLW	mean lower low water
MPRSA	Marine Protection, Research, and Sanctuaries Act
MSA	Magnusson-Stevens Fishery Management and Conservation Act
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
Network	Dredged Material Placement Network
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O&M	operation and maintenance
ODFW	Oregon Department of Fish and Wildlife
ODMDS	Ocean Dredged Material Disposal Site
OHW	ordinary high water
RCRA	Resource Conservation and Recovery Act
RHA	Rivers and Harbors Act
RM	river mile
ROD	Record of Decision
ROE	Right of Entry
RPM	reasonable and prudent measures
SE	Supplemental Evaluation
SEF	Sediment Evaluation Framework for the Pacific Northwest
SEIS	Supplemental Environmental Impact Statement
SIP	State Implementation Plan
TMDL	Total Maximum Daily Load
USC	U.S. Code
USGCRP	U.S. Global Change Research Program
USFWS	U.S. Fish and Wildlife Service
VTD	Vancouver to The Dalles Project
WDFW	Washington Department of Fish and Wildlife
WQC	Water Quality Certification
WRDA	Water Resources Development Act

1. INTRODUCTION

This assessment addresses the environmental impacts of continued Operations and Maintenance (O&M) dredging of the 43-foot (ft) deep Columbia River (CR) Federal Navigation Channel (FNC) between River Mile (RM) +3.0 and RM 106.5, including dredged material placement. This document has been prepared by the U.S. Army Corps of Engineers (Corps) for compliance with the National Environmental Policy Act (NEPA). Previous NEPA documents prepared by the Corps for operation and maintenance (dredging and placement) of the CR FNC include (but are not limited to):

- a. *Integrated Feasibility Report for Channel Improvements and Environmental Impact Statements* (Corps, 1999) (1999 EIS), which discussed deepening of the CR FNC from -40 feet (ft) Columbia River Datum (CRD) to -43 ft deep (CRD).
- b. *Columbia River Channel Improvement Project Final Supplemental Integrated Feasibility Report and Environmental Impact Statement* (Corps, 2003) (SEIS), which discussed changes to the dredge material placement plan.
- c. *Record of Decision Columbia River Navigation Improvement Project*, (Corps, 2004) (ROD)
- d. *Columbia River Channel Improvement Project Supplemental Evaluation* (Corps, 2008) (SE), which discussed changes to the mitigation plan.

This Environmental Assessment (EA) addresses the present and proposed maintenance dredging and dredged material placement alternatives, including updates and improvements to the Dredged Material Placement Site Network (Network), and the listing of three new species under the Endangered Species Act (ESA) since the 2003 SEIS: Southern Distinct Population Segment (DPS) of green sturgeon (*Acipenser medirostris*) and Southern DPS of Pacific eulachon (*Thaleichthys pacificus*) by the National Marine Fisheries Service (NMFS) and the streaked horned lark (*Eremophila alpestris strigata*) by the U.S. Fish and Wildlife Service (USFWS).

1.1. Vicinity of the Proposed Project

The Columbia River runs for 1,240 miles. The head of Columbia River starts high in the Rocky Mountain Range of British Columbia, of Canada, winding its way northwest before turning south into Washington State, of the United States. The Columbia River forms a portion of the border between Washington and Oregon before flowing into the Pacific Ocean.

1.2. Project Limits

The CR FNC Project is located between RM +3.0 of the Columbia River and RM 106.5 at Vancouver, WA. The Columbia River -43 ft channel is authorized up to RM 106.5. Advanced maintenance dredging (AMD) is practiced up to five ft below the authorized channel depth (-48 ft CRD) and up to 100 ft outside the authorized channel width to remove additional material from critical shoals for the purpose of maintaining the authorized depth of the navigation channel for a longer period between dredging events. Advanced maintenance dredging removes additional material from a shoal for the purpose of maintaining the authorized depth of the navigation channel for a longer between dredging events. This AMD approach enhances navigational safety by maintaining the authorized channel depth (which is necessary to ensure adequate under-keel clearance) during periods of channel shoaling that occur between maintenance dredging events and is

done at the same time as routine maintenance dredging. Dredged material is primarily placed in-water in or adjacent to the CR FNC, along the shoreline, and at upland sites, but can also be placed at designated ocean and nearshore sites.

1.3. Adjacent Projects

The Mouth of the Columbia River (MCR) FNC is immediately downstream from RM -3.0 to +3.0. Material dredged to maintain the MCR FNC is placed in the designated ocean and nearshore sites.

The lower portion of the Columbia River from Vancouver, WA to The Dalles, OR (VTD) FNC is immediately upstream from RM 106.5 to 145 (Bonneville Dam). Material dredged to maintain the VTD FNC is generally placed in-water upstream of Vancouver, WA.

The Lower Willamette River FNC is located between RM 0 and 12 from Portland, OR to its confluence with the Columbia River. The most recent material dredged to maintain the Lower Willamette FNC was placed upland at a site also used for the CR FNC.

1.4. Scope and Nature of the Proposed Action

The Proposed Action entails the existing O&M Program for dredging the CR FNC from RM +3.0 to 106.5 and updating the existing Network operations to meet current and projected dredged material placement needs for the first 20 years of maintenance after completion of construction in 2010. By necessity, planned dredged material placement volumes are updated because of changes to upland placement capacity and improvements to the strategic management of the Network must occur to maximize efficiency and allow for greater flexibility.

1.5. Authority and Funding

The Corps has been the governmental agency responsible for maintaining navigable waters since 1824. The Commerce Clause in the Constitution and subsequent Court decisions have established the Federal right and obligation to regulate navigation and commerce and to make necessary improvements. Congress has furthered this obligation by authorizing projects such as CR FNC through various Rivers and Harbors Acts (RHA), the earliest one being enacted in 1878. The RHAs gave way to the Water Resources Development Acts (WRDA) starting in 1973. Congress also provides annual appropriations for maintenance of the CR FNC. The Courts have determined that the United States Army Corps of Engineers has paramount rights to work in all U.S. navigable waters below the ordinary high water (OHW) mark (mean higher high water [MHHW] in the estuary).

Placement of material is not formally designated within these authorizations. In-water placement of dredged material is governed by Section 404 of the Clean Water Act (CWA). The Corps does not issue itself a 404(b)1 permit for authorization of dredged material placement in-water; however, the Corps conducts the 404(b)1 analysis and implements the guidelines put forth by the CWA.

The CR FNC is also authorized to place material dredged from RM +3.0 to 30 in ocean disposal sites. The Ocean Dredged Material Disposal Site (ODMDS) Deep Water Site (DWS) was designated by the U.S. Environmental Protection Agency (EPA) in 2005 under Section 102 of the Marine

Protection, Research and Sanctuaries Act (MPRSA) to provide sufficient capacity for current and anticipated future ocean disposal needs at the MCR and lower CR (EPA 2005). The DWS occupies a total area of 17,000 by 23,000 ft and lies 6 miles offshore from the MCR. However, the portion of the DWS site used for disposal is 11,000 by 17,000 ft.

Maintenance dredging and in-water placement of dredged sediments to maintain authorized navigation channels is conducted under the provisions of Sections 102 and 103 of the MPRSA of 1972, Sections 401 and 404 of the CWA of 1977, and in accordance with Regulations 33 Code of Federal Regulations (CFR) parts 335 through 338 (“Operation and Maintenance of Army Corps of Engineers Civil Works Projects Involving Discharge of Dredged or Fill Material into Waters of the U.S. or Ocean Waters” and affiliated procedures, etc).

1.5.1. Columbia River Federal Navigation Channel – History

In the RHA of 18 June 1878, Congress authorized the CR FNC Project and directed the Corps to establish and maintain a 20-ft minimum channel depth. Maintaining this depth required dredging in only a few shallow reaches of the river where the natural controlling depths were in the 12 to 15 ft range. In the RHA of 13 July 1892, Congress increased the authorized navigation channel depth to 25 ft. The maintenance dredging associated with this increase was still limited to a few particularly shallow reaches where sporadic dredging was conducted, as needed. In the RHA of 13 June 1902, Congress adopted a 25-ft channel to the sea (which included the mouth of the Columbia River).

In the RHA of 25 July 1912, Congress increased the channel depth to 30 ft. At that time, the navigation channel width was established at 300 ft. Increasing the channel depth to 30 ft resulted in the need for increased maintenance dredging to ensure that authorized navigation depths were safe for shipping and to address shoaling associated with the new depth.

In the RHA of 3 July 1930, House Document 195, Congress increased the authorized depth from Portland to the sea to 35 ft. The navigation channel width was also increased to 500 ft and realigned in certain reaches. The channel modifications were completed in 1935. From 1936 to 1957, Congress authorized additional channel alignment adjustments that added to the dredging requirements. During this period, dredging averaged 6.7 million cubic yards (MCY) per year.

By 1958, the channel alignment had stabilized, but maintenance dredging was augmented to increase the AMD depth from two ft to five ft in areas of active shoaling.

The deepening of the 40-ft deep by 600-ft wide navigation channel was authorized by the RHA of 23 October 1962, and construction took place in stages from 1964 to 1976.

1.5.2. Columbia River Federal Navigation Channel – Present Project

The current 43-ft deep channel in the Columbia and Lower Willamette River (C&LW) was authorized by the WRDA of 17 August 1999 (Public Law 106-53) and constructed from 2005 to 2010. The channel is 43 ft deep and 600 ft wide from RM +3.0 to 101.4; 43 ft deep and 400 ft wide from RM 101.4 to 105.5; 43 ft deep and 400 ft wide in the downstream 1.5 miles of Oregon Slough; and 35 ft deep from RM 105.5 to 106.5 (from the Burlington Northern and Santa Fe Railway Bridge

to the Interstate 5 Bridge). Advanced maintenance dredging is authorized up to five ft below the authorized depth (-48 ft) and up to 100 ft outside the authorized channel width. The reach from RM 102.5 to 105.5 also includes the Portland/Vancouver Anchorage (RHA of 1960, Section 107 project), which consists of one deep-draft anchorage and one anchorage used primarily for empty vessels.

1.6. Approvals and Permits

Table 1 outlines the permits and approvals that would be required prior to updating the project:

Table 1. List of Approvals and Permits needed.

Agency	Permit/Approval	Status
Oregon Department of Environmental Quality (DEQ)	401 Water Quality Certificate	Pending
Oregon Department Land Conservation and Development (DLCD)	Coastal Zone Management Act (CZMA) Consistency Determination Concurrence	Pending
Washington Department of Ecology (DOE)	CZMA Consistency Determination Concurrence	Pending
Washington Department of Ecology (DOE)	401 Water Quality Certificate	Pending
National Marine Fisheries Service (NMFS)	Amendment to the 2012 BiOp	No further action needed
US Fish and Wildlife Service (USFWS)	BiOp to update 2010 Letter of Concurrence	Pending

2. PURPOSE AND NEED

The purpose of continued maintenance dredging of the 43-ft deep CR FNC between RM +3.0 and 106.5 is to provide a continuous, safe, reliable commercial shipping channel by periodically removing restricting shoals. The CR FNC provides economic benefits to the region and nation.

In order to maintain the channel at its authorized depth, material from maintenance dredging is placed in-water, along the shoreline, upland, and at designated ocean and nearshore sites, depending on the geographic and temporal variability of shoal development within the CR FNC.

The Proposed Action updates the Network for the continued maintenance of the CR FNC. The 2003 SEIS identified 29 sites for dredged material placement as suitable for the initial construction of the 43-ft channel and 90 MCY of dredged material over the first 20 years of maintenance. However, since the channel was deepened from 40 ft to 43 ft from 2005 to 2010, some beach nourishment and upland sites in the Network have reached or are nearing site capacity and some sites have been eliminated. As a result, the planned dredged material placement volumes need to be updated. Improvements to the strategic management of the Network are also proposed to maximize efficiency and allow for greater flexibility, which will minimize impacts to the terrestrial and aquatic environment. The need for an updated Network is recognized as a key element for successful continual maintenance of the CR FNC. When compared to the No Action alternative, the Proposed Action alternative would achieve the following:

- 1) Improve flexibility and efficiency of the O&M Program of the CR FNC by updating the Network based on present site capacity, adding shoreline placement to rebuild and protect an existing upland placement site, and maximizing efficiency of upland dredged material placement at one site through the addition of an in-water temporary material storage site (sump).
- 2) Facilitate the placement of dredged materials to minimize impacts to natural and human environments.

3. HISTORICAL AND EXISTING CONDITIONS

3.1. Navigation Channel

The FNC has been maintained using a combination of dredging and hydraulic control works, such as pile dikes. Prior to construction of the -30 ft channel in 1912, dredging was limited to a few very shallow reaches of the river where the natural controlling depths were in the -12 to 15 ft range. From 1912 to 1935, the channel was deepened to -35 ft by 500 ft wide and realigned at many reaches. It was also during this time that many hydraulic control structures were built and dredging became necessary to maintain the authorized channel. From 1936 to 1957, channel alignment adjustments were made that added to the dredging requirements. During this period, dredging averaged 6.7 MCY annually. By 1958, the channel alignment had stabilized but dredging was augmented to increase the AMD depth from 2 to 5 ft to allow the channel to infill for a year and still provide full project dimensions. The -40 ft channel was constructed in stages between 1964 and 1976. Construction of the channel followed the river's thalweg (the deepest part of the river channel). From 1976 to the onset of the most recent channel improvement (completed in 2010), maintenance dredging has averaged approximately 5.5 to 6.5 MCY per year, excluding emergency dredging related to the 1980 eruption of Mount St. Helens (Corps 1999). The construction of the -43 ft channel between 2006 and 2010 overlaid the same footprint as the -40 ft channel. Most of the channel is naturally controlled at depths deeper than the required -43 ft. Shoals tend to form in channel reaches where natural controlling depths are less than -43 ft. Maintenance dredging of the 43-ft channel to date has averaged 6.7 MCY per year.

Each channel deepening may be viewed as low intensity disturbances that impact long reaches of the river. The riverbed slowly adjusted its side-slopes adjacent to each new dredge cut. With each deepening, it takes several years for the side-slopes to approach equilibrium with the deeper channel. Maintenance dredging increased throughout the river during these adjustment periods, typically lasting approximately 5-7 years. In addition to deepening the channel, development actions have included constrictions, realignments, and in-water fills. Channel constrictions, realignments, and fills are high intensity, localized disturbances in the river. These practices cause immediate changes in flow patterns that can result in local erosion. Although the impacts are generally limited to a short reach of the river, it may be years before equilibrium conditions become reestablished throughout the project area. As a result of the deepening completed in 2010, there has been a recent increase in maintenance dredging. The CR FNC has yet to stabilize since the completion of the deepening.

The rapidly changing and uncontrollable shoaling conditions within the CR FNC require continual operations and maintenance. Segments of the CR FNC are dredged on an annual or semi-annual basis due to reoccurring shoals. Shoals may require more or less dredging depending on intensity and timing of flows and seasons. Some shoals may form spontaneously without warning and may not be identified until the annual dredging is underway. The Columbia River is still self-adjusting to the deepened channel.

3.2. Existing Dredged Material Placement Network

There are four options for placement of dredged material: in-water, upland, beach nourishment/shoreline, and ocean placement. Ocean placement remains unchanged from the 2003

SEIS and is not considered further in this EA because the action is unchanged. The impacts of its use have been updated 2012 MCR EA.

3.2.1. In-Water Placement

In-water placement typically occurs adjacent to the FNC at depths between 35 to 65 ft, with occasional exceptions, when geologic features situated throughout the Columbia River constrain the channel and require in-water placement in water depths as shallow as 20 ft or deeper than 65 ft. Currently, in-water placement of dredged material occurs within the CR FNC, in the flowlane adjacent to the FNC, or at Harrington Point Sump from RM 20 to 22.

In-water dredged material placement is conducted throughout the length of the CR FNC from RM +3.0 to RM 106.5. In-water placement can be conducted by mechanical (clamshell) or hydraulic dredges (pipeline, hopper). In-water placement locations vary depending on the condition of the channel each year. As deeper flowlane areas are filled with dredged material, new deep areas are formed elsewhere as a result of natural river processes. Hopper dredges collect material in the hopper of the vessel until it is near capacity. Once filled, the vessel moves to a flowlane site. When in place above an appropriate dredged material placement site, the hopper moves forward while displacing dredged material through the hopper doors on the bottom of the ship. Material can be deposited from the hopper at varying rates based on how far and quickly the hopper doors are opened. The dredge controls these rates while moving forward in order to avoid mounding. Once the hopper is empty, the dredge maneuvers back to the shoal and resumes dredging. In-water discharge from pipeline dredges differs from hoppers in that material pumped by the pipeline is continuously placed in the flowlane during dredging operations. Placement of material at flowlane sites is done using a down-pipe with a diffuser plate at the end. This down-pipe extends 20 ft below the water surface to minimize or avoid impacts to migrating juvenile salmonids. During placement of dredged material, the downpipe is moved often so that mounding on the bottom is minimized.

The Corps also places dredged material in-water at a temporary material storage site called a sump to maximize the efficient use of an upland placement site when shoaling is not located within direct pumping distance. A sump is a dredging feature located between the FNC and an upland placement site that connects two related operations. Material dredged via hopper dredges is placed in the sump, where it is temporarily stored until a pipeline dredge pumps it onto the upland site. As material is removed from the sump, the sump's capacity to receive additional dredged material is restored and the process begins again. The Harrington Point Sump located near Rice Island from RM 20 to 22 is used by hopper dredges and sometimes by pipeline dredges for placement of dredged material when performing maintenance dredging at Tongue Point Crossing and Miller Sands Channel. When the sump has reached capacity, portions of the sump are pumped upland to the Rice Island placement site via the pipeline dredge. On average, a total of approximately 0.2 to 1 MCY of sand may be removed from Harrington Point Sump each time it is dredged and placed upland. This operation typically occurs as needed to restore sump capacity.

The construction of the CR FNC was completed in 2010. The average annual quantity of material placed in-water since 2010 is 6.2 MCY. As a result of the construction of the deep-draft channel, it was expected that there would be an increased quantity of materials to be dredged and placed. The

Corps projects that the volume to be dredged and placed would decrease over time as the channel re-stabilizes to its new depth.

3.2.2. Dredged Material Placement Site Network

3.2.2.1. Upland Placement

Upland placement of dredged material is conducted from clamshell, hopper, and pipeline dredges that is pumped or barged to upland sites. Upland placement utilizes earth-moving equipment (bulldozers, backhoes, etc.) regardless of type of dredge used; these types of equipment may be barged in or driven in, depending on site accessibility. When equipment is barged in, the barge(s) is maneuvered to the shoreline and anchored for the duration of the operation. A wide sand berm is constructed from the barge to land for movement of equipment. Clamshell-dredged material deposited onto a barge is off-loaded at a transfer point for placement at an upland site. Hopper and pipeline dredges pump dredged material in a sand and water slurry directly into a diked, upland site located near the dredge site. Discharge of water from upland sites back into the river is controlled by the use of weirs. The landward end of the pipe is moved by a bulldozer at regular intervals to minimize unintentional mounding on the site.

Upland placement is currently practiced at 22 dredged material placement sites in the Network. Two of these sites (Pillar Rock Island and Puget Island) are not able to receive dredged material placement under current conditions. The Corps does not conduct upland placement at the Fazio Sand and Gravel site, but the landowner does pump material placed in-water by the Corps to the upland site by separate permitted action. The dredged material placement sites within the Network are strategically located throughout the Columbia River. Eleven of the upland sites are located in Oregon, and eleven are located in Washington (Skamokawa is considered a beach nourishment and upland placement site; Rice Island is in both Oregon and Washington). Elevation of placed dredged material varies by site. Final elevations for each placement site were listed in the 2003 SEIS. In the 2003 SEIS, final elevations were calculated based on the existing elevation of the site and the anticipated volume of material to be placed during construction, operation, and maintenance of the -43-ft channel.

Construction of the -43-ft channel was scheduled from 2002 to 2004. Actual construction began in 2005 and was completed in stages through 2010. Meanwhile, dredged material from maintenance of the existing -40-ft channel project continued to be placed at many sites, which consequentially changed the “existing” and anticipated “final” elevations for the -43-ft channel project. The Corps conducted a survey of dredged material placement site elevations in 2013 to determine site capacities remaining after construction of the -43-ft channel and found that the carrying capacity of a site did not match expected final site elevation. The use of a final site height as a metric is not an effective site management tool. Site height and capacity is typically limited by the range of the pipeline dredge from a shoal to a dredged material placement site. The pipeline dredge’s capability to pump to higher elevations is reduced the further the pipeline dredge is situated from a site. Additionally, the site footprint may constrain the capacity of a site; the slope of a site must be graded at a slope of no greater than 2 Rise:1 Run. As a result, the Corps has updated the anticipated volumes of material to be placed at each placement site during the continued maintenance of the -43 ft channel and the

anticipated remaining capacity available for each placement site. The volume of material calculated for each site is an approximation and not a maximum limit.

The pipeline dredge is currently capable of placing from up to a mile away without a booster pump, but that distance may be increased from a recent engine overhaul. If a booster pump is available, the pipeline range is increased to over two miles. Sometimes a hopper dredge works in tandem with a pipeline to improve efficiency by placing dredged material in-water in front of a working pipeline dredge so the material will be subsequently pumped to an upland placement site.

3.2.2.2. Beach Nourishment/Shoreline Placement

Shoreline placement involves pumping dredged material through a floating discharge pipe from the pipeline or hopper dredge to an existing shoreline at the sand/water interface. The dredge first pumps a landing on the shoreline to establish a point from which further material placement occurs. Dredged material is pumped out in a mixture of sand and water slurry (about 20 percent sand) and as it exits the shore pipe, sand settles out on the shoreline while the water returns to the river. Settling rates of Columbia River sands are very quick and turbidity from the operation is minimal. After sufficient sand has settled out and begins to increase in height, the settled sand is moved by bulldozers to match the elevation and profile of the existing shoreline at approximately the high water line. During placement, a temporary sand berm is constructed to retain sand on the beach; otherwise, much of the sand would immediately be lost to the river. The temporary berms typically are approximately 5 ft high and 12 ft wide at the base. The berms are built gradually by earth-moving equipment as pump-out continues and are created from existing beach sand, pumped sand, or both.

A typical shoreline placement operation lasts from 5 to 15 days and the width of the shoreline created approximately 100 to 150 ft. The process continues by adding to the shore pipe and proceeding longitudinally along the shoreline. The length of shoreline replaced is dependent on the quantity of material to be dredged from the shoal in the channel. After placement, the slope of the shoreline is groomed by mechanical equipment (bulldozers) to a steepness of 10 to 15 percent to prevent the possibility of creating areas where juvenile fish could be stranded from vessel wakes on the new shoreline.

The combination of river flows, waves, and tidal effects erodes material from the shoreline. Where shoreline placement replenishes the material previously eroded on a regular basis, the placement action is commonly referred to as beach nourishment. Shoreline placement and beach nourishment are used interchangeably throughout this document; the effects and methods of the actions are the same.

Beach nourishment is currently practiced at 3 dredged material placement sites in the Network: Miller Sands Island in Oregon (RM 23.5), Skamokawa-Vista Park in Washington (RM 33.4), and Sand Island in Oregon (RM 86.2). Skamokawa-Vista Park is also used for upland placement. In the last five years, the Corps has placed an average of 100,000 to 500,000 cubic yards (CY) of material annually at beach nourishment sites.

Shoreline placement can be used to restore and protect assets such as upland dredged material placement sites which can become compromised by rapidly eroding shorelines. The Corps does not currently practice shoreline placement at any sites in the Network.

The volume of material that might be placed at the beach nourishment/shoreline placement sites is difficult to predict due to the recent deepening of the CR FNC and due to the variable use of any given site; which could range from no placement required, to annual placement, to placement once every three to ten years. Furthermore, the reduction of upland placement resulting from placement of dredged material at beach nourishment sites is also difficult to predict.

4. ALTERNATIVES

4.1. No Action Alternative

The No Action alternative (without-project condition) is the most likely condition expected to prevail over the length of the planning period (the first 20 years after deepening was completed in 2010) in the absence of the Corps updating the Network for the CR FNC. The No Action alternative provides the baseline for estimating direct and indirect impacts associated with the Proposed Action.

The No Action alternative assumes that the navigation channel would continue to be maintained with dredging to its existing dimension within its existing Network and in-water placement as described above. Operations and maintenance dredging and placement of dredged materials for the CR FNC would continue to use the current range of in-water, upland, and beach nourishment placement for the first 20 years since deepening was completed in 2010 (Figure 1). It is expected that the majority of the Network would reach capacity within 10 dredging seasons. Once the upland placement sites reach capacity, material dredged from the CR FNC would need to be placed in-water or as beach nourishment.



Figure 1. Map of the No Action Alternative Network.

4.2. Proposed Action Alternative

The Proposed Action updates the Network for the continued maintenance of the CR FNC. The Proposed Action was developed in response to the urgent and compelling need to address the changes in dredged material placement capacity within the Network since the construction of the 43-ft channel. Updated calculations show that the 2003 SEIS total planned project volume and final expected fill height for dredged material placement on upland sites are no longer accurate; this alternative updates the Network’s placement capacity.

Additionally, improvements to the strategic management of the Network are also proposed to maximize efficiency and allow for greater flexibility. Pillar Rock Island is currently not suitable for upland placement of dredged material due to land loss by erosion; the original footprint of the upland site needs to be built back out prior to placing material upland. By using shoreline placement at Pillar Rock Island to rebuild the site, future upland placement can be conducted. The Puget Island upland site was determined to be a suitable upland site in the 2003 SEIS. The Corps later identified that an in-water sump in this reach would be the most efficient method for moving dredged material to the upland site (Figure 2).

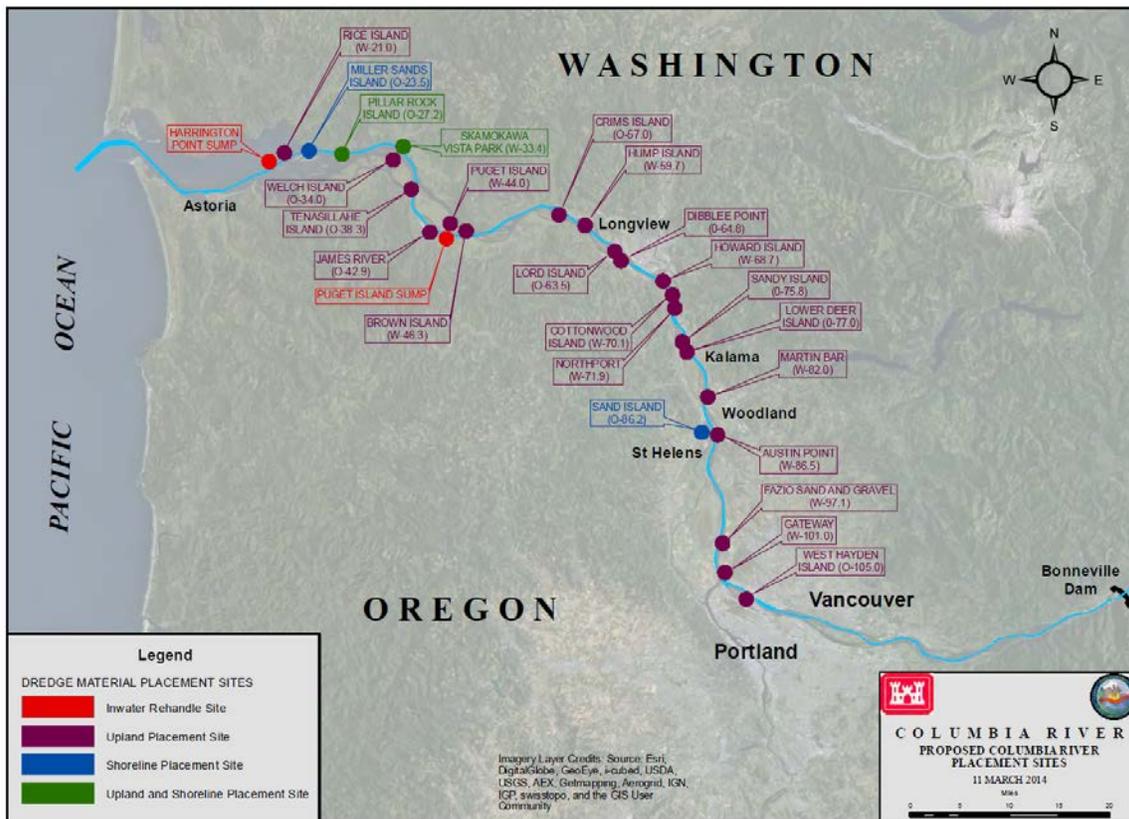


Figure 2. Map of Proposed Action update to the Network.

4.2.1. Addition of Shoreline Placement to Pillar Rock Island

To restore the upland footprint of Pillar Rock Island (RM 27.2), shoreline placement is required. Currently, upland placement is not logistically feasible or cost effective due to the extent of erosion on the island site. There is not enough upland area to stage equipment and place materials that would make upland placement cost effective given mobilization and placement expenses. The addition of shoreline placement work on Pillar Rock Island would give the Corps the capability to restore the site for future upland and shoreline placements. Depending upon the rate of site erosion, the Corps estimates it may take 2 to 4 years of shoreline placement to restore the upland footprint and restart upland placement activities.

4.2.2. Addition of Puget Island Sump

The proposed Puget Island sump (Figure 3) straddles the Washington/Oregon state line at RM 44. The total sump acreage is 31.2 acres and has a maximum capacity of 400,000 CY at any given time. Portions of the sump would need to be constructed to a depth of 44 ft CRD. The sump would then begin operations. First, it would be re-filled to depth of 35 ft by in-water placement of dredged material from nearby shoals. Then, up to 400,000 CY would be dredged to provide new capacity in the sump by pipeline dredge pumping to the upland Puget Island placement site. There is no difference in dredging method for the construction of a sump versus operation and maintenance use of a sump. This process would be repeated annually or less frequently until the upland placement reaches capacity; at that time, the sump would be filled to a final profile that would not exacerbate downstream or shoreline erosion. It is projected that the sump would be used for approximately 20 years.

4.2.3. Updated Capacity Calculations

The site capacity outlined in the 2003 SEIS did not predict continued use of the Network for maintenance of the 40-ft channel during construction of the 43-ft channel, which was delayed and then completed incrementally over 5 years. Also, some sites included in the 2003 SEIS were eliminated from the Network because of external real estate issues, issues with site capacity feasibility, or contamination. As a result, the planned site capacity for the operations and maintenance of the deep-draft channel does not reflect the current capacity of the Network.

Table 2 provides a comparison of individual site capacities between the No Action and Proposed Action. Representative estimated volumes were used for shoreline sites and borrow sites because capacity depends on erosive processes and commercial need for sand, respectively. The volume of material and final elevation listed for each site in the 2003 SEIS were intended to be an approximation and not a maximum limit. The footprint of the dredged material placement sites remain the same as what was shown in the 2003 SEIS and is a contributing element in determining site capacity. The site capacity update does not list an elevation; instead, use of an upland site is contingent upon the pipeline dredge's pumping capability and is not to exceed a slope profile of 2:1 throughout and after placement of materials. The pipeline dredge recently received an engine overhaul, which will likely allow for dredged material to be pumped further and higher than what was outlined in the 2003 SEIS. The estimated No Action planned volume assumes no change to the

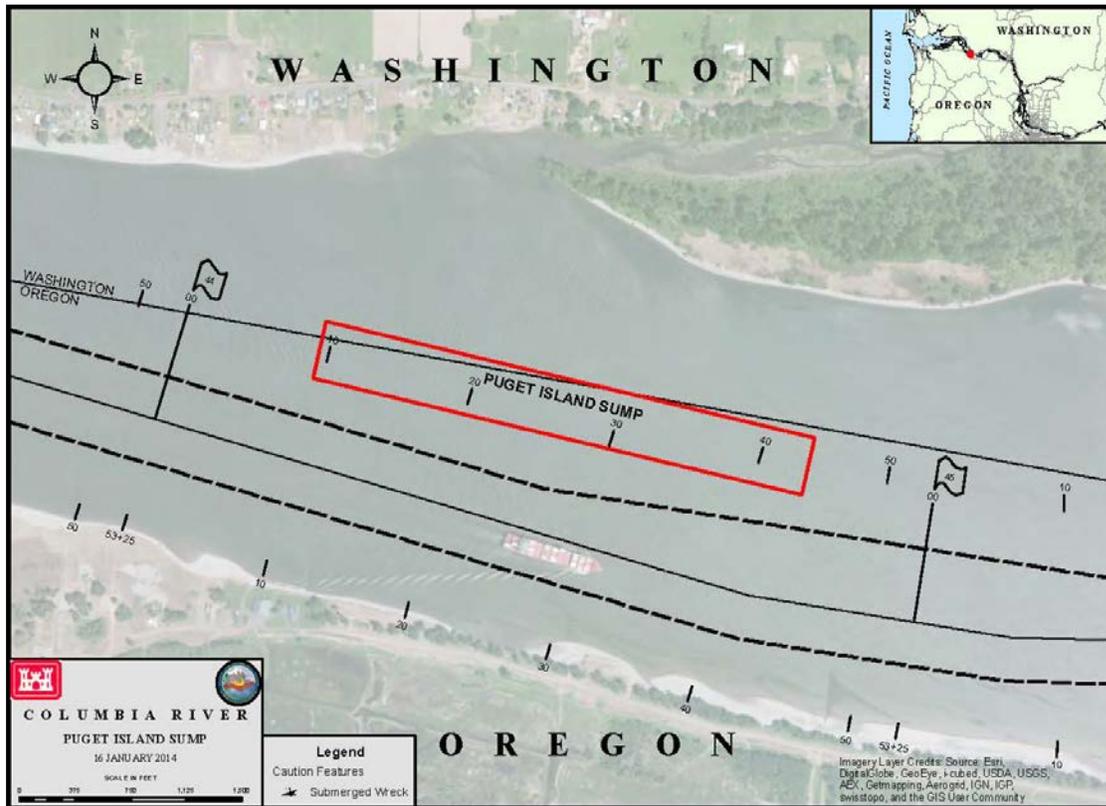


Figure 3. Proposed Puget Island sump.

Table 2. Comparison of No Action and Proposed Action Site Capacity.

Site	State and RM	No Action Site Type	2003 Total Planned Project Volume (CY)	No Action Planned Project Volume (CY)*	Proposed Action Site Type**	Proposed Action Planned Project Volume (CY)* **
Rice Island	O/W-21.0	Upland, Sump	5,500,000	1,225,000	No change	3,275,000
Miller Sands	O-23.5	Beach Nourishment	7,000,000	Varies (shoreline) – no change	No change	No change
Pillar Rock Island	O-27.2	Upland	1,000,000	0	Upland, add shoreline	3,000,000 upland, shoreline varies - assume 4,300,000
Skamokawa - Vista Park	W-33.4	Upland, Beach Nourishment	Varies – 1,000,000	No change	No change	No change
Welch Island	O-34.0	Upland	400,000	No change	No change	1,100,000
Tenasillahe Island	O-38.3	Upland	2,300,000	1,520,000	No change	1,820,000
James River	O-42.9	Upland	1,070,000	Varies (borrow pit) – assume 2,500,000	No change	No change

*Columbia River Federal Navigation Channel Operations and Maintenance Dredged and Dredged
Material Placement Network Update – DRAFT Environmental Assessment*

Puget Island	W-44.0	Upland	3,300,000	0	Upland, add Sump	2,500,000
Brown Island	W-46.3	Upland	4,700,000	2,700,000	No change	No change
Port Westward	O-54.0	Upland	1,700,000	0	No change	No change
Crims Island	O-57.0	Upland	1,200,000	1,100,000	No change	1,800,000
Hump Island	W-59.7	Upland	1,500,000	390,000	No change	550,000
Mt. Solo	W-62.0	Upland	2,400,000	0	No change	No change
Reynolds Aluminum	W-63.5	Upland	200,000	0	No change	No change
Lord Island (Upstream)	O-63.5	Upland	600,000	800,000	No change	No change
Dibblee Point	O-64.8	Upland	2,700,000	Varies (borrow pit) – 5,500,000	No change	No change
International Paper	W-67.5	Upland	2,900,000	0	No change	No change
Rainier Beach	O-67.0	Upland	3,000,000	0	No change	No change
Howard Island	W-68.7	Upland	600,000	780,000	No change	2,700,000
Cottonwood Island	W-70.1	Upland	1,500,000	2,100,000	No change	No change
Northport	W-71.9	Upland	1,900,000	Varies (borrow pit) – no change	No change	No change
Sandy Island	O-75.8	Upland	1,000,000	400,000	No change	No change
Lower Deer Island	O-77.0	Upland	1,200,000	490,000	No change	650,000
Martin Bar	W-82.0	Upland	760,000	Varies (borrow pit) – 2,700,000	No change	No change
Reichold	O-82.6	Upland	2,600,000	0	No change	No change
Sand Island	O-86.2	Beach Nourishment	1,000,000	Varies (shoreline) – 3,000,000	No change	No change
Austin Point	W-86.5	Upland	1,700,000	Varies (borrow pit) – no change	No change	No change
RR Corridor	O-87.8	Upland	400,000	0	No change	No change
Lonestar	O-91.5	Upland	4,400,000	0	No change	No change
Adjacent to Fazio	W-96.9	Upland	Varies - 500,000	0	No change	No change
Fazio Sand & Gravel	W-97.1	Upland, In-water	1,200,000	Varies (borrow pit) – no change	No change	No change
Gateway	W-101.0	Upland	2,300,000	Varies (borrow pit) – 5,000,000	No change	No change
W. Hayden Island	O-105.0	Upland	4,500,000	2,000,000	No change	No change
Total Capacity			68,030,000	45,405,000		61,195,000
Change relative to 2003 Plan			-	-22,625,000		-6,835,000

* includes volume to date

** Proposed Action in **BOLD**

Blue cell = removed from the Network

final limiting elevations listed for each site in the 2003 SEIS and no addition of shoreline placement at Pillar Rock Island or a sump at Puget Island, which eliminates capacity at both sites. As a result,

the total revised estimated No Action planned volume for the 43-ft channel is limited to 67% of the 2003 SEIS planned volume. The estimated Proposed Action planned volume assumes that each site will be used to maximum capacity regardless of final elevation and adds shoreline placement at Pillar Rock Island and a sump at Puget Island, which restores capacity at both sites. As a result the total revised estimated Proposed Action planned volume is 90% of the 2003 SEIS planned volume required for successful maintenance of the 43-ft channel.

4.3. Alternatives not considered for further evaluation

4.3.1. Addition of New Dredged Material Placement Sites

An expansion of the Network would consist of adding new sites to the network for upland and beach/shoreline placement. Additionally, there has been a demonstrated need for shoreline placement operations at existing upland placement sites throughout the Network. The shore face at some upland placement sites is eroding away, threatening the integrity of the placement site. While there is a need for shoreline placement at sites throughout the system, only one (Pillar Rock Island) has been identified and analyzed for immediate use at this time. A tentative list of future upland placement sites is being compiled for long-term assessment. These potential sites need to be vetted for placement suitability, operational compatibility, dredging needs by reach, and real estate access. These sites need further evaluation and consideration prior to inclusion into the Network. Due to the lack of preliminary information, the Corps is not ready to pursue this option.

5. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

5.1. Project Area and Action

The CR FNC project spans from RM +3.0 to 106.5. Operations and Maintenance of this project has been evaluated in previous EISs and EAs. The action considered here within focuses on shoreline placement at the Pillar Rock Island site, addition of the Puget Island sump, and the updated Network capacity.

The Corps CR O&M program uses two general types of dredging equipment: hydraulic dredges and mechanical dredges. Hydraulic dredging is typically conducted by either a hopper dredge or a pipeline dredge. Mechanical dredging includes clamshell or backhoe dredging. Hopper and pipeline dredges currently handle the majority of O&M dredging needs for the CR FNC. Approximately 6 to 8 MCY of material is dredged from the Lower Columbia River and placed at upland, shoreline, or in-water dredged material placement sites. Ocean placement sites can also be used for material dredged from RM +3.0 to 30. There are two vessel types that the Corps anticipates using to conduct the construction and O&M dredging for Puget Island sump and placement of material on Pillar Rock Island shoreline. Both the Hopper and the Pipeline are considered hydraulic dredges. Hopper dredges are typically self-propelled vessels that provide flexibility for dredging operations because of their maneuverability. They are most often used on small-volume sand wave shoals in the river, on large shoals in the estuary, and in the high-current areas at the mouths of rivers. As shown in Figure 4, hopper dredges use dragheads (1) at the end of drag- or trailer arms (2) located on both sides of the dredge. The dragheads are lowered to the channel bottom, and suction from the pump (3) is used to transport material through the dragarm and into the “hopper” or holding area of the dredge (4). The Corps dredging procedures for hopper dredging (and pipeline dredging below) call for the draghead to be buried in the riverbed during operations or raised no more than three ft off the bottom when the pumps are running to prevent fish entrainment.

Hopper dredges collect dredged material in the hopper until it is near capacity. When the hopper is filled, the dragarms are raised and the vessel moves to the placement site. Some hopper dredges are of the “split hull” type, and some are of the “hopper door” type. Contractor hopper dredges typically employ a split-hull design. In split hull hopper dredges, the hull is split open for discharging and the rate of discharge is varied by how far the hull is opened. The split-hull method of placement is more rapid (time-efficient) than bottom-door hopper dredges and reduces the horizontal dispersal of dumped dredged material on the seabed. The Corps’ hopper dredge, the *Essayons*, utilizes a series of doors located on the hull bottom to release each load of dredged material. The bottom doors are sequentially opened during placement until the entire load of dredged material is released from the vessel, resulting in a gradual release of dredged material from the vessel. In dredges with hopper doors, as the dredge is moving the hopper doors are opened and the material is discharged at varying rates, depending on how many hopper doors are opened. In some cases, the hopper dredge can use its pump to discharge the dredged material directly overboard or through a pipeline to a placement site not accessible by the hopper dredge (e.g. beach, upland or shallow nearshore locations). This process is often referred to as *pump-ashore* dredged material placement. Hopper dredges would likely be used to place material in the proposed Puget Island Sump.

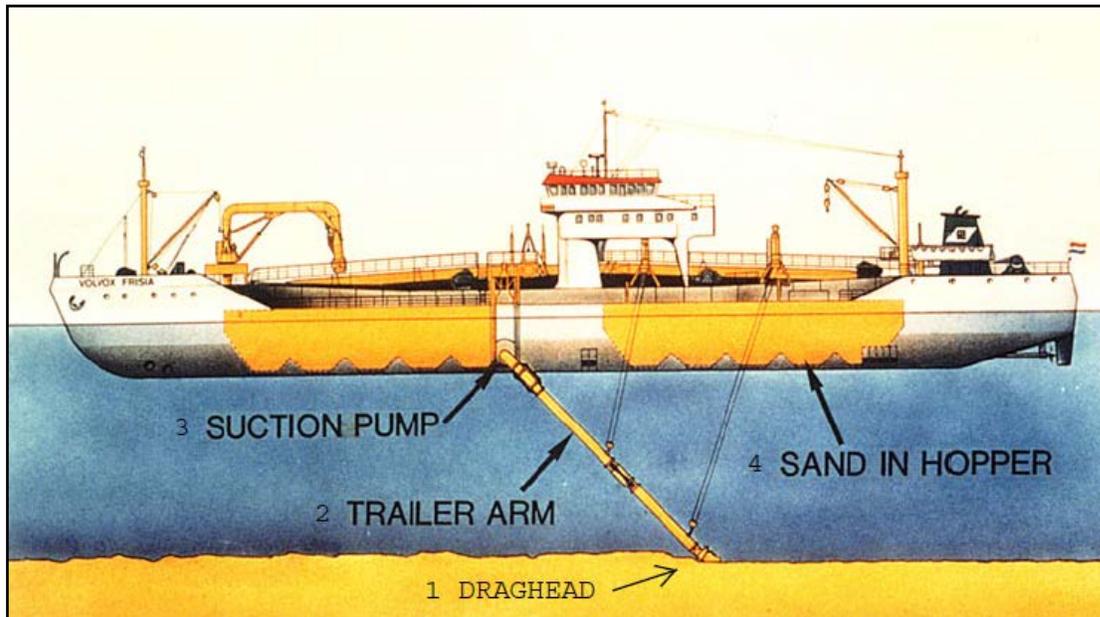


Figure 4. Typical Hopper Dredge schematic.

Pipeline dredges are used for large cutline shoals and areas with continuous sand wave shoals. Pipeline dredging in the Columbia River is typically used to remove material from the navigation channel between river mile (RM) 21 to 106.5. Only those shoals that have formed in a reach are dredged, not the entire reach. A typical shoal would include an area that is 250 to 300 ft wide by 2,000 to 4,000 ft long, though shoals vary in length, width and depth depending on flow conditions. Although many reaches of the navigation channel are annually dredged by pipeline, other reaches may require dredging on a less frequent basis depending upon the hydrographic surveys and flow conditions.

As shown in Figure 5, a pipeline dredge uses a “cutterhead” on the end of an arm that is buried three to six ft deep in the river bottom and swings in a 250- to 300-ft arc in front of the dredge. Spuds extend from the back of the dredge to the river bottom to anchor the dredge in place while the cutterhead and suction arm are in operation. Dredged material is sucked up through the cutterhead and then pumped through the pipes to placement areas; the material is placed in upland sites, beach nourishment sites or in the flowlane. Pillar Rock Island shoreline placement and the construction and operation of the Puget Island sump would be conducted by this type of dredge.

5.1.1. In-Water Placement

In-water dredged material placement is conducted throughout the CR FNC. Placement of materials depends on the condition of the channel each year. Most in-water placement occurs in the flowlane within or directly adjacent to the navigation channel by hopper or pipeline dredge, or by bottom-dump barges used with mechanical dredges. As deeper flowlane areas are filled with dredged material, new deep areas are formed elsewhere as a result of natural river processes. In-water placement typically occurs at depths between 35 to 65 ft, with occasional exceptions, when geologic features situated throughout the Columbia River constrain the channel and require in-water

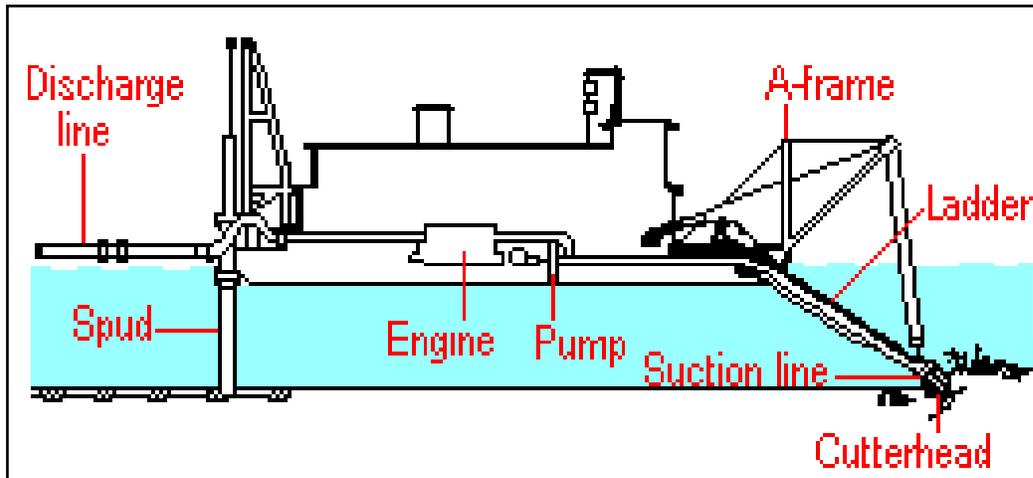


Figure 5. Typical Pipeline Dredge schematic.

placement in water depths as shallow as 20 ft or deeper than 65 ft. The average annual quantity of materials placed in-water is approximately 6.7 MCY. Impacts from in-water placement have already been evaluated in the 1999 EIS, 2003 SEIS and are not be further evaluated in this EA for the overall Network. Effect of in-water placement for the Puget Island sump would have the same effects as the in-water action disclosed in the 2003 SEIS for Harrington Point Sump.

A “sump” is a designated site outside the navigation channel, where a pipeline dredge can reach from the sump location to an upland or shoreline placement site. Sumps are used to most efficiently temporarily store and move material dredged from shoals to upland or shoreline placement sites. Material dredged from shoals may be initially placed in a sump until there is enough material in the sump to make it time and cost-efficient for a pipeline dredge to rehandle the material and place it at the nearby upland or shoreline placement site.

HARRINGTON POINT SUMP (O-21)

There is currently one sump in the CR FNC: the Harrington Point Sump. The Harrington Point Sump, as seen in Figure 6, is located in the flow lane along Rice Island from approximate RM 20 to 22 and is used by hopper and pipeline dredges for placement of dredged material when performing annual maintenance dredging between RM 17 to 25. Portions of the sump may be dredged annually to provide renewed capacity. The sump is dredged to -48 ft mean lower low water (MLLW) with a pipeline dredge and the material is pumped to Rice Island for upland placement. On average, a total of approximately 0.2 to 1 MCY of sand is removed from Harrington Point Sump each time it is dredged. Its overall capacity is approximately 2 MCY.

The amount of dredged material placed in-water via the flowlane or in Harrington Point Sump placement varies from year to year; the effect of the action remains unchanged from the 2003 SEIS and is not further evaluated in this EA.

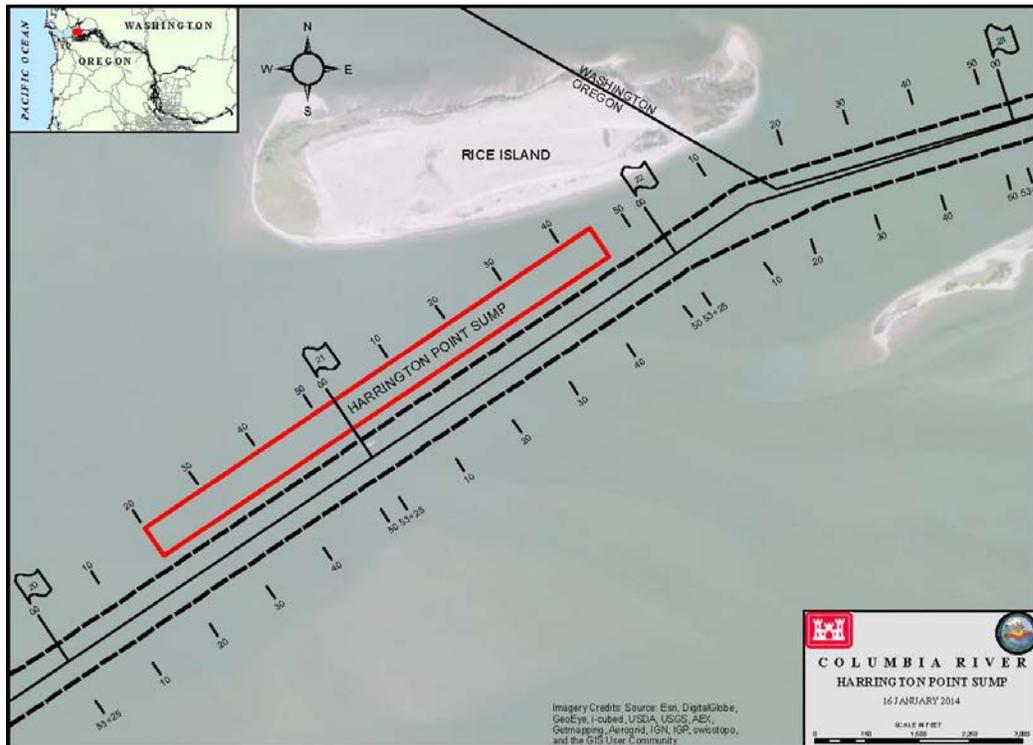


Figure 6. Harrington Point Sump.

5.1.2. Upland and Beach Nourishment/Shoreline Placement Sites

RICE ISLAND (O/W-21.0)

Rice Island, which is located in the lower Columbia River estuary, is composed of approximately 365 acres, including approximately 100 acres of intertidal mudflats along the western and northern shorelines. The linear bar island is generally oriented from east-northeast to west-southwest, and it is bisected by the Oregon-Washington state line. The eastern tip of the island is within the State of Washington. The states of Washington and Oregon own their respective portions of the island. The Harrington Point Sump is located adjacent to Rice Island, between RM 20 and 22.

Rice Island was created in the past with dredged material from the CR FNC. The Corps has used the site for upland placement of dredged material for several decades. The dredged material placement site (Figure 7) covers approximately 264 acres. The portion of the placement site in the State of Washington is approximately 37 acres; the remaining portion of the placement site in the State of Oregon and is approximately 227 acres. The entire placement site is located from approximate RM 21 to 22.3 and at its closest point; the site is 1,000 ft. north of the CR FNC.

The Washington ports' easement from the Washington DNR expires in 2037. Dredged material was last placed on the western tip prior to 2000. The Corps placed approximately 1,000,000 CY dredged material in 2002 on the remaining portion of the island in Oregon. In 2012, site preparation work was



Figure 7. Rice Island.

conducted on the Washington side of the island. In 2013, an estimated 3,350,000 CY of site capacity remained. In 2013, approximately 400,000 CY of dredged materials were placed on the Washington portion of the site.

Almost the entire upland portion of the island is above elevation 10 ft (CRD), up to 73 ft in the southwest portion of the placement area. The vast majority of the placement site is unvegetated, bare sands. One wetland was delineated in the Rice Island placement area in 2013. Wetland A is a 0.06-acre, palustrine emergent (PEMx) wetland-swale feature is located in the eastern portion of the placement area within the State of Oregon. It is approximately 20 ft above the river in the lowest part of a dredged material-settling basin. It was formed as a depression and connecting swale near the vertical drainpipe. The wetland is dominated by hydrophytic plants, including dune willow, soft rush, Baltic rush, and Lyngbye's sedge. The wetland is fed by direct precipitation and subsurface water from precipitation within the eastern drainage basin area. There is no surface hydrologic connection between the wetland and Columbia River. Uplands immediately adjacent to Wetland A are dominated by broom fescue and silver hair grass, interspersed with thistle, yellow flag iris, blackberry, and clover.

One non-wetland aquatic feature, a 0.29-acre man-made pond, is located in the western settling basin, within the placement area in the State of Oregon. This basin area is used to infiltrate water during the placement of dredged material. This perennial retention pond is more than six ft deep, and it is fed by direct precipitation and runoff within the western drainage basin area. There is no

hydrologic surface connection between the pond and Columbia River. Non-native, water milfoil is the dominant submerged aquatic vegetation in the pond (Corps, 2013a unp.).

Several bird species have been observed on the site, with nesting by gulls along the northwest portion of the site in 2013. Fishermen use the island for shoreline fishing. The island has habitat for waterfowl, shorebirds, and sporadic aquatic mammals on the shores.

MILLER SANDS (O-23.5)

The Miller Sands dredged material placement site (Figure 8) is a horse shoe-shaped shoreline placement site. It forms a spit island in the lower Columbia River estuary, from approximate RM 22.2 to 24.6. The curvilinear site is oriented east to west with a sheltered embayment on the southern side.



Figure 8. Miller Sands Island.

Historically, the site was formed as a flow control structure, approximately three miles long. It was a 90-acre site used primarily for the dredged material placement from the Miller Sands Bar. Currently, the site is approximately 117 acres. At its closest point, the site is approximately 400 ft south of the CR FNC. The Miller Sands site is in Clatsop County, Oregon.

The site is owned by the State of Oregon and the Port of Portland has a 25-year easement with Oregon DSL for placement by the Corps, expiring in 2030. Since the site is continually eroded by river currents, the available placement capacity is not fixed and it varies year to year. Shoreline

placement occurred in 2007 on the center portion of the upstream edge, in 2008 on the upper portion of the upstream edge, in 2010 and 2011 on the center of the site, in 2012 on the downstream end of the site and the lower portion of the upstream edge, and in 2013 on the center of the upstream edge. Approximately 150,000 CY were placed in 2013.

The elevations on the site range from 0 ft (CRD) at the waterline to approximately 25 ft along the northern face at the site's midpoint. The site is relatively level, consisting of open sands. No wetland delineation has been conducted on the Miller Sands site. Beach grass, sparse shrubs, herbaceous plants, and trees form the southern edge of the site. The embayment south of Miller Sands site is sheltered from the mainstem flows by the placement site. The embayment has a network of mud flats, tidal marsh, and sub-tidal waters and provides high value habitat for foraging shorebirds, waterfowl, eagles, other birds, and aquatic mammals. A secondary island is also located south of the site, separated by a narrow, tidal channel at the upstream end of the placement site. The secondary island is vegetated with numerous trees, shrubs, and grasses.

PILLAR ROCK ISLAND (O-27.2)

Pillar Rock Island, which is in the Columbia River estuary, is an dredged material placement site. The linear island is oriented east to west and it is within the Lewis and Clark National Wildlife Refuge. Historically, the island was a shoal and past placement practices in the 1980s and 1990s increased the island elevation. The current dredged material placement site (Figure 9) on the island is approximately 52 acres. Pillar Rock Island is in Clatsop County, Oregon. The site is located from approximate RM 26.8 to 28. At its closest point, the island is approximately 1,100 ft south of the CR FNC.

The site is owned by the State of Oregon and the Port of Portland has a 25-year easement with Oregon DSL for placement by the Corps. The Port of Portland's easement from the Oregon DSL expires in 2030. The Corps placed material on the downstream and middle portions of the site in 2000 and on the upstream quarter of the site in 2001. Approximately 250,000 CY were placed in 2001. In 2003, the estimated upland site capacity for placement of dredged material was 2,555,000 CY. Since the site is continually eroded by river currents, the site's available capacity is not fixed and it varies year to year. Between 2003 and 2013, approximately 32% of Pillar Rock Island eroded away, primarily from the north side of the island.

The elevations on the island range from 0 ft (CRD) at the low waterline to approximately 30 ft on the northern bank. Steep 10 to 25 ft banks exist along portions of the island but the island interior is relatively level. Much of the placement site is covered in sandy dredged material. Stands of young cottonwoods, scattered shrubs, and forbs with grasses are visible on the island. The presence of vegetation is due to Corps limited use of the site in the past five years. The upstream edge of the island has eroded away. The downstream end of the island has two pile dikes approximately 500 ft and 700 ft long. Both pilings are located outside the placement site. These pilings run perpendicular to Pillar Rock Island.

There are approximately 430 acres of protected tidal flats and marsh located over 250 ft to the south of the placement site, along the southern side of the island. 400 acres of the tidal flats are intertidal. 30 acres are estuarine wetlands.



Figure 9. Pillar Rock Island.

These aquatic habitats developed over time due to the wind and current protection provided by the placement area. The island and tidal wetlands are used by waterfowl during the fall and winter and aquatic mammals throughout the year. Mudflats and intertidal marsh areas are used by shorebirds. Approximately 20 acres of unprotected intertidal shallow water habitat run along the north side of the island. The eroding northern shore is a steep slope that drops from 0 ft CRD to below -20 ft CRD within 150 ft from shore. Approximately 2 acres of sandy beach line the northern end of the island, backed by 31 acres of sandy, grassy uplands. A 100 ft wide riparian vegetation buffer runs east/west through the center of the island.

SKAMOKAWA-VISTA PARK (W-33.4)

The Skamokawa-Vista Park, which is located in the upper Columbia River estuary, is a multi-use county parcel. The park is on the northern bank of the Columbia River, at RM 33.4, downstream of Skamokawa Creek.

Historically, the dredged material placement site was used for several years and was then developed into a county park. The current placement site (Figure 10) is approximately 15 acres and it is approximately 2,400 ft long. The site is currently used as a shoreline and upland placement site from which materials are excavated by others. The site is located in Wahkiakum County, Washington. At its closest point, the site is approximately 200 ft northeast of the CR FNC.



Figure 10. Skamokawa-Vista Park Upland/Beach Nourishment Site,

The site is owned by the Port of Wahkiakum II and the other Washington ports are pursuing a multi-year easement for placement by the Corps. Since the riverward portion of site is continually eroded by river currents and the upland area has sand removal activities by others, the site capacity is variable year to year. In 2012, approximately 150,000 CY were placed over the entire site.

The elevations on the site range from 2 ft (CRD) at the waterline to approximately 22 ft at the highest point in the site's center. The site has a steep 10 to 12 ft edge on the upstream portion of the site that is adjacent to an open area of the park. The downstream portion of the site has a gentle slope from the waterline to the landward edge of the site, adjacent to a forested edge of the park. Minimal wildlife use is associated with the site due to the human recreational use of the park and limited available habitat. The adjacent park and forestlands are used by songbirds and small mammals.

WELCH ISLAND (O-34.0)

Welch Island, which is located in the upper end of the Columbia River estuary, is approximately 950 acres with multiple interior waterways. Welch Island and Tenasillahe Island form a discontinuous island, separated by a narrow waterway called Multnomah Slough. Welch Island is within the Lewis and Clark National Wildlife Refuge. Historically, the Corps' placement area on Welch Island was used for both upland and shoreline placement of dredged materials. Currently, the Corps utilizes a 41-acre area (Figure 11) for upland placement on the northeast bank of Welch Island in Clatsop County, Oregon. The site is located from approximate RM 33.5 to 34.5. At its closest point, the site is approximately 2,800 ft southwest of the CR FNC.



Figure 11. Welch Island.

The site is owned by the State of Oregon. The Port of Portland acquired a 25-year easement with Oregon DSL for upland placement by the Corps which expires in 2030. In 2003, the estimated site capacity for placement of dredged material was 400,000 CY. The most recent action by the Corps was the placement of approximately 400,000 CY over 40 acres in 2008. In 2013, the revised site capacity was 700,000 CY.

The elevations on the Corps' placement site range from 0 ft (CRD) at the low waterline to approximately 36 ft along the face of the downstream portion. The site is generally level, but gently increases in elevation from upstream to downstream. The majority of the Welch Island placement site is devoid of vegetation. A few scattered shrubs and grasses are visible in the central portion of the site. The landward (southern) boundary of the site is a forested riparian edge. The shoreline of the placement site is utilized by foraging shorebirds. In March 2009, the USFWS funded habitat restoration trials on Welch Island, which involved tilling plots of land on the upstream quarter of the site. The Corps is not aware of any further actions on the site. The remainder of Welch Island, outside of the placement site, ranges from 4 ft to 12 ft. The majority of Welch Island outside the Corps placement site is dominated by tidal scrub-shrub and emergent wetlands. The adjacent wetlands on Welch Island provide high-quality wildlife habitats for birds and aquatic mammals.

TENASILLAHE ISLAND (O-38.3)

Tenasillahe Island, which is located in the upper end of the Columbia River estuary, is approximately 2,050 acres. Tenasillahe Island is generally heart-shaped and it is approximately 2.8 miles long by

1.7 miles wide. Tenasillahe Island is separated from the Oregon mainland by Clifton Channel. Tenasillahe Island is within the Julia Butler Hansen National Wildlife Refuge for Columbian white-tailed deer.

Historically, the Tenasillahe Island placement site was a shoreline placement site. Currently, the Corps utilizes a 41-acre site (Figure 12) on the southeastern, upstream tip of the island for upland placement. This tip of the island encompasses approximately 105 acres and is separated from the rest of Tenasillahe Island by a narrow tidal flat. The placement site is located from approximate RM 37.9 to 38.4, in Clatsop County, Oregon. The site is generally oriented south to north and at its closest point, it is approximately 1,000 ft west of the CR FNC.



Figure 12. Tenasillahe Island.

The site is owned by the State of Oregon and the Port of Portland has a 25-year easement with Oregon DSL for placement by the Corps, which expires in 2030. The downstream portion of the site was last used for placement prior to 2000. In 2003, the estimated site capacity for placement of dredged material was 2,300,000 CY. In 2012, material was placed in the remaining upstream portion of the site, excluding an area where streaked horned larks were nesting in 2012. In 2013, the revised site capacity was 1,270,000 CY. In 2013, 300,000 CY of material were placed on the upstream portion of the site, excluding an area where larks were nesting in 2013. The 2013 lark nesting location was different from the 2012 location.

The elevations on the Corps' placement site range from 5 ft (CRD) at the low waterline to approximately 38 ft in southern portion of the site. The site is generally level, but gently slopes from upstream to downstream. A pile dike is located off the southeast corner of the site.

The northern portion of the site is dominated by grasses, but has a row of shrubs and trees in the center. The western and northern boundary of the site is bound by trees that transition to an adjacent tidal wetland and marsh. One 0.17-acre wetland was delineated in the northeast portion of the placement site. The wetland is classified as a palustrine shrub scrub (PSS) wetland-swale that is hydrologically connected to Columbia River during periodic high river flows. (Corps, 2013b unp.) The dominant wetland vegetation is dune willow, red-osier dogwood, reed canary grass, and cocklebur. The adjacent upland vegetation with the placement area is dominated by scotch broom, blackberry, and silver hair grass, interspersed with thistle. The bank area provides a narrow foraging area for wading and shorebirds. The western site boundary of trees and shrubs provides additional riparian habitat for birds, small mammal, and other wildlife. Bald eagles were historically known to nest near the Tenasillahe Island placement site.

JAMES RIVER (O-42.9)

The James River site, which is on the south bank of the Columbia River and immediately downstream of the lower entrance to Westport Slough, is located near RM 42.9 of the Columbia River. The site (Figure 13) is irregularly shaped and has an access road from State Highway 30 that crosses the Portland and Western Railroad. The site is in Clatsop County, Oregon.

Historically, the site was used as an upland placement area for dredged material from federal navigation channels. Trees were removed in the past by the owner to expand the site to its current extent of 53 acres. The upland placement site is actively used by the land owner and others that periodically remove placed sediments. At its closest points, the Corps' upland placement site is approximately 400 ft south of the CR FNC and approximately 600 ft west of the Westport Slough and Wahkiakum Ferry FNCs.

The site is owned by a private landowner and the Port of Portland has a 20-year easement for placement by the Corps, which expires in 2027. The Corps has not used the site since before 2000. In 2003, the estimated site capacity for placement of dredged material was 1,280,000 CY. In 2013, the revised site capacity was 1,350,000 CY.

The elevations on the placement site range from 10 ft (CRD) in the unused portions of the site to 30 ft along the top of the containment berm. The berm extends along the western, southern, and eastern boundaries of the 53-acre site. The recently used or disturbed portions of the site are bare sand, while the remaining portions of the site are covered in grasses and shrubs. Much of the site has been actively graded and leveled due to use by others and the Corps placement of dredged materials. The

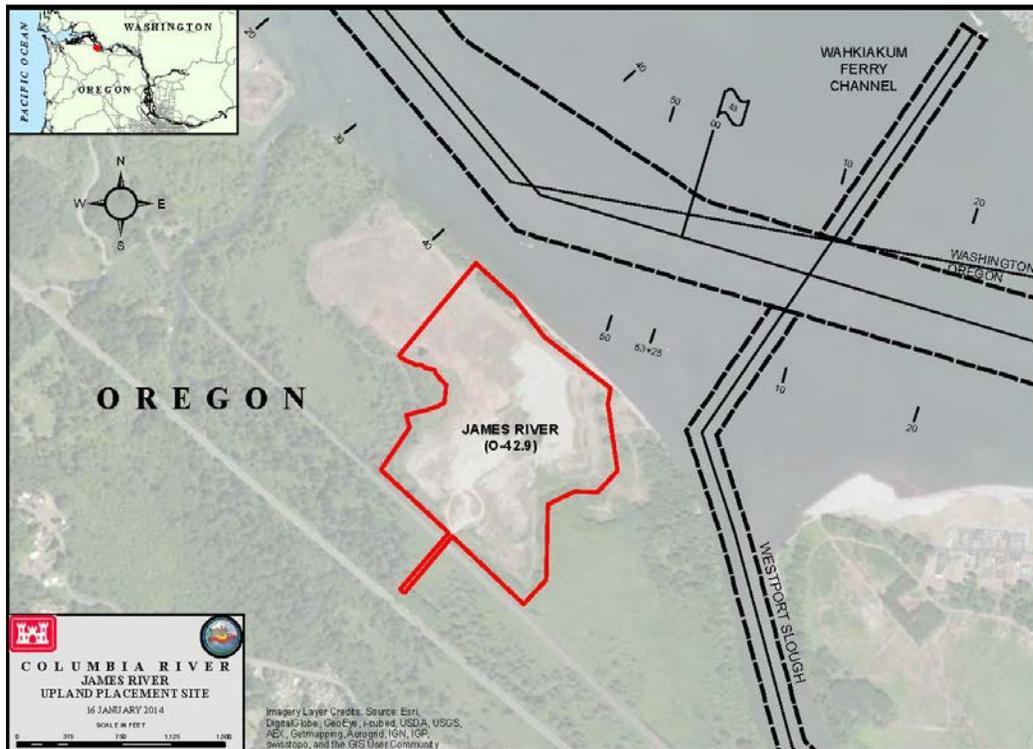


Figure 13. James River.

site provides limited wildlife habitat due to its frequent use and disturbance by the landowner. The Columbia River is the northern site boundary and the railroad is the southern boundary. An open grassy area is adjacent to the northwest portion of the site and the remaining adjacent lands area forested. The adjacent upland habitats are used by songbird, deer, and small mammals.

PUGET ISLAND (W-44.0)

Puget Island, which is located in the lower Columbia River, is approximately 4,785 acres and it is oriented southeast to northwest. Cathlamet Channel separates Puget Island from the Washington shoreline. Puget Island has multiple sloughs and several smaller islands along its perimeter. The majority of Puget Island is protected by levees that sever direct hydrologic surface connections for the interior sloughs. Puget Island is entirely within the State of Washington. The footprint of the site is smaller than what was declared in the 2003 SEIS due to real estate issues for one parcel.

Historically, the Puget Island site has been in agricultural use. The Puget Island upland placement site (Figure 14) is located in the southern interior of Puget Island, near RM 44. The Corps' 96-acre placement site (approximately 2% of the entire island) is bound by East Sunny Sands Road to the south and agricultural fields on the remaining sides. The roughly rectangular site is in Wahkiakum County, Washington. At its closest point, the Corps' placement site is approximately 2,000 ft north of the CR FNC. The Puget Island Sump is located immediately south of the placement site, at RM 44.



Figure 14. Puget Island Upland site.

The site is composed of six contiguous properties, five of which are owned by ports in Washington and one by a private landowner. The Corps has 20-year right of entry (ROE) agreements for the five properties owned by the Washington ports, expiring in 2025 or 2030. The Washington ports are currently in negotiation for access to the private property. As required by the Ports' the pending easement, the site would be reseeded with grass after each placement. Trees would be planted along the perimeter of the site to prevent wind erosion of the sand onto adjacent properties. The landowner may lease the site for cattle between placement events. The Corps has not placed material at the site. In 2013, the site capacity was 3,500,000 CY.

The sites elevations range from 5 ft to 10 ft (CRD) across the site. East Sunny Sands Road, south of the site, is a levee with a road top elevation of 16 ft. The site is generally flat due to agricultural practices. The site is partitioned by narrow fence lines that have scattered shrubs along their lengths. Farmed wetlands are known on the site and account for approximately 5.4 acres. The upper end of Gilbertson Slough extends west from the site. Due to existing levees, the site does not have a direct hydrologic surface connection to the Columbia River. The site has limited wildlife habitat value beyond foraging of croplands by birds and small mammals. The adjacent parcels are active farm lands and have limited wildlife habitat values. Deer, songbirds, raptors, waterfowl, and small mammals utilize the adjacent agricultural lands for foraging and resting.

The proposed Puget Island Sump is to the south of Puget Island in waters with ranging with depths of the existing riverbed from approximately -30 to -40 ft. The material to be pumped upland is anticipated to be coarse-grained, based on the proximity of the sump area to the coarse-grained

sediments of the FNC and the occurrence of sandy beaches on the river banks. The proposed sump location straddles the Wauna/Driscoll and the Westport Bar shoals. Shoals within this reach are typically formed by sandwave shoals, quickly moving shoals that have the potential to increase in size and severity over time. Shoals form as the sand waves grow in height while they migrate downstream. Sand waves move downstream as sediment erodes from the upstream face, deposits in the downstream trough and is then buried by additional material eroded from the upstream face. This movement occurs in a layer only a few sand grains thick. Through this mechanism, all the individual grains in a sand wave are exposed to flow, eroded, transported, deposited, buried, and then eventually exposed again as the sand wave migrates downstream.

BROWN ISLAND (W-46.3)

Brown Island is located off the upstream end of Puget Island in the Columbia River and is approximately 170 acres. Brown Island is currently connected to Whites Island but they are separated from Puget Island by Cut-Off Slough. Historically, the placement site was a shoreline extension to Brown Island to reduce downstream erosion and to provide an upland placement area on the upstream end. This work was done to promote wildlife use in the created uplands. The Corps' upland placement site (Figure 15) currently encompasses 102 acres on the upstream portion of Brown Island. The site is from RM 45.8 to 46.9, in Wahkiakum County, Washington. At its closest point, the upland placement site is approximately 1,200 ft north of the CR FNC.

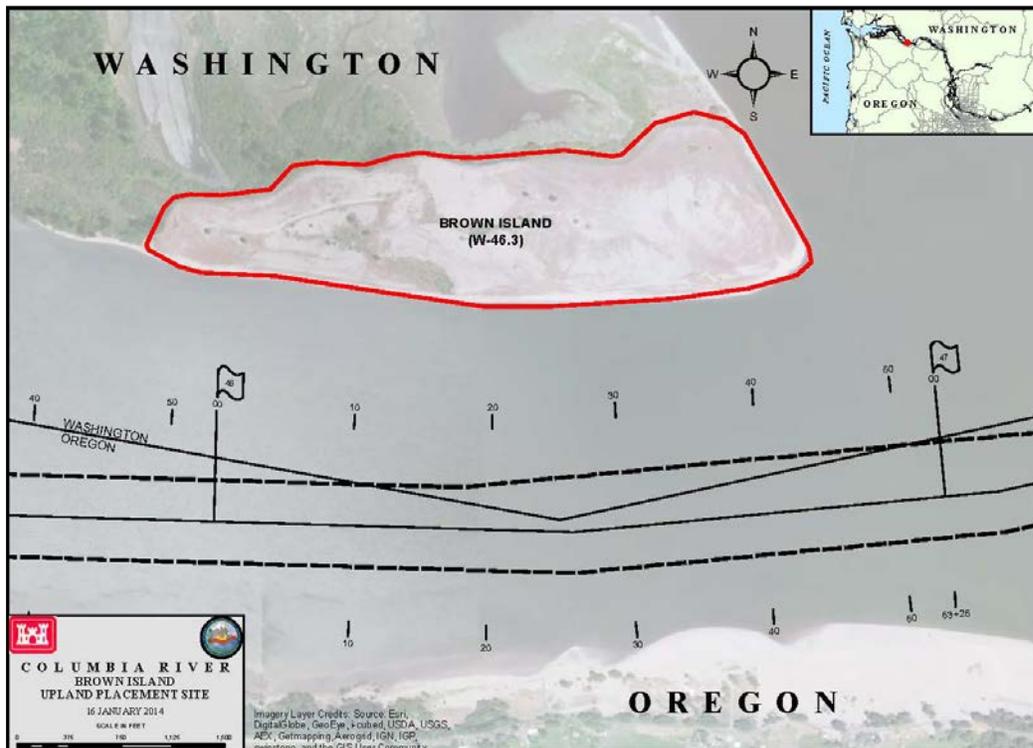


Figure 15. Brown Island.

The site is owned by the State of Washington and the Washington ports have a 30-year easement with Washington DNR for placement by the Corps expiring in 2037. In 2003, the estimated site capacity for placement of dredged material was 4,700,000 CY. Material was placed on the entire site footprint in 2006. In 2011, 200,000 CY of material was placed in the upstream portion of the site. In 2013, the site capacity was 4,700,000 CY.

The elevations on site range from 5 ft (CRD) at the low water line to 50 ft in the west-central portion of the site and 56 ft at the upstream bank. The perimeter of the site has steep banks of 10 to 40 ft in height. The upstream portion of the site is bare sand while the lower third is vegetated with sparse grasses. A few scattered shrubs are visible in the central portion of the site. Waterfowl have nested on the upland portion of the site. The adjacent portions of Brown Island have elevations of 5 to 15 ft (CRD). Wetlands and several tidal channels occur north and west of the placement site. The marsh habitats are used for foraging, resting, and rearing young waterfowl.

CRIMS ISLAND (O-57.0)

Crims Island is located in a bend of the lower Columbia River and it is separated from the Oregon shoreline by Bradbury Slough. Gull Island is located on the northern (downstream) end of Crims Island. Crims Island is dissected by several natural and manipulated waterways.

Historically, this site was used as a beach nourishment site on a former sand spit to shelter adjacent wetlands on Crims Island. The Corps' 59-acre, upland placement area (Figure 16) is oriented southeast to northwest, upstream of Crims Island. The placement area is separated from Crims Island by a narrow channel. The placement area is located from approximate RM 56 to 57, in Columbia County, Oregon. A pile dike protects the upstream end of the placement area. Three short pile dikes extend perpendicular from the northeastern shore of the placement site. At its closest point, the upland placement site is approximately 2,400 ft southwest of the CR FNC.

The site is owned by the State of Oregon and the Port of Portland has a 25-year easement with Oregon DSL for placement by the Corps. The Port of Portland's easement from the Oregon DSL expires in 2030. The downstream third of the site has not had material placed since before 2000. In 2003, the estimated site capacity for placement of dredged material was 1,600,000 CY. In 2008, the upper two thirds of the site received dredged materials. In 2010, approximately 250,000 CY of dredged materials were placed in the upstream end of the site. In 2013, the revised site capacity was 880,000 CY.

The elevations on site range from 5 ft (CRD) at the low waterline to 40 ft in the center of the site. The downstream (west) portion of the site tapers to a point and it has a level elevation of 12 ft. The downstream, tapered portion of the site is vegetated with grasses and herbaceous cover, and a few shrubs and trees. The 40-ft high center of the site is relatively flat. The upstream portion of the site is concave from 38 ft at its edge down to 20 ft in the center. The central and upstream portions of the 59-acre site are largely bare sand with very little vegetation and scattered shrubs. Known wildlife use of the site includes waterfowl and shorebirds. The adjacent land, west of the site, is forested, with an elevation of approximately 16 ft. This forested area is densely covered with cottonwood trees and it has a marshy margin along the narrow channel. Nearby eagle nests are known on Crims Island and Gull Island. Shorebirds and waterfowl use both islands.

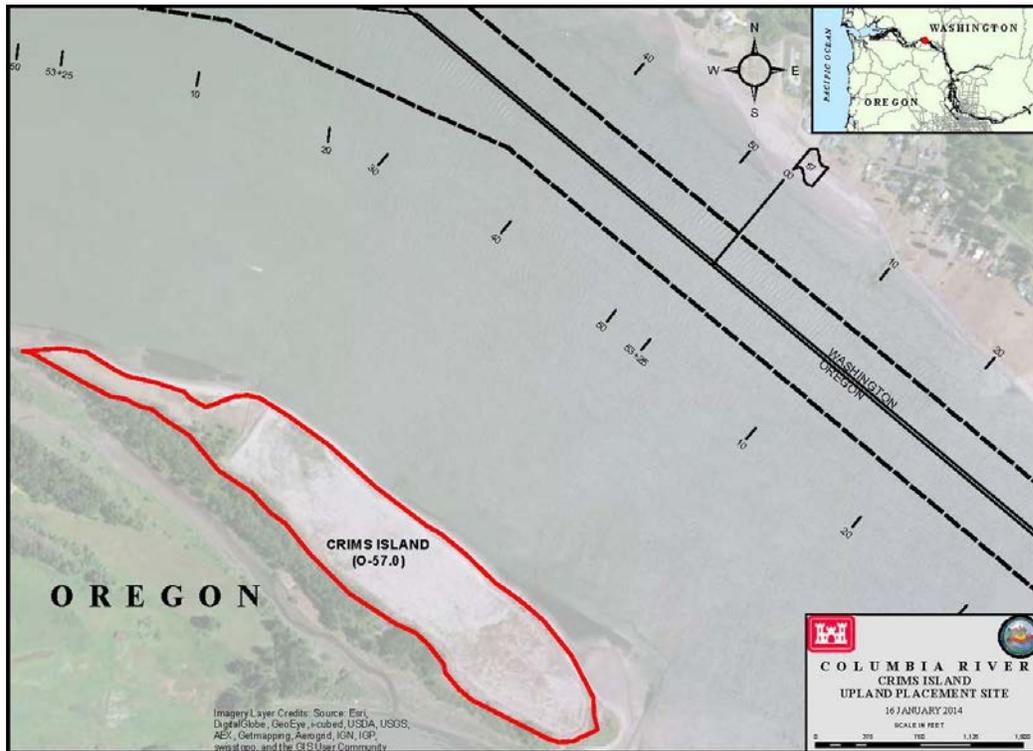


Figure 16. Crims Island.

HUMP ISLAND (W-59.7)

Hump Island, which is located in the middle reach of the lower Columbia River, is approximately 77 acres. The linear island is oriented from southeast to northwest. The southeastern end of Hump Island is connected to Fisher Island by mudflats and vegetated lowlands. Hump Island is south of Fisher Island, separated by a shallow lagoon. Fisher Island Slough is a side channel of the Columbia River that separates Fisher Island from the Washington shoreline.

Historically, the Hump Island site had extensive placement activities since it acts as a flow control structure. As a properly functioning flow control structure, Hump Island minimizes the need for maintenance dredging of the CR FNC. Repeated upland placement and grading is necessary to maintain proper functioning. The Corps' 65-acre placement area (Figure 17) covers the riverward shore and inland area of Hump Island from its downstream (northwest) end to the island's upstream connection with Fisher Island. The site is in Cowlitz County, Washington, from RM 58.6 to 60.3. At its closest point, the Corps' upland placement site is approximately 500 ft north of the CR FNC. The site is owned by the State of Washington and the Washington ports have a 30-year easement with Washington DNR for placement by the Corps, which expires in 2037. No materials have been placed on site since before 2000. In 2003, the estimated site capacity for placement of dredged material was 1,500,000 CY. In 2013, the revised site capacity was 550,000 CY. The elevations of the placement site range from 10 ft (CRD) at the low water line to 30 ft at the downstream end.

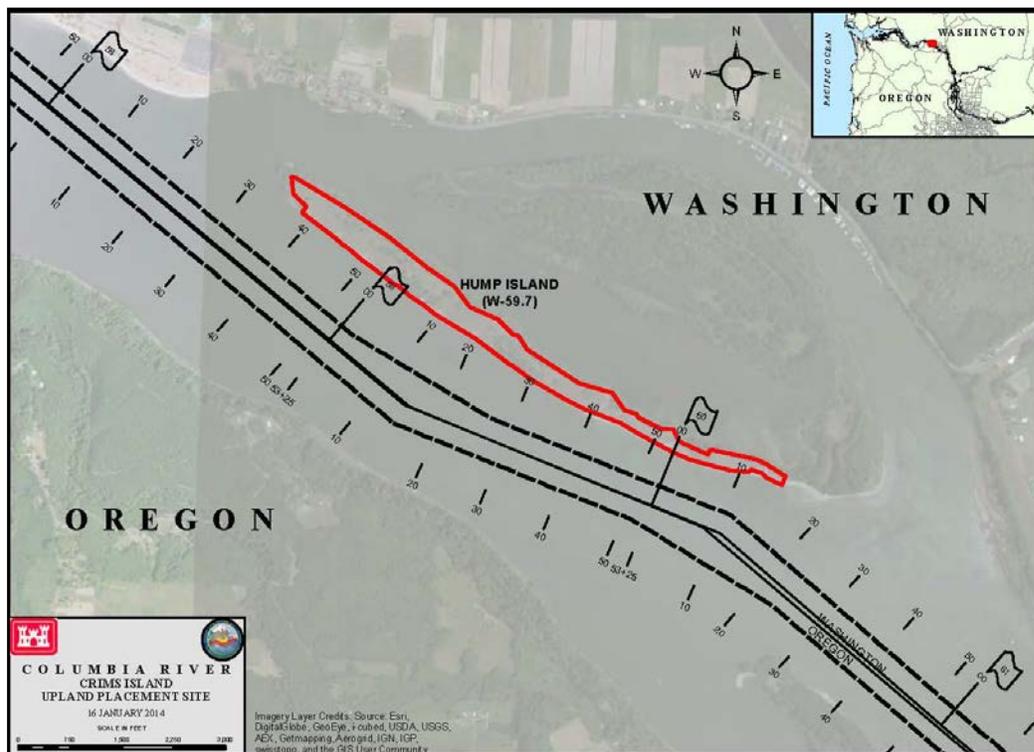


Figure 17. Hump Island.

The site is vegetated with grasses, woody shrubs, saplings, and trees. Dominant vegetation includes Scotch broom, cottonwood, blackberry, barnyard grass, and brome grasses. No wetlands were delineated within the Corps placement site in 2013 (Corps, 2013c unp.). Fishermen use the site for shoreline fishing. The 10-acre riparian area on the backside (north) of the island ranges in elevation from 0 to 15 ft (CRD). The riparian area is densely vegetated and dominated by trees, shrubs, and blackberries. Tidally and non-tidally influenced forested wetlands were observed north of the riparian buffer. Historically, waterfowl and eagle nesting are known to occur near the site. The lagoon between the islands provides avian foraging habitat, as well as tidal and sub-tidal aquatic habitats for fish and small mammals.

LORD ISLAND UPSTREAM (O-63.5)

Lord Island, which is located in the middle reach of the lower Columbia River, is approximately 415 acres, excluding intertidal mudflats along the northwestern shorelines of the island. A 2,000-ft long pile dike runs parallel to the upstream end of the island, approximately 200 ft from shore. Lord Island is oriented from southeast to northwest.

Historically, the Lord Island placement site was an upland site that became vegetated with alder and cottonwoods. The current 24-acre upland dredged material placement site, Lord Island Upstream, (Figure 18) is situated on the southern-most tip of the island across from Longview, Washington. The site is located from approximate RM 63.4 to 63.8, in Columbia County, Oregon. At its closest point, the site is approximately 750 ft southwest of the CR FNC.



Figure 18. Lord Island, Upstream.

This island is owned by the State of Oregon and the Port of Portland has a 25-year lease with Oregon DSL for placement by the Corps, which expires in 2030. In 2003, the estimated site capacity for placement of dredged material was 1,500,000 CY. In 2009, approximately 200,000 CY of material was placed over the entire footprint. In 2013, the revised site capacity was 550,000 CY. The dredged material placement site elevations range from 10 ft (CRD) at the low waterline to 56 ft at its high peak. Steep 20 to 40 ft banks drop off along the edges of the site to the Columbia River. The interior of the dredged material site slopes to the island profile adjacent to the dredged material placement site. The placement site's riparian edges are primarily vegetated with cottonwood trees. The vast majority of the Lord Island Upstream site is unvegetated, bare sands. Patches of Himalayan blackberry, dune willow, and Scotch broom populate the sandy interior parts of the dredged material placement site. The eastern tip of the site is dominated by dune grasses. An established riparian forest lies to the west and northwest boundary of the dredged material placement site. The remainder of Lord Island, aside from the dredged material placement site, is covered with riparian forest and shallow channels. The island is used for fishing access and waterfowl, foraging and resting.

DIBBLEE POINT (O-64.8)

The Dibblee Point peninsula is on the southern bank of the Columbia River, in Columbia County, Oregon. The point was created from dredged material placement. The artificial peninsula has been heavily modified over time by land clearing, dredged material placement, and excavation activities. Portions of the peninsula have been undisturbed and are vegetated with mature trees and shrubs.

The entire Dibblee Point peninsula was historically used for placement of dredged material. Currently, the approximately 52-acre placement site is used as an upland placement and borrow site. An approximately 500-ft long pile dike runs perpendicular out from the dredged material placement site. The site (Figure 19) is between RM 64 and 65, downstream of Rainier, Oregon. At its closest point, the site is approximately 650 ft southwest of the CR FNC.



Figure 19. Dibblee Point.

The site is owned by the State of Oregon and the Port of Portland has a 25-year lease with Oregon DSL for placement by the Corps expiring in 2030. In 2003, the estimated site capacity for placement of dredged material was 2,235,000 CY. In 2009, 1,500,000 CY of the material was placed over the entire site. The site was last used in 2010 for placement of 1,000,000 CY of material from the Columbia River Channel Improvement Project (CRCIP). Since the site is an active borrow site, its long-term capacity varies as material is removed by others.

The elevations on the site range from 10 ft (CRD) at the waterline to 65 ft in the western portion of the placement area. The southwest corner of the property is utilized by a sand and gravel mining operation. The Dibblee Point site is a well-used site and is sparsely vegetated with grasses with some shrubs clustered throughout the site. The west, south, and east perimeters of the current site boundary are comprised of well established stands of hardwoods. Outside of the placement site boundary, the ground surface slopes downhill from the center of the peninsula to the Columbia River on the north and towards a backwater slough to the south. Portions of this peninsula are heavily vegetated with mature cottonwoods, while other areas contain wetlands and pond areas. There is a tidal marsh to the

south of the buffer of cottonwoods and willows. The peninsula shoreline is used for fishing access, while the backwater slough is used for waterfowl resting.

HOWARD ISLAND (W-68.7)

Howard and Cottonwood Islands were combined into an approximately 950-acre island during dredging and placement activities following the Mount St. Helen's eruption. This larger island extends from RM 68.2 to 71.7 of the Columbia River. The island is composed of two placement areas, Howard Island and Cottonwood Island, as well as forests, shrub lands, wetlands, ponds, and several waterways. A disturbed area is largely a dredged material placement site, with approximately 500 acres of exposed sand or sand covered by a layer of moss and lichen. Carrolls Channel, on the northern and eastern sides of the larger island, separates the island from the Washington shoreline.

Historically, the Howard Island site was used as an upland and beach nourishment site. This site has been used for approximately 50 years. Currently, the Corps has a 315-acre site (Figure 20) for upland placement on the downstream end of the larger island. The Howard Island Site is located from RM 68.2 to 70, in Cowlitz County, Washington. At its closest point, the site is 450 ft northeast of the CR FNC.

The site is composed of two parcels, separately owned by the Washington ports and the State of Washington. The Corps' 20-year ROE agreement for the ports-owned parcel expires in 2033. The Washington ports have a 28-year easement with Washington DNR for the State's parcel for placement by the Corps that expires in 2037. In 2003, the estimated site capacity for placement of dredged material was 6,400,000 CY. Approximately 200,000 CY of material was placed on the downstream side of Carrolls Channel in 2007. The remainder of the site has not been used since prior to 2000. In 2013, the revised site capacity was 2,700,000 CY.

The site elevations range from 10 ft (CRD) at the waterline to 50 ft at the downstream tip of the site. Although the site slopes from northwest to southeast based on past placement efforts, it is uniformly level along certain reaches. There are steep banks (20 ft banks) that drop off to the Columbia River and Carrolls Channel. The vegetated area consists of mixed deciduous habitat. A lowland area with a pond and wetlands are located adjacent to the northwestern site boundary and Carrolls Channel. A small drainage channel runs north from the pond into the channel. The wetland area is avoided during placement activities. The site is used by deer, songbirds, and small mammals.

Forests, wetlands, and a former, inactive placement area abut the placement site's northeastern and eastern boundary. There are several ponds situated on the island near the site. Eight pile dikes are situated along the Columbia River side of the island, and other navigation aids and groins are distributed along the shoreline. The Corps also maintains a 110-acre wildlife mitigation site on Port-owned lands in the center of the Howard-Cottonwood Island that was constructed as part of the 43-ft Columbia River channel improvement project in 2011. The wildlife mitigation site includes tree and shrub plantings and wetland habitat. In 2012, the USFWS planted about 16 acres of forage grass for Columbian white-tailed deer on Port-owned lands outside the placement area. While there is no direct access to the island, the area is not closed to the public and it is commonly used as a recreational site for camping and fishing. Bald eagles nest on the island and the waters around the island are regularly used for waterfowl hunting.



Figure 20. Howard Island.

COTTONWOOD ISLAND (W-70.1)

As described in the Howard Island narrative, Cottonwood and Howard Islands were combined into one island following emergency dredging in the wake of the Mount St. Helens eruption. Historically, the Cottonwood Island site was a beach nourishment site prior to the Mount St. Helens placement. The site has been continuously used for placement and the Corps currently uses the 62-acre site (Figure 21) for upland placement on Cottonwood Island. The site is located on the interior of the island, at the upstream end of the larger island. The Cottonwood Island site is located from RM 70.5 to 71.5, in Cowlitz County, Washington. At its closest point, the site is approximately 600 ft east of the CR FNC.

The site is owned by Washington ports and is available for placement by the Corps. The Corps' 20-year ROE agreement from the Washington ports expires in 2027. In 2003, the estimated site capacity for placement of dredged material was 3,200,000 CY. In 2008, approximately 1,400,000 CY of material was placed on the upstream half of the site. In 2013, the revised site capacity was 640,000 CY. The elevations on the site range from 20 to 30 ft (CRD) in upstream half of the site to 30 to 60 ft in the downstream portion of the site. Unlike Howard Island, the Cottonwood Island site does not abut the Columbia River or Carrolls Channel. The downstream portion of the site has a few stands of trees but it is largely covered by grasses, mosses, and lichens. The elevated, upstream portion of the site is covered by grasses, mosses, and lichens. Waterfowl are known to rest on the site and the site is used by deer, songbirds, and small mammals. In 2012, the USFWS planted forage grass for Columbian white-tailed deer on a portion of the site filled in 2008.



Figure 21. Cottonwood Island.

Forests and open lands abut the placement site. There are steep banks dropping to both the Columbia River and Carrolls Channel along the upstream reaches of this island. The island has some beacons and five timber pile dikes adjacent to or on the site. There are visible trails, but no developments are on the island other than the Corps wildlife mitigation site discussed in the Howard Island narrative above. There is no direct access to the island, but recreational camping and fishing has been observed. Bald eagles nest on the island and the waters around the island are used for waterfowl hunting.

NORTHPORT (W-71.9)

The Northport placement site is on a peninsula contiguous with the Port of Kalama. The peninsula is located on the eastern shore of the Columbia River from RM 71.7 to 72.2. The Port's developed land is from the upstream entrance to Carrolls Channel south to the Kalama River. This area includes the Port of Kalama's waste water treatment area, open industrial land, and an active industrial dock.

Historically, the Corps used the Northport site as a shoreline placement area. The Corps has a 31-acre site (Figure 22) for upland placement that others use to borrow materials. Only 27 acres are currently used for upland placement and borrowing activities. The site is on the downstream end of the Port's property, in Cowlitz County, Washington. At its closest point, the site is approximately 1,000 ft west of the CR FNC.



Figure 22. Northport.

The site is owned by the Port of Kalama and is available for placement by the Corps. The Corps' 20-year ROE agreement from the Port of Kalama expires in 2024. In 2003, the estimated site capacity for placement of dredged material was 900,000 CY. Approximately 500,000 CY of material was placed on 27 acres of the site in 2008. In 2013, the revised site capacity was 200,000 CY.

The elevations on the site range from 10 ft (CRD) to 41 ft. The western, riverward site boundary is 30 to 20 ft above the river. The site was used by others to excavate placed dredged materials. This property is routinely traversed by vehicles and heavy equipment. A relic weir remains on the site, surrounded by dense Scotch broom. Portions of the site are covered in sparse moss, grasses, and lichens, as well as excavated bare areas. Streaked horned larks are known to use the site due to its sparse vegetation. Due to lark use, placed materials have not been removed, but the site is regularly accessed by public vehicles. While the site has little wildlife value, it is used by coyotes, raccoons, and birds, such as crows, killdeer, and various raptors. The public uses the site for dog walking. The rectangular peninsula is bordered by the river to the west, port lands to the south and southeast, and forested lands to the east and northeast. Most of the peninsula and the adjoining properties to the south have received fill from previous placement operations. Bald eagles forage in the vicinity of the site.

SANDY ISLAND (O-75.8)

Sandy Island, which is located in lower Columbia River near Kalama, Washington, is approximately 340 acres, excluding several waterways and side channels. Sandy Island is bean shaped and is

separated from the Oregon shore by a side channel of the Columbia River. There is a 5,500-ft long pile dike along the upstream portion of the island, parallel to the flow of the river and the island.

Historically, the placement site on Sandy Island was used for upland and beach nourishment placement. The island is likely a relic sand bar and approximately 2.5 miles of beach nourishment have occurred on Sandy Island. The Corps currently uses 32 acres as an upland site (Figure 23). The upland placement site is located on the upstream, southern tip of Sandy Island, from RM 75.8 to 76.2. At its closest point, the site is approximately 1,300 ft west of the CR FNC, in Columbia County, Oregon.



Figure 23. Sandy Island.

The site is owned by the State of Oregon and the Port of Portland has a 25-year lease with Oregon DSL for placement by the Corps. The Port of Portland's easement from the Oregon DSL expires in 2030. In 2003, the estimated site capacity for placement of dredged material was 1,100,000 CY. In 2011, approximately 400,000 CY of material was placed on the entire site footprint. In 2013, the site was evaluated and it was determined that the site had reached capacity, such that materials need to be removed to provide capacity for future placement.

The site elevations range from 10 ft (CRD) at the waterline to 50 ft on the upstream bank of the site. The topography of the site is relatively flat with a sloping center from east to west. Steep 40 to 50 ft banks are located along the northern, eastern, and southern boundaries of the site. Dikes were constructed to manage dredged material during prior placement events. The site is mostly bare sand with a small, triangular cluster of approximately 20 trees in the northwest portion of the site. The site is used for fishing access, as well as low-quality songbird habitat and resting waterfowl, deer and

small mammals. The topography of Sandy Island is relatively flat. It is vegetated by forests, shrub land, wetlands, and some open grassland along the eastern bank.

LOWER DEER ISLAND (O-77.0)

Deer Island is located in the lower Columbia River near Saint Helens, Oregon and is approximately 2,900 acres. The island is approximately 5.2 mile long, with pointed tips and a wide middle. It is generally oriented south to north, and it is separated from the Oregon shore by Deer Island Slough. It has a levee around its perimeter that runs the entire western boundary of the island and physically separates the island's interior from the direct flows of the Columbia River. Pumps and tide gates are used to control interior water levels in the sloughs on the island.

Historically, the Corps' placement area was used to replace sediments that had eroded away. Currently the Corps uses the 24-acre Lower Deer Island site (Figure 24) for upland placement. The placement area is almost entirely composed of previously dredged material and it is located at the downstream, northern end of the island in Columbia County, Oregon. The site is located from approximate RM 76.5 to 77.1. At its closest point, the site is approximately 580 ft west of the CR FNC.



Figure 24. Lower Deer Island.

This placement area is owned by the State of Oregon and the Port of Portland has a 25-year easement with Oregon DSL for placement by the Corps expiring in 2030. There has been no placement of dredged materials or site preparation work at the site since 1995. In 2003, the estimated site capacity

for placement of dredged material was 1,500,000 CY. In 2013, the site capacity was revised to 650,000 CY.

The elevations in the placement area range from 8 ft (CRD) at the river's edge to 32 ft in the northern portion. The majority of the placement area is above elevation 10 ft. Dredged material has historically been placed above elevation of 10 ft. The Lower Deer Island placement area is riverward of the levee on Deer Island. There are three pile dikes perpendicular to the site, which extend into the river, all of which are in satisfactory to poor condition. The dredged material placed near the southern tip of the placement area is partially stabilized with herbaceous vegetation, but the downstream portion is also eroding due to river currents.

Both a natural gas pipeline and a fiber optic cable pass through this site, dividing it roughly in half. Placement is not allowed within the 3.4-acre pipeline easement area. The site is dominated by herbaceous vegetation, moss, and lichens, with sparse shrubs. The shrubs on the site are typically scotch broom and the site is bounded by young stands of woody vegetation. No wetlands were delineated on the site in 2013 (Corps, 2013d unp.). Fishermen regularly use the site for shoreline fishing.

There is an extensive tidally influenced emergent, shrub, and forested wetland outside of the placement area, adjacent to the site's northern end. Forested wetlands are located west of the southern portion of the placement area. Vegetation adjacent to the dredged material placement site is either a mix of herbaceous plants and shrubs or stands of cottonwoods. The adjacent riparian habitat and forest on Deer Island provide good wildlife value.

MARTIN BAR (W-82.0)

The Martin Bar area is located on the eastern shoreline of the lower Columbia River. The area is composed of two separate parcels, Martin Bar North (~17 acres) and Martin Bar South (~23 acres). The parcels are separated by an unimproved road and a cluster of trees that form Lions Day Park and boat launch area. Both parcels are riverward of a levee. Martin Bar North is leased for farming and Martin Bar South is used as for upland placement and it is a borrow site. Combined, the parcels form a 40-acre site (Figure 25) from RM 81.8 to 82.3, in Cowlitz County, Washington. At its closest point, the site is approximately 1,000 ft west of the CR FNC.

The upland placement sites are owned by the Port of Woodland and available for placement by the Corps. The Corps' 20-year ROE agreement from the Port expires in 2025. In 2003, the estimated site capacity for placement of dredged material was 1,500,000 CY. In 2008, the Martin Bar South parcel was filled with 500,000 CY of material. The Port of Woodland leased the site for sand mining and most of the sand placed in 2008 has been removed. In 2008, the Martin Bar North site had exterior diking work, but no placement occurred even though the external berms remain in place. In 2013, the site capacity was estimated at 720,000 CY.

The elevation on the north parcel averages approximately 20 ft (CRD). The elevation on the south parcel averages approximately 29 ft (CRD). One pile dike protects the shoreline of the southern parcel. The northern parcel is vegetated with grasses, while the southern parcel is mostly bare sand with scattered low plants. Martin Bar South due to the site's exterior berms and regular use as a



Figure 25. Martin Bar.

borrow site. No habitat is expected on Martin Bar North due to current agricultural practices. Together, the parcels provide little to no wildlife habitat.

Cottonwoods populate the area north of the northern parcel. Nearby improvements include a beacon for navigational purposes and groin placed perpendicular to the shoreline, fencing, shed, an outhouse, and several unimproved roads. An RV park is located south of the southern parcel. The lands east of the levee are used for agricultural farming.

SAND ISLAND (O-86.2)

Sand Island is approximately 55 acres and is located at the downstream entrance to Multnomah Channel. The Multnomah Channel separates Sand Island from the town of Saint Helens, Oregon. Sand Island is immediately downstream of Sauvie Island. The island is developed as a marine park, has two boating piers on its western shore, and it is used for public recreation.

Historically, Sand Island served as a flow control structure to minimize maintenance dredging of the adjacent St. Helens Bar. Dredged materials were placed on the east bank of the island to maintain the structure and replace eroded sediments. Currently, the Corps has 28-acre shoreline placement site (Figure 26) along the east side of Sand Island, in Columbia County, Oregon. The shoreline site extends beyond the existing island's footprint to the north, east, and south. A 1,920-ft long pile dike extends along the upstream end of the site. At its closest point, the site is approximately 750 west of the CR FNC.



Figure 26. Sand Island beach nourishment.

The placement site is owned by the State of Oregon and the Port of Portland has 25-year easement for placement by the Corps expiring in 2030. In 2003, the estimated site capacity for placement of dredged material was 1,250,000 CY. In 2012, material was placed on the downstream shoreline of the site. In 2013, approximately 150,000 CY of material was placed on the upstream shoreline and tip of the island. The site capacity varies annually due to continual erosion of the shoreline by river flows.

The elevations in the placement site range from -15 ft (CRD) at the downstream limit to 20 ft on the landward edge adjacent to the park. The site is a highly erosive beach of mostly bare sand, with sparse grasses and ground cover on the higher portions. The interior and western bank of the island is forested, interspersed open grassland and beach areas. The island has approximately 25 acres of well-established woody vegetation. Areas with woody vegetation are outside the dredged material placement boundaries. Dredged material is placed on the island to support beach nourishment along this reach. The wooded portions of site provide songbird and raptor habitats, while the beaches are used by shorebirds and a few waterfowl. Anglers use the site for shoreline fishing and this area is a popular recreational destination during the summer.

AUSTIN POINT (W-86.5)

The Austin Point placement site is located on east bank of the lower Columbia River, outside of the levee for Woodland, Washington. Austin Point is at the confluence of the Lewis River with the Columbia River.

Historically, this site was a beach nourishment site to facilitate wildlife mitigation efforts on Austin Point 30 to 40 years ago. The site was also used for upland placement. Currently, the Corps' 30-acre upland placement site (Figure 27) is used as a heavy equipment, crane, and rigging training school in Cowlitz County, Washington. The site is located from RM 86.0 to 86.3. At its closest point, the site is approximately 600 ft west of the CR FNC.

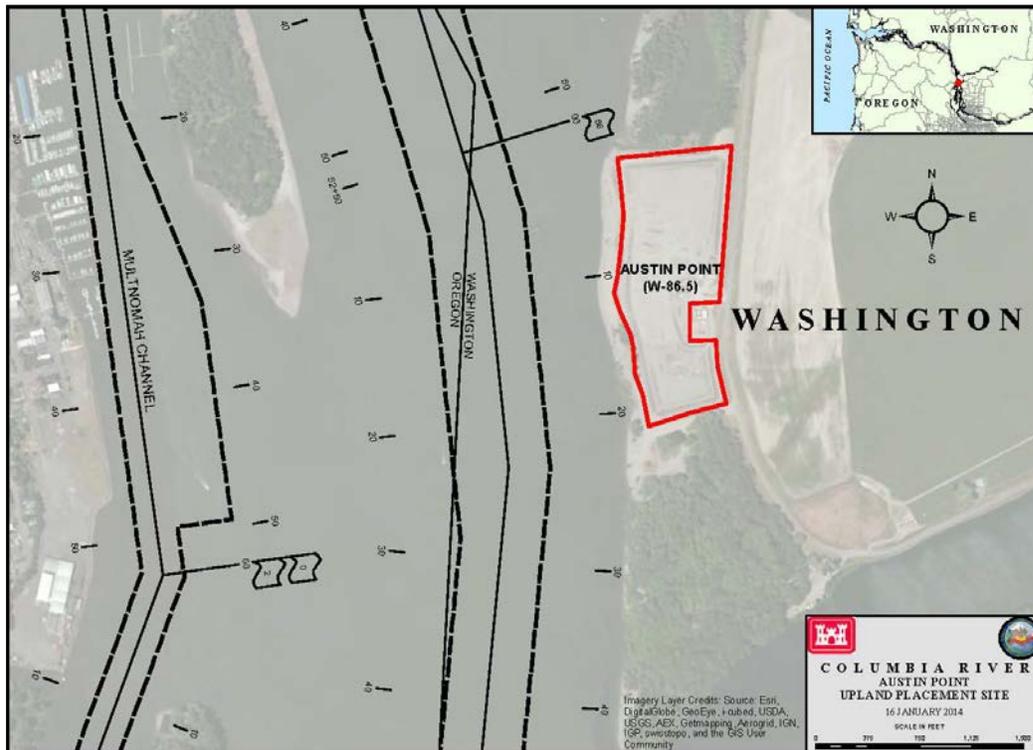


Figure 27. Austin Point.

The Austin Point placement site is owned by the Port of Woodland and available for placement by the Corps. The Corps' 20-year ROE from the Port of Woodland expires in 2025. In 2003, the estimated site capacity for placement of dredged material was 1,645,000 CY. In 2008, material was placed on the entire site. In 2013, 250,000 CY of material was placed on the downstream 2/3 of the site. Material would need to be removed from the site to provide capacity for future placement events.

The site elevations range from 15 to 35 ft (CRD). The topography of site is open, level, and devoid of vegetation. An elevated dike runs along the western edge of the property. The site is primarily a large, undulating sand pit. Overall, the site provides low wildlife habitat values. A water supply well house and groundwater well for the equipment school are situated near the site. There is approximately 150 ft of open sand between the shoreline and the western edge of the dredged material placement site. Two pile dikes extend perpendicular from the shoreline into the river. Blackberries, weedy grasses, low-lying shrubs, and cottonwoods are located north and south of the site. Bald eagles nest in the area and forage downstream of the site. Fishermen use the area for

shoreline fishing, while songbirds, small mammals, and waterfowl use the nearby lands and waterways.

FAZIO SAND & GRAVEL (W-97.1)

The Fazio Brothers Sand Company, Inc. owns a 220-acre sand and gravel facility located on the east bank of the Columbia River, near RM 97. The company has been in operation at this site since the 1950s. This company has an open parcel upstream of their facility that is used for sorting and processing sandy materials removed from the river. The operation is located in Clark County, Washington upstream of the Ridgefield National Wildlife Refuge.

The Corps has placed dredged materials in-water near the 17-acre upland site (Figure 28). Materials are currently placed riverward of the shoreline. The placed materials are mined by dredging and processed by the company under a separate permit for commercial uses. The site is located from RM 97.1 to 97.3. At its closest point, the site is approximately 1,400 ft east of the CR FNC.

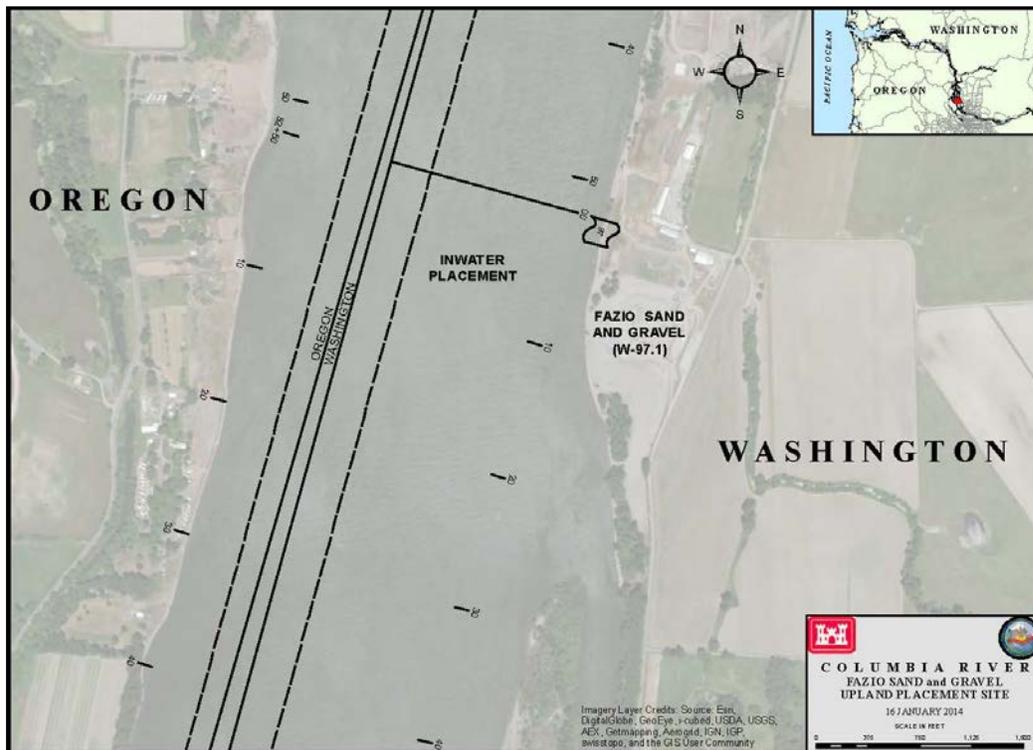


Figure 28. Fazio Sand and Gravel.

The Washington Ports have an easement with the Fazio Brothers Sand Company, Inc. for direct placement of dredged material by the Corps into their upland processing area. However, the current practice by the Corps is to place material in-water in the State of Washington so Fazio Brothers Sand Company, Inc. can later mine the material for upland processing at their site under separate permits. In 2003, the estimated upland site capacity for placement of dredged material was 1,200,000 CY for the life of the project. The Corps intends to continue placing material in-water annually as Fazio

Brothers Sand Company, Inc. mining operations continue to provide in-water placement capacity each year.

The site elevations range from 10 ft (CRD) at the shoreline placement area to 45 ft in the processing area. The upland area is open, bare sands. A few stands of cottonwood trees are located along the shore. Due to the active sand mining and processing activities, the site provides little wildlife habitat and it is assumed to provide no suitable nesting habitat for larks.

GATEWAY (W-101.0)

The Gateway upland placement site is located at RM 101 of the Columbia River, in Clark County, Washington. The site is located approximately 500 ft inland from the river and 450 ft south of a man-made channel, known as the Vancouver Lake Flushing Channel. This area is located between the Columbia River and Vancouver Lake, downstream from the City of Vancouver.

Historically, the Gateway site has been a major placement area. Currently the 40-acre placement site (Figure 29) is used for upland placement and as a borrow site. The site is located from approximate RM 100.9 to 101.2. At its closest point, the site is approximately 2,200 ft northeast of the CR FNC.



Figure 29. Gateway.

The site is owned by the Port of Vancouver and available for placement by the Corps. The Corps' 20-year ROE agreement from the Port of Vancouver expires in 2025. The site was constructed in 2005 with a height-restricted capacity of 2,000,000 CY. In 2005 and 2007, the Corps placed

approximately 1,150,000 CY of material over the entire site. The Port of Vancouver has removed all but 3,000 CY of materials, leaving a renewed site capacity of 2,000,000 CY. The capacity of this site can be increased if the pipeline is capable of placing further.

The site elevations range from 20 ft (CRD) in the interior to 40 ft along portions of the site's containment berm. The site is actively used to borrow placed materials, which precludes the establishment of woody shrubs or trees onsite. The majority of the site is bare, with some areas of grasses and low herbaceous plants. Due to borrow activities, topography of the site, visual barriers (trees) between the site and the river, and lack of suitable foraging opportunities, the site provides little wildlife value.

This site is bounded to the north, east, and south by agricultural lands used for growing corn for silage. Woodlands are located to the west, separating the site from the Columbia River. The woodlands are cottonwoods and with some shrubs. The adjacent agricultural lands have limited wildlife habitat, though some songbirds, raptors, waterfowl, and small mammals utilize the adjacent agricultural lands for foraging and resting.

WEST HAYDEN ISLAND (O-105.0)

Hayden Island is located in the lower Columbia River, upstream of the confluence of the Willamette and Columbia Rivers. Hayden Island is approximately 1,400 acres and it is oriented southeast to northwest. Hayden Island is entirely within Multnomah County, Oregon and it is separated from the Oregon shore by Oregon Slough. The Oregon shore across from the island is developed for commercial and industrial land uses, including docks for the Port of Portland and others.

The eastern portion of the island is within the City of Portland and it is heavily developed for commercial, retail, residential, and recreational land uses. There are many houseboat and boat moorages along the banks of the eastern portion of the island, primarily along Oregon Slough. The western portion of island, which is delineated from the eastern portion by a railroad line, is not developed but has been altered by utility lines, prior dredged material placement, and land clearing.

Historically, the Corps has used the downstream portion of Hayden Island for placement of dredged material. Material has been placed as beach nourishment in the past. Currently, the Corps has a 116-acre upland placement site (Figure 30), referred to as the West Hayden Island site, on the northern side of the island from RM 104.6 to 105.4. At its closest point, the site is approximately 1,200 ft southwest of the CR FNC.

The site is owned by the Port of Portland and available for placement by the Corps. The Corps' 20-year ROE agreement from the Port of Portland expires in 2025. In 2003, the estimated site capacity was 5,750,000 CY. In 2011, approximately 50,000 CY of materials were placed in the southern corner of the site as part of the Corps maintenance program in the Willamette River. In 2013, the site capacity remained the same.

The site elevations range from 15 ft (CRD) at the top of the riverbank to 40 ft in the center of the site. The site is undulating due containment berms and grading activities from placement of dredged materials. Large portions of the site are comprised of open sand and weedy grasses. Two stands of

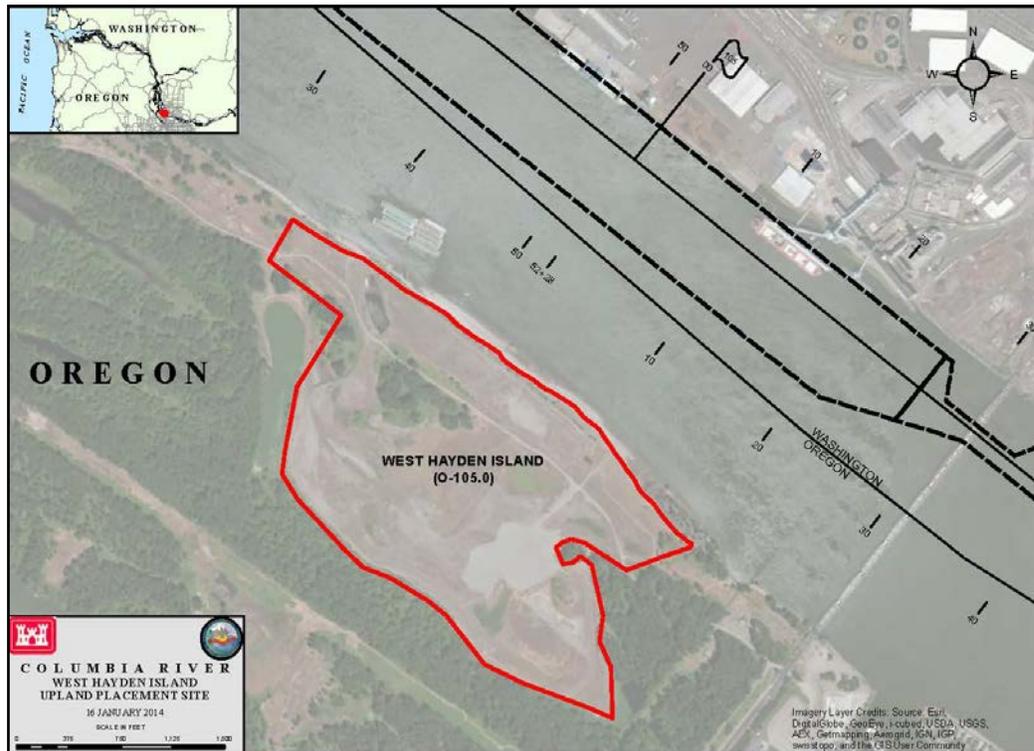


Figure 30. West Hayden Island.

trees are located in the northwest portion of the site. An unimproved dirt road provides land access to the site and there are several weirs placed throughout the site. The site is actively used by the Port for placing their dredged materials, dredging equipment, and other storage. The Port maintains roads on the site and manages the island to prevent the establishment of trees. The site does provide open habitats for songbirds and shorebirds.

A deciduous forest is located to the east, south, and west of the placement site. The Columbia River is the northeast perimeter of the site. The western portion of Hayden Island is largely vegetated and provides high quality forested, riparian, wetland, and pond habitats for resident and migratory wildlife.

5.2. Biologic Environment

5.2.1. Aquatic and Terrestrial Communities

This section discusses natural communities of concern. The focus of this section is on biological communities, not individual plant or animal species. The Columbia River serves as a wildlife and fish corridor; habitat fragmentation will be discussed. Wildlife corridors are areas of habitat used by wildlife for seasonal or daily migration. Habitat fragmentation involves the potential for dividing sensitive habitat and thereby lessening its biological value. There are a wide range of regulations and laws that dictate and provide protection for components of the biologic environment. The applicable

laws and compliance with the laws is detailed in Chapter 6. Species and habitat areas that have been designated under the ESA are reviewed in section 5.2.4.

5.2.1.1. Affected Environment

The Columbia River system is comprised of a wide variety of aquatic and terrestrial habitats. Habitat information was obtained from the USFWS, NMFS, Oregon Department of Fish and Wildlife (ODFW), and Washington Department of Fish and Wildlife (WDFW). A full assessment of the without project Columbia River biologic environment has been evaluated in the 2003 SEIS. The updated capacity calculations for the Network is considered as having no changes to the effect already evaluated in the 2003 SEIS. The assessment conducted within this section is for the reclassification of Pillar Rock Island site to include shoreline placement and the addition of the Puget Island sump to the Network. The dredging and in-water placement effects are unchanged from the 2003 SEIS, therefore the effects from dredging and in-water placement are not evaluated further in this section.

Shoreline placement at on the northern shore of Pillar Rock Island would occur in open, unprotected shallow water habitat due to direct exposure to Columbia River's high flow events. There are pilings adjacent to the northern shore that protects the island from erosion, which in turn protects the shallow water and estuarine wetland habitats to the south of the island. There are approximately 20 acres of shallow water habitat (less than 20 ft water depth and within 100 ft of the shore) on the north side of Pillar Rock Island and approximately 430 acres of shallow water habitat on the south, protected, side of the island. There are approximately 50 acres of intertidal estuarine wetlands on the southern, protected, side of the island. Based on 2012 aerial photography, there are approximately two (2) acres of open beach shoreline habitat, approximately 31 acres of grass-shrub dominated uplands, and approximately 17 acres of woody riparian vegetation on Pillar Rock Island.

The addition of the Puget Island sump would occur in deepwater habitat of the Columbia River, which serves as a part of the migratory corridor for anadromous fish species.

5.2.1.2. Project Impacts

The continued dredging and in-water placement of dredged materials would temporarily disrupt or alter aquatic and terrestrial communities. Temporary disturbance would range from a few hours for the water column during in-water placement and a few days on the riverbed, to a few years on upland placement sites for woody vegetation to become re-established. The level of habitat disturbance would continue at its current rate when sites in the network are utilized for aquatic, beach/shoreline, or upland placement. Aquatic communities are expected to re-colonize placement sites quickly. Terrestrial communities are expected to take longer to recover because it may take one or more growing seasons for the site vegetation to grow and provide the ecological functions and values.

5.2.1.2.1. No Action

Direct: The No Action alternative includes the continued O&M dredging of the CR FNC with the existing placement network. Because the Pillar Rock Island and Puget Island upland sites are not available, approximately 33% more dredged material would need to be placed in-water. The increase in disturbance to the water column is temporary.

The rate of shoreline erosion at Pillar Rock Island would result in the loss of this upland site in 10 years and continue to preclude the Corps from placing material on its uplands. Without shoreline and upland placement, the island would be breached by river currents. The terrestrial habitats on the island would be reduced, or lost entirely over time. The protected intertidal wetland complex on the south side of the site would be fragmented when the island is breached by river flows (Corps, 2014 unp.). Federally listed species utilize both the sparsely vegetated upland and shallow water habitats at Pillar Rock Island for foraging and rearing. The 500 acres that encompass the Pillar Rock Island placement area and adjacent shallow waters account for approximately 1.5% of the 35,000 acres of the Lewis and Clark National Wildlife Refuge. The conversion of approximately 50 acres of upland habitat and approximately 50 acres of intertidal estuarine wetlands to shallow water habitat over 10 years would account for 0.2% of the Refuge's total acreage.

There would be no direct effect to the aquatic community at Puget Island sump from the No Action alternative. The sump location is classified as deepwater (>20 ft water depth, >100 ft from shore) habitat.

Indirect: If shoreline placement does not occur, the pilings located on the northern shore of Pillar Rock Island, which deflect flows around the island and protect downstream shallow water habitats, would be lost over time due to erosion of their footings. The loss of piling would reduce the amount of vertical structure in and over-water, as well as the pockets of low current habitat on the downstream side of each piling. Overtime, the loss of upland and intertidal shallow water and estuarine wetlands at Pillar Rock Island would reduce the amount of terrestrial and shallow water aquatic habitats in the lower Columbia River estuary. The conversion of this placement area to deeper water would increase deepwater habitat in the Columbia River estuary. The loss of Pillar Rock Island within the Lewis and Clark National Wildlife Refuge would reduce the number island marshes used by migrating tundra swans and Canada geese to 19 islands. These refuge islands and marshes are heavily used during waterfowl migration.

No indirect impacts to aquatic communities at the Puget Island sump location are expected if the sump is not created. There would be no impact to the deepwater migratory corridor.

5.2.1.2.2. Proposed Action

Direct: The Proposed Action alternative includes the continued O&M dredging of the CR FNC with the updated placement network. Because the Pillar Rock Island and Puget Island upland sites would be available, approximately 33% less dredged material would be placed in-water resulting in a decrease in disturbance to the water column. Placement of dredged material on the northern shoreline of Pillar Rock Island would protect high-quality shallow-water aquatic habitat to the south of the Island by preventing the breaching of the upland island. Terrestrial habitats on the island would be restored overtime through shoreline and upland placement actions. The new shoreline edge and its adjacent shallow water habitat would be available for use by aquatic species after the placement action concludes. It would restore shallow water habitat north of the island to its prior location in the river. These aquatic and terrestrial habitats would continue to benefit island communities, including federally-listed species and their designated critical habitats.

Construction and placement of dredged materials in the Puget Island sump may temporarily disrupt the deepwater aquatic habitat during and immediately after work. There would be a temporary loss of benthic habitat but it is expected that the benthic community would re-establish itself after placement. No permanent direct impacts to aquatic communities are expected.

There are no changes to the Network footprint for the updated capacities. Therefore, the direct impacts to the terrestrial and aquatic communities are not greater than the effects disclosed in the SEIS.

Indirect: Shoreline placement at Pillar Rock Island would indirectly protect the structural integrity of the pile dikes downstream of the placement site. In turn, these pile dikes would continue to protect the shallow water habitat on the south side of the island by deflecting high flows away from the area.

It is expected that there would be no indirect effect to aquatic communities at the Puget Island sump. There would be no permanent removal of aquatic habitat at or adjacent to the project area. No indirect impacts are expected to the deepwater migratory corridor.

No additional indirect impacts to aquatic or terrestrial communities are expected from the revised site capacities because the site footprints are not expanding.

5.2.2. Vegetation

The Columbia River system supports a wide range of aquatic and terrestrial vegetative communities. Vegetation information was obtained from the USFWS, NMFS, ODFW, and WDFW. There are no new sites added to the Network or changes to the CR FNC alignment. The capacity adjustments remain within the footprint already mitigated for in 2003 SEIS.

5.2.2.1. Affected Environment

The channels and banks of the Columbia River are deeply incised river valleys, with banks typically vegetated and consist of basalt, silt, and clay deposit. The river thalweg is primarily comprised of fine and medium grained sand. Current thalweg depths are typically around 50 ft deep with deeper spots occurring along outside bends. Upland placement sites are typically very sandy and do not support a robust, diverse vegetation community. If vegetation is evident on upland or beach nourishment site, several possible vegetation community types occur. Within the proposed project area, the two predominant vegetation community types are Columbia River estuarine and Columbia River riparian. The updated Network capacity project impacts have already been evaluated in the 2003 SEIS. The network footprint and effects are unchanged. Therefore, these sites are not further evaluated in this section.

Native estuarine vegetation habitat within the Lower Columbia River is typically comprised of fringing intertidal marshes and intertidal island marshes. From RM 11 to RM 35, over 14,000 acres of land adjacent to the river have been diked, primarily for agricultural resources. Rice Island, Miller Sands Island, Pillar Rock Island, and Tenasillahe Island are sandy islands, either created as a result of natural shoaling processes, or intentionally developed via placement of dredged material. Active dredged material placement sites typically do not support robust, woody established plant

communities, due to lack of nutrients and the xeric composition of placed dredged material. Patches of invasive vegetation like scotch broom and European beach grass may be interspersed across a site (management of invasive species are discussed in section 4.2.5). High tide lines that perimeter upland dredged material placement sites are more likely to support vegetative communities due to naturally occurring nutrient and debris deposition within this zone. Established estuarine riparian habitats commonly found in this part of the Columbia River are stands of cottonwoods and alders.

Riverine vegetation habitat upstream of RM 35 consists of fragmented, reduced riparian habitat. Approximately 162,000 acres of land have been converted for agricultural and industrial purposes. Unless modified or developed, a narrow band of vegetation lines the banks of the Columbia River. Cottonwood and Oregon ash stands are likely to populate areas that have yet been developed or altered for use. There are a number of refuges and wildlife management areas located within the Columbia River basin. These areas provide established natural and man-made wetland and riparian forest habitat for a variety of wildlife species. Upland placement sites are typically bare sand with pockets of cottonwoods and alders and may be sparsely covered with grasses and forbs.

5.2.2.2. Project Impacts

The continued upland placement of dredged materials would disrupt or alter vegetation. The continued in-water dredging and in-water placement is not expected to affect vegetation. Disturbances would range from a few hours for temporary access during placement, to a few years on upland placement sites for woody vegetation to become re-established. The level of habitat disturbance would continue at its current rate. Vegetation succession is expected to continue at its current rate and it is primarily affected by the growing season and precipitation events.

5.2.2.2.1. No Action

Direct: The No Action alternative includes the continued O&M dredging of the CR FNC with the updated placement network. There are no changes to the dredging or in-water placement footprint for the No Action alternative.

If no shoreline placement occurs on Pillar Rock Island, the uplands would eventually be eroded away in 10 years and no upland or riparian vegetation would be present. Additionally, as the island is breached by ongoing erosion, the estuarine wetlands protected on the south side of the island would be fragmented by increased exposure to higher river flows.

There would be no vegetation impacts if the Puget Island sump is not created or utilized because it is a deepwater site without submerged or aquatic vegetation. No increase or decrease of direct effects to vegetation would occur from maintaining the current site capacities. The upland footprint of the sites would be unchanged, relative to the effects disclosed in the 2003 SEIS.

Indirect: Due to the loss of upland and estuarine vegetation at Pillar Rock Island as the island is eroded away, the total area of upland and riparian vegetation in the Columbia River estuary would decrease slightly.

No indirect impacts to vegetation are expected from not using the sump or maintaining the current site capacities.

5.2.2.2. Proposed Action

Direct: The Proposed Action alternative includes the continued O&M dredging of the CR FNC with the updated placement network. There are no changes to the dredging or in-water placement footprint for the Proposed Action alternative. Shoreline placement of material on the Pillar Rock Island would not affect an established vegetative community. Shoreline placement would require placement of sediments at the shoreline-water interface where vegetation does not exist. The placement action would occur on an eroding sandy shoreline. It is unlikely that a vegetation community would become established along this shoreline due to tidal and wave erosion.

There is no aquatic vegetation present in the Puget Island sump. Therefore, no direct effects to vegetation are expected at the sump location.

The revision of site capacities across the Network would not increase or decrease direct effects on vegetation because the upland footprint of the sites is unchanged, relative to the effects disclosed in the 2003 SEIS.

Indirect: Placement of material on the shoreline of Pillar Rock Island would protect the established estuarine habitats on the backside of the island. As the shoreline is rebuilt to the baseline footprint, a vegetation community has the potential to become re-established in uplands after a couple of years. The restoration of the island's footprint would allow future upland placement on the site. This future placement may require the removal of woody and shrub vegetation to facilitate upland placement. The removal of vegetation on Pillar Rock Island for upland placement was previously disclosed in the 2003 SEIS.

Placement of dredged material in the sump or revision of the Network capacities would have no additional indirect effects to vegetative communities.

5.2.3. Aquatic and Terrestrial Wildlife Species

The Columbia River system supports a wide variety of aquatic and terrestrial wildlife species. Species information was obtained from the USFWS, NMFS, ODFW, and WDFW. An assessment of the impacts to unlisted species that use, reside, or migrate through or within the Network and CR FNC has been evaluated in the 2003 SEIS. The assessment conducted within this EA is for the CR FNC O&M program with the reclassification of Pillar Rock dredged material placement site, the addition of the Puget Island sump, and the updated capacity calculations for the Network.

5.2.3.1. Affected Environment

Aquatic and terrestrial wildlife species inhabit or periodically utilize the Pillar Rock Island site, the deep-draft channel, the Network, and adjacent waters. Aquatic species found adjacent to the island include: smallmouth bass, largemouth bass, bullhead, carp, catfish, channel crappie, crawfish, eulachon, yellow perch, northern pike minnow, Chinook salmon, chum salmon, coho salmon,

sockeye salmon, American shad, steelhead, white and green sturgeon, suckerfish, trout, coastal cutthroat trout, and walleye. Terrestrial species that utilize the island include streaked horned larks, terns, cormorants, gulls, pelicans, migratory songbirds, eagles, osprey, crows, mice, nutria, waterfowl, and shoreline birds.

Aquatic species found along the Puget Island sump reach include: largemouth bass, smallmouth bass, bullhead, carp, catfish, channel crappie, crawfish, eulachon, yellow perch, northern pike minnow, Chinook salmon, coho salmon, chum salmon, sockeye salmon, American shad, steelhead, green and white sturgeon, suckerfish, coastal cutthroat trout and walleye. Terrestrial wildlife species that utilize the sump waters include terns, cormorants, gulls, pelicans, eagles, osprey, and waterfowl.

The dredged material placement Network may be utilized by a wide variety of aquatic and terrestrial species. A full assessment of species present within the Network and CR FNC has been evaluated in the 2003 SEIS and is considered representative of what species may be present within the project area. Because the Network footprint and range of effects are unchanged, the revised site capacities are not further evaluated in this section. The dredging and in-water placement effects are unchanged from the 2003 SEIS, therefore the effects from dredging and in-water placement are not evaluated further in this section.

5.2.3.2. Project Impacts

The continued O&M dredging and upland and aquatic placement of dredged materials would disrupt wildlife. Disturbances would range from a few hours during dredging, in-water placement, and for temporary access during placement, to a few years on upland placement sites for woody vegetation to become re-established. The level of habitat disturbance would continue at its current rate. Vegetation succession is expected to continue at its current rate and it is primarily affected by the growing season and precipitation events.

5.2.3.2.1. No Action

Direct: The No Action alternative includes the continued O&M dredging of the CR FNC with the updated placement network. There are no changes to the dredging or in-water placement footprint for the No Action alternative. There would be no changes in impacts to aquatic species. Impacts to terrestrial species remain within the range of effects considered in the 2003 SEIS. Effects to ESA-listed species are evaluated in section 5.2.4 of this EA. The No Action alternative would result in the loss of the Pillar Rock Island site in 10 years and its upland wildlife habitat. The shallow water habitat south of the island would be fragmented and reduced by increased erosion and river currents, thereby reducing shallow water and wetland habitat for wildlife.

The No Action alternative would not affect wildlife at the Puget Island sump. The No Action alternative would maintain the existing site capacities and it would not differ in the ranges of wildlife effects disclosed in the 2003 SEIS.

Indirect: The No Action alternative would result in an overall reduction of terrestrial, wetland, and nearshore habitat for aquatic and terrestrial wildlife species in the Columbia River estuary.

5.2.3.2.2. Proposed Action

Direct: The Proposed Action alternative includes the continued O&M dredging of the CR FNC with the updated placement network. There are no changes to the dredging or in-water placement footprint for the Proposed Action alternative. The Proposed Action alternative would restore the upland footprint of Pillar Rock Island, which will increase the area of potential upland wildlife habitat. The restoration of the site would maintain the intertidal wetlands and shallow water wildlife habitat on the south side of the island.

The creation and use of the Puget Island sump would not permanently alter which wildlife species may utilize Puget Island reach because it would maintain its deepwater habitat characteristics. Temporary disturbances to wildlife during use of the sump are expected to dissipate quickly once work is completed.

The Proposed Action alternative would utilize the existing site footprints. Therefore, the revised site capacities would not differ in the range of wildlife effects disclosed in the 2003 SEIS.

Indirect: The Proposed Action alternative would increase amount of upland wildlife habitat in the Columbia River estuary as the site is restored to its previous extent. Future upland placement on the island would restart vegetation succession on the site, which is crucial for the development of breeding and rearing habitat for some upland species, such as terns and larks.

No additional indirect effects to wildlife from the Puget Island sump or revised site capacities are expected.

5.2.4. Endangered Species Act Listed Species

The primary federal law protecting threatened and endangered species is the Endangered Species Act (ESA): 16 United States Code (USC), Section 1531, et seq. as well as 50 CFR Part 402. The ESA and its subsequent amendments provide for the conservation and recovery of endangered and threatened species and the ecosystems upon which they depend. Under Section 7 of the ESA, federal agencies are required to consult with USFWS and/or NMFS to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat is defined as geographic locations critical to the existence of a threatened or endangered species. The outcome of consultation under Section 7 may include a Biological Opinion with an Incidental Take statement, a Letter of Concurrence and/or documentation of a no effect finding. Section 3 of the ESA defines Take as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or any attempt at such conduct.”

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1976, was established to conserve and manage fishery resources found off the coast, as well as anadromous species and Continental Shelf fishery resources of the United States. This act is implemented by exercising (a) sovereign rights for the purposes of exploring, exploiting, conserving and managing all fish within the exclusive economic zone established by Presidential Proclamation 5030, dated 10 March 1983, and (b) exclusive fishery management authority beyond the exclusive economic zone over such

anadromous species, Continental Shelf fishery resources and fishery resources in special areas. Essential Fish Habitat (EFH) is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity. Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH” (50 CFR 600.810).

Since the 2003 SEIS, additional species have been listed under the ESA. The Southern DPS of Pacific eulachon was listed by NMFS in 2010, with critical habitat designated in 2011. The Southern DPS of green sturgeon was listed by NMFS in 2006, with critical habitat designated in 2008. The streaked horned lark was listed and had critical habitat designated by the USFWS in 2013.

ESA-Listed Species Under NMFS Jurisdiction

The federally listed threatened and endangered species or managed fisheries under the jurisdiction of the NMFS that may occur in the proposed project area are shown in Tables 3, 4, and 5.

Table 3. ESA-listed Anadromous Salmonids under NMFS Jurisdiction.

Evolutionarily Significant Unit	Status	Critical Habitat	Federal Register (FR) Citation
Chinook Salmon (<i>Oncorhynchus tshawytscha</i>)			
Snake River spring/summer run	Threatened	Yes	70 FR 37160; 28 June 2005
Snake River fall run	Threatened	Yes	70 FR 37160; 28 June 2005
Lower Columbia River	Threatened	Yes	70 FR 37160; 28 June 2005
Upper Columbia River spring run	Endangered	Yes	70 FR 37160; 28 June 2005
Upper Willamette River	Threatened	Yes	70 FR 37160; 28 June 2005
Coho Salmon (<i>Oncorhynchus kisutch</i>)			
Lower Columbia River	Threatened	Proposed	70 FR 37160; 28 June 2005 78 FR 2725; 14 January 2013
Chum Salmon (<i>Oncorhynchus keta</i>)			
Columbia River	Threatened	Yes	70 FR 37160; 28 June 2005
Sockeye Salmon (<i>Oncorhynchus nerka</i>)			
Snake River	Endangered	Yes	70 FR 37160; 28 June 2005
Steelhead (<i>Oncorhynchus mykiss</i>)			
Snake River Basin	Threatened	Yes	71 FR 834; 1 January 2006
Lower Columbia River	Threatened	Yes	71 FR 834; 1 January 2006
Middle Columbia River	Threatened	Yes	71 FR 834; 1 January 2006
Upper Columbia River	Threatened	Yes	71 FR 834; 1 January 2006
Upper Willamette River	Threatened	Yes	71 FR 834; 1 January 2006

Table 4. ESA-listed Fish and Marine Wildlife Species under NMFS Jurisdiction.

Species	Status	Critical Habitat	Federal Register (FR) Citation
Southern DPS* Green Sturgeon (<i>Acipenser medirostris</i>)	Threatened	Yes	71 FR 17757; 7 April 2006
Southern DPS Pacific Eulachon (<i>Thaleichthys pacificus</i>)	Threatened	Yes	75 FR 13012; 18 March 2010
Steller Sea Lion (<i>Eumetopias jubatus</i>)	Threatened	Yes	55 FR 49204; 26 November 1990

*DPS = Distinct Population Segment

Table 5. EFH in the Action Area.

Fishery Management Plan with EFH	EFH affected	EFH conservation plan
Pacific Coast Salmon	Yes	Yes
Pacific Coast Groundfish	Yes	Yes
Coastal Pelagic Species	Yes	Yes

5.2.4.1. Affected Environment

The Corps has previously consulted with NMFS on the CR FNC O&M program addressing effects to the ESA-listed species and EFH stated above.

National Marine Fisheries Service. 2012. *Reinitiation of Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Columbia River Navigation Channel and Operations and Maintenance, Mouth of the Columbia River to Bonneville Dam, Oregon and Washington (HUCs 1708000605, 1708000307, 1708000108)*. NMFS No. 2011/02095. Northwest Region. Seattle, Washington, 11 July 2012. (2012 BiOp)

The NMFS 2012 BiOp outlines Reasonable and Prudent Measures (RPMs) that, if followed, would avoid jeopardizing the continued existence of ESA-listed species or adverse modifications to their critical habitats within the jurisdiction of the NMFS. The RPMs includes measures for timing of work conducted, water quality monitoring sampling and monitoring, operational constraints, and construction requirements for in-water, upland, and shoreline dredged material placement sites.

The NMFS 2012 BiOp concluded that the CR FNC O&M program is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of their designated critical habitats. The 2012 BiOp included Terms and Conditions to carry out RPMs to avoid and minimize the extent of take (see appendix one for the Terms and Conditions). The 2012 BiOp included two conservation recommendations to offset potential adverse effects on EFH.

The Corps provided the revised Proposed Action information to NMFS on 19 November 2013 to update the Corps federal action for this consultation. The NMFS stated on 24 December 2013 that the proposed modifications do not alter the effects conclusions outlined in the 2012 BiOp for the CR FNC O&M Program. Therefore, the continued O&M dredging of the CR FNC, the addition of shoreline placement at Pillar Rock Island, the Puget Island sump, and the updated Network capacities are within the range of effects previously consulted upon in the NMFS 2012 BiOp.

5.2.4.2. Project Impacts

The continued O&M dredging work and subsequent upland and aquatic placement of dredged materials may affect ESA-listed species and their habitats. The duration of effects may range from a few hours during dredging and placement, to a few years on upland placement sites for woody vegetation to become re-established along the water’s edge. The level of disturbance would continue at its current rate. The ESA-listed species affected by the project include two species that have been listed by NMFS since the 2003 SEIS: the Southern DPS of Pacific eulachon and the Southern DPS of

green sturgeon. Effects to these recently listed species and their critical habitat were addressed in the NMFS 2012 BiOp.

In-water and shoreline placement of dredged materials may have adverse and beneficial effects to NMFS ESA-listed species and their habitats. The NMFS 2012 BiOp on the CR FNC O&M dredging program effects to NMFS ESA-listed provides detailed effects analysis of the dredging and placement actions. The NMFS 2012 BiOp concluded that the CR FNC O&M program is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of their designated critical habitats. The potential for directly killing or injuring eulachon occurs only during active dredging and placement. The analysis conducted in the NMFS 2012 BiOp shows that the potential impacts that may result in killed or injured eulachon due to dredging (.0003% to .0158%) and placement (.003% to .0334%) is very small compared to the amount of time and area eulachon may be present in the Columbia River system. The potential impacts that may result in killed or injured green sturgeon due to dredging is very small (.08%) compared to the amount of time and area where green sturgeon may be present during dredging and in-water placement of dredged material in the Columbia River system. Placement of materials at the Pillar Rock Island shoreline site would indirectly protect shallow water habitat adjacent to the island.

5.2.4.2.1. No Action

Direct: The No Action alternative includes the continued O&M dredging of the CR FNC and use of the existing Network. The impact to NMFS ESA-listed species was calculated by assessing the magnitude, timing, duration and severity of effects during dredging and in-water placement actions. The effects to NMFS ESA-listed species did not reach the level of jeopardy. NMFS issued terms and conditions to be followed when conducting the CR FNC O&M program. The Corps will follow these terms and conditions.

The No Action alternative would result in the loss of the Pillar Rock Island (projected erosion rates indicate the island would erode back into a shoal in 10 years). During this time, the open shallow water habitat north of the island would likely remain constant at approximately 20 acres. The island may revert back into a shallow shoal retaining open shallow water habitat and small tidal channels; however, the habitat would become fragmented and more susceptible to increased scouring by natural high-flow energy events, thereby reducing suitability for shallow water habitat use by NMFS ESA-listed species. The higher value intertidal estuarine wetland and shallow water habitat south of the island would be exposed to higher river flows as the island erodes. These flows would fragment the currently protected habitats and reduce their amount and quality.

The No Action alternative at the Puget Island sump would not have additional effects to NMFS ESA-listed species or their habitat beyond the range of effects covered in the 2012 BiOp. The No Action alternative would maintain the existing site capacities and it would not differ in effects already disclosed in the 2003 SEIS and consulted upon in 2012 BiOp for NMFS ESA-listed species. The 2012 BiOp addressed effects to NMFS species listed and critical habitat designated or proposed since the 2003 SEIS.

Indirect: The No Action alternative includes the continued O&M dredging of the CR FNC and use of the existing Network. Indirect effects to ESA-listed species within NMFS jurisdiction are addressed in the 2012 NMFS BiOp.

The No Action alternative at the Pillar Rock Island would result in an overall reduction of protected shallow water and estuarine wetland habitats in the Columbia River estuary. No additional indirect effects to NMFS ESA-listed species from the No Action alternative are expected at the Puget Island sump or from the existing site capacities.

5.2.4.2.2. Proposed Action

Direct: The Proposed Action alternative includes the continued O&M dredging of the CR FNC and use of the updated Network. The impact to NMFS ESA-listed species was calculated by assessing the magnitude, timing, duration and severity of effects during dredging and in-water placement actions. The decrease of in-water placement of dredged materials is within the range of projected magnitude and duration of dredging and placement operations and maintenance actions for the CR FNC. There is a decrease expected for in-water placement; however, this decrease does not exceed the analysis conducted for CR O&M FNC program. The direct effects from dredging and in-water placement are within the range of effects considered in the NMFS 2012 BiOp. NMFS issued terms and conditions to be followed when conducting the CR FNC O&M. The Corps will follow these terms and conditions.

The Proposed Action alternative would restore the upland footprint of Pillar Rock Island through shoreline placement, which would shift shallow water habitat north to its previous extent. The restoration of the site would maintain the existing pile dikes and intertidal wetlands and shallow water habitats on the south side of the island. These protected habitats provide high value aquatic habitats for ESA-listed species. The direct effects from shoreline placement at Pillar Rock Island is within the range of effects considered in the NMFS 2012 BiOp. The NMFS stated on 24 December 2013 that the proposed modifications do not alter the effects conclusions outlined in the 2012 BiOp for the CR FNC O&M Program.

The creation and use of the Puget Island sump would not permanently affect ESA-listed species or their habitat because the site would maintain its deepwater habitat characteristics. Temporary effects to listed species during placement and removal of dredged materials of the sump are expected to dissipate quickly once work is completed. The effects to ESA-listed species are within the range of effects considered in the NMFS 2012 BiOp. The NMFS stated on 24 December 2013 that the proposed modifications do not alter the effects conclusions outlined in the 2012 BiOp for the CR FNC O&M Program.

The Proposed Action alternative would utilize the existing placement site footprints. Therefore, the revised site capacities would not differ in the range of effects to ESA-listed species disclosed in the 2003 SEIS and covered in the NMFS 2012 BiOp. The NMFS stated on 24 December 2013 that the proposed modifications do not alter the effects conclusions outlined in the 2012 BiOp for the CR FNC O&M Program.

Indirect: The Proposed Action alternative would help maintain the amount of riparian, wetland, and shallow water habitats in the Columbia River estuary through the protection of the habitats south of the Pillar Rock Island. The indirect effects from shoreline placement at Pillar Rock is within the range of effects considered in the NMFS 2012 BiOp.

No additional indirect effects to ESA-listed species or their habitats, beyond those consulted upon in the 2012 NMFS BiOp, from the Puget Island sump or revised site capacities are expected.

ESA-Listed Species Under USFWS Jurisdiction

The federally listed threatened and endangered species under the jurisdiction of USFWS that may occur in the proposed project area are shown in Table 6.

Table 6. ESA-listed Wildlife Species under USFWS Jurisdiction.

Species	Status	Critical Habitat	Federal Register
Short-tailed Albatross (<i>Phoebastria albatrus</i>)	Endangered	(none)	65 FR 46643 46654; 31 July 2000
Marbled Murrelet (<i>Brachyramphus marmoratus</i>)	Threatened	Designated	57 FR 45328 45337; 1 October 1992
Western Snowy Plover (<i>Charadrius nivosus nivosus</i>)	Threatened	Designated	58 FR 12864 12874; 5 March 1993
Columbian White-tailed Deer (<i>Odocoileus virginianus leucurus</i>)	Endangered	(none)	32 FR 4001; 11 March 1967
Northern Spotted Owl (<i>Strix occidentalis caurina</i>)	Threatened	Designated	55 FR 26114 26194; 26 June 1990
Oregon Silverspot Butterfly (<i>Speyeria zerene hippolyta</i>)	Threatened	Designated	45 FR 44935; 15 October 1980
Bull Trout (<i>Salvelinus confluentus</i>)	Threatened	Designated	63 FR 31693 31710; 10 June 1998
Streaked Horned Lark (<i>Eremophila alpestris strigata</i>)	Threatened	Designated	78 FR 61506; 3 October 2013
Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)	Threatened, proposed	(none)	78 FR 61621; 3 October 2013
Water Howellia (<i>Howellia aquatilis</i>)	Threatened	(none)	58 FR 19795 19800; 16 April 1993

5.2.4.3. Affected Environment

The Corps has previously consulted with USFWS on the O&M dredging program of the CR FNC and the addition of the Puget Island sump to address effects to many ESA-listed species in their jurisdiction. Several species have been delisted and no longer require ESA consultation, which include the bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), brown pelican (*Pelecanus occidentalis*), and the Aleutian Canada goose (*Branta canadensis leucopareia*).

United States Fish and Wildlife Service. 2002. *Biological and Conference Opinions for the Columbia River Channel Improvement Project*. Tracking number 02-1743, 02-4943. Oregon State Office. Portland, Oregon. 20 May 2002.

United States Fish and Wildlife Service. 2010. *Letter of Concurrence for Operations and Maintenance of the Columbia River Federal Navigation Project*. Reference number 13420-2010-I-0165. Oregon State Office. Portland, Oregon. 29 September 2010.

The effects of CR FNC O&M dredging program to Columbia River bull trout (*Salvelinus confluentis*), marbled murrelet (*Brachyramphus marmoratus*), and Columbian white-tailed deer (*Odocoileus virginianus leucurus*) from the CR FNC O&M program were previously addressed in the 29 September 2010 informal ESA consultation with the USFWS (USFWS reference #13420-2010-I-0165).

The Corps' 2010 Biological Assessment (BA) for the Columbia River dredging and dredged material placement program, for which the dredging and placement action and range of effects is very similar to the Proposed Action, received a USFWS Letter of Concurrence on 29 September 2010, as listed above. Therefore, the potential effects of the Proposed Action alternative for bull trout, marbled murrelet, and Columbian white-tailed deer are consistent with the previous determination of likely to affect, not likely to adversely affect and do not require re-initiation of informal consultation. In addition, the Corps determined the Proposed Action would have "no effect" to western snowy plover (*Charadrius nivosus nivosus*), northern spotted owl (*Strix occidentalis caurina*), short-tailed albatross (*Phoebastria albatrus*), Oregon silverspot butterfly (*Speyeria zerene*), and water howellia (*Howellia aquatilis*). Therefore, these species do not require ESA consultation.

Placement activities can facilitate the creation and/or maintenance of suitable streaked horned lark habitat and the Corps has worked with USFWS and its partners to minimize potentially adverse effects and maximize the beneficial effects of dredged material placement actions throughout the lower Columbia River for streaked horned lark.

Beginning in April 2013, the Corps sought active participation from USFWS on ways to avoid and minimize potential adverse effects to streaked horned larks and its habitats. On 4 March 2014, the Corps re-initiated ESA consultation with USFWS and submitted a BA to address potential adverse effects to streaked horned larks and its designated critical habitat in the lower Columbia River from the CR FNC O&M dredging program. The BA included the addition of shoreline placement at Pillar Rock Island and revised capacities of the Network for the next five years.

The USFWS announced the proposed listing of the western distinct population of yellow-billed cuckoos (*Coccyzus americanus occidentalis*) as threatened under the ESA on 3 October 2013 (FR 78 61622). The proposal applies to the western yellow-billed cuckoo throughout its entire breeding range. The available information concludes that the western yellow-billed cuckoo has declined by several orders of magnitude over the past 100 years, and that the decline is continuing, isolating birds into smaller populations at core breeding areas. The decline of the western yellow-billed cuckoo is primarily the result of habitat loss and degradation. While much of this habitat loss occurred historically, many of the impacts have subsequent ramifications that are on-going and affect the size, extent, connectivity, and quality of riparian vegetation within the range of the cuckoo. The USFWS found that no critical habitat was present in Oregon or Washington and as a result, no critical habitat was proposed for designation in this region.

The western yellow-billed cuckoo is a riparian obligate species, historically found in parts of 12 states west of the Continental Divide, including: Oregon, Washington, Idaho, Montana, Wyoming, Colorado, Nevada, Utah, California, Arizona, New Mexico, and Texas. Approximately 350-500 pairs are estimated to breed north of the Mexican border where habitat requirements include extensive riparian forests dominated by mature, structurally diverse trees and a vegetative understory

consisting of shrubs and smaller trees. The last confirmed breeding records in Oregon are from the 1940s and observations of individual birds in 2009, 2010, and 2012 near the Sandy River Delta and its confluence with the Columbia River were the first confirmed sightings west of the Cascade Mountains since 1977. Historically, the western yellow-billed cuckoo was considered rare in the Pacific Northwest and the available data suggests that if yellow-billed cuckoos still breed in Oregon and Washington, the numbers are extremely low with pairs numbering in the single digits.

The USFWS concluded that the curtailment and decline in riparian habitat is primarily the result of long-lasting effects from manmade features that alter watercourse hydrology such that the natural processes that sustain riparian habitats are diminished or non-functional. In addition, the encroachment and establishment of non-native species has further degraded the quality of remaining riparian areas. Climate change was also recognized as a critical issue with potentially wide-ranging effects on the species and its habitat; it was suggested that the effects of climate change would exacerbate habitat loss and degradation, invasive species, and wildlife/drought resulting in smaller patch sizes and more isolated breeding areas. Nesting yellow-billed cuckoos are sensitive to patch size and seldom use riparian areas smaller than 100m x 300m. For this reason, the USFWS concluded that smaller patch sizes and isolated breeding areas may compound juvenile dispersal and re-occupation of breeding adults. Furthermore, where riparian areas are located in proximity to urban and agricultural areas, the potential for pesticide and herbicide to affect habitat, prey availability, and cuckoos themselves is increasingly high.

Based on the information provided above, it is assumed that very few western yellow-billed cuckoos are present in the region, and if any birds are present they would likely occupy intact and extensive riparian forests found outside of the Network. The placement sites are largely composed of open, sandy areas and if riparian vegetation is present, it does not consist of large, extensive riparian forests preferred by the cuckoo (greater than 100 x 300m). For this reason, the preferred alternative is highly unlikely to affect individual cuckoos or their preferred habitats because these conditions are not present in the action area. As a result, the Corps has determined the Proposed Action would have “no effect” to the western yellow-billed cuckoo.

5.2.4.4. Project Impacts

The continued O&M dredging work and subsequent upland and aquatic placement of dredged materials may affect ESA-listed species and their habitats. The duration of effects may range from a few hours during dredging and in-water or upland placement, to a few years on upland placement sites for vegetation to become re-established. The level of habitat disturbance would continue at its current rate.

Upland placement of dredged materials may have adverse and beneficial effects to streaked horned larks and its habitats. The Corps’ 2014 BA on the CR FNC O&M dredging program effects to streaked horned larks provides a detailed effects analysis of the 2014-2018 dredging years. The BA concludes that O&M dredging program may affect, is likely to adversely affect streaked horned larks and adverse affect its critical habitat through upland placement of dredged materials. The USFWS BiOp is expected to provide terms and conditions that will include RPMs to avoid and minimize take of streaked horned larks. The upland placement of dredged materials is a critical beneficial disturbance action that creates and sustains suitable habitat for streaked horned lark foraging,

breeding, nesting, and over-wintering in the lower Columbia River. Without the Corps' upland placement of dredged materials in the lower Columbia River, the geographic extent, quantity, and quality of suitable habitat for streaked horned lark would decrease and become unsuitable. The upland sites would be degraded over time as sites become too vegetated, eroded by river currents, and excavated for sandy materials. Through additional upland placement, the Proposed Action would increase the amount, quality, and geographical extent of suitable habitat for streaked horned larks over the next five years in the lower Columbia River.

5.2.4.4.1. No Action

Direct: The No Action alternative would affect ESA-listed species within the jurisdiction of the USFWS during dredging, in-water placement, and upland placement activities. The effects to listed species were addressed in the USFWS 2010 Letter of Concurrence. Potential adverse and beneficial effects to the streaked horned lark and its designated critical habitat from continued upland placement within the existing Network should be addressed in the pending ESA consultation request.

The No Action alternative would result in the loss of Pillar Rock Island (projected erosion rates indicate the island would erode back into a shoal in 10 years). Pillar Rock Island is designated critical habitat for streaked horned lark and the remaining suitable upland habitat would be lost over time. Pillar Rock Island is used by streaked horned lark for foraging, breeding, and rearing young in sparsely vegetated uplands. The island may be used as over-wintering habitat by streaked horned lark. The island would revert back into a shallow shoal retaining open shallow water habitat. However, the aquatic habitats would become fragmented and more susceptible to increased scouring by natural high-flow energy events, thereby reducing suitability for shallow water habitat for some ESA-listed species. The higher value intertidal estuarine wetland and shallow water habitat on the backside of the island would be exposed to higher river flows as the island erodes. These flows would fragment the currently protected habitats and reduce their amount and quality for ESA-listed species.

The No Action alternative at the Puget Island sump would not have additional effects to USFWS ESA-listed species or their habitats beyond the effects addressed in the USFWS 2010 Letter of Concurrence. The No Action alternative would maintain the existing site capacities and the effects to ESA-listed species in USFWS jurisdiction were addressed in the 2010 Letter of Concurrence, except for streaked horned larks. Potential adverse and beneficial effects to streaked horned larks from upland placement within the existing Network should be addressed in the pending ESA consultation with the USFWS.

Indirect: The No Action alternative would result in the loss of Pillar Rock Island, thereby reducing overall suitable upland habitat for streaked horned lark and reduce protected shallow water and estuarine wetland habitats in the Columbia River estuary for ESA-listed species within the jurisdiction of the USFWS. No additional indirect effects to USFWS ESA-listed species from the No Action alternative are expected by not utilizing the Puget Island sump or from the maintaining the existing placement site capacities. Potential adverse and beneficial effects to streaked horned larks from upland placement within the existing Network should be addressed in the pending ESA consultation with the USFWS.

5.2.4.4.2. Proposed Action

Direct: The Proposed Action alternative would affect ESA-listed species within the jurisdiction of the USFWS through O&M dredging of the CR FNC and subsequent aquatic and upland placement of dredged materials. The effects to listed species were addressed in the USFWS 2010 Letter of Concurrence and those effects are ongoing. Potential adverse and beneficial effects to the streaked horned lark and its designated critical habitat from continued upland placement within the Network should be addressed in the pending ESA consultation request.

The Proposed Action alternative would restore the upland footprint of Pillar Rock Island through shoreline placement, which would increase the available upland habitat for streaked horned lark over time. Newly restored uplands that have partial vegetation can support breeding streaked horned lark and promote their recovery. Shoreline placement would shift shallow water habitat north to its previous extent. The restoration of the site would maintain the existing pile dikes and intertidal wetlands and shallow water habitats on the south side of the island. These protected habitats provide high value resources for ESA-listed species. The effects of shoreline placement to aquatic species listed by the USFWS were addressed in the 2010 Letter of Concurrence. The direct effects from shoreline placement at Pillar Rock Island to streaked horned lark should be addressed during the pending ESA consultation with USFWS.

The effects to USFWS species, excluding streaked horned lark, for the creation and use of the Puget Island sump was previously addressed in the 2010 informal ESA consultation with the USFWS. The Puget Island sump is not likely to adversely affect USFWS species or designated critical habitat. The sump would not permanently affect ESA-listed species or their habitat because it would maintain its deepwater habitat characteristics. Temporary effects to listed species during use of the sump are expected to dissipate quickly once work is completed. The direct effects from use of the Puget Island sump to streaked horned lark should be addressed during the pending ESA consultation with USFWS.

The Proposed Action alternative would utilize the existing placement site footprints. Therefore, the revised site capacities would not differ in the range of effects disclosed in the 2003 SEIS or consulted upon in the USFWS the 2010 Letter of Concurrence. The potential adverse and beneficial direct effects to streaked horned larks and its critical habitat from the revised site capacities and upland placement should be addressed in the pending ESA consultation with the USFWS.

Indirect: The Proposed Action alternative would help maintain the amount and quality of upland, riparian, wetland, and shallow water habitats in the Columbia River estuary for ESA-listed species in the jurisdiction of the USFWS. Indirect effects to ESA-listed species, excluding streaked horned larks, were previously addressed in the 2010 informal ESA consultation with the USFWS. The indirect benefits and effects from shoreline placement at Pillar Rock would increase the overall amount and suitability of habitat for streaked horned lark in lower Columbia River. Indirect effects to streaked horned lark should be addressed in the pending ESA consultation with the USFWS.

Additional indirect effects to ESA-listed species or their habitats from the Puget Island sump or revised site capacities should be addressed in the pending ESA consultation with the USFWS.

5.2.5. Invasive Species

Executive Order 13112 requires federal agencies to “prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.” The order defines invasive species as “any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem whose introduction does or is likely to cause economic or environmental harm or harm to the human health.”

WDFW and ODFW along with regional invasive species management groups have identified the top priority invasive species for prevention from establishment or eradication efforts. Invasive species once established have the potential for widespread native ecological disruption by displacement of native plants and animals, reduction in habitat and species biodiversity, competition with native organisms for limited resources, and degradation of habitats. Once an introduced species becomes established, the species becomes increasingly difficult and expensive to control; invasive species has the potential to negatively affect the environmental and economic viability of a region.

5.2.5.1. Affected Environment

High priority invasive species have been identified as the species most likely to generate ecological and economic losses within the Lower Columbia River system, consequently causing relatively high impacts to the human and ecological environment. Some species are already established within the system; other species have been discovered but are yet established, while other species are not within the system. Table 7 outlines which species are established or if established, likely to disrupt the Lower Columbia River system. The Corps may come across these species during dredging and placement operations.

Table 7. Most common Invasive Species.

Species	Status
Terrestrial Plants	
Butterfly bush (<i>Buddleja davidii</i>)	Present
Common crupina (<i>Crupina vulgaris</i>)	Present
Garlic mustard (<i>Alliaria petiolata</i>)	Present
Giant hogweed (<i>Heracleum mantegazzianum</i>)	Present
Himalayan blackberry (<i>Rubus armeniacus</i>)	Present
Kudzu (<i>Pueraria montana var. lobata</i>)	Eradicated
Scotch broom (<i>Cytisus scoparius</i>)	Present
Aquatic plants	
Caulerpa seaweed (<i>Caulerpa taxifolia</i>)	Eradicated
Common reed (<i>Phragmites australis</i>)	Present
Eurasian water milfoil (<i>Myriophyllum spicatum</i>)	Present
Parrot’s feather (<i>Myriophyllum aquaticum</i>)	Present
Purple loosestrife (<i>Lythrum salicaria</i>)	Present
Spartina (<i>Spartina patens</i>)	Present: not established
Water chestnut (<i>Trapa natans</i>)	Not present
Terrestrial animals	

Feral swine (<i>Sus scrofa</i>)	Present
White garden snail (<i>Theba pisana</i>)	Not present
Aquatic animals	
American Bullfrog (<i>Lithobates catesbeianus</i>)	Present
Chinese Mitten Crab (<i>Eriocheir sinensis</i>)	Reported sightings, not confirmed
Common Snapping turtle (<i>Chelydra serpentina serpentina</i>)	Present
Crayfish (<i>Orconectes neglectus</i> , <i>O. rusticus</i> , <i>Procambarus clarkii</i>)	Present
Green crab (<i>Carcinus maenas</i>)	Present
New Zealand mud snail (<i>Potamopyrgus antipodarum</i>)	Present
Nutria (<i>Myocastor coypus</i>)	Present
Red-Eared Slider (<i>Trachemys scripta elegans</i>)	Present
Zebra/quagga mussel (<i>Dreissena polymorpha</i> , <i>D. rostriformis bugensis</i>)	Not present
Fish	
Asian carp (<i>Hypophthalmichthys nobilis</i> , <i>H. molitrix</i> , <i>Mylopharyngodon piceus</i>)	Present
Atlantic salmon (<i>Salmo salar</i>)	Present: not established
Northern snakehead (<i>Channa spp.</i>)	Not present
Oriental Weatherfish (<i>Misgurnus anguillicaudatus</i>)	Present

None of the species on the list are used by the Corps for erosion control or pest management. All equipment and materials would be inspected for the presence of invasive species. In compliance with the Executive Order 13112, the Corps would exercise precaution if invasive species are found in or adjacent to construction areas. Proper inspection and cleaning of construction equipment and eradication strategies would be implemented should an invasive species are present.

5.2.5.2. Project Impacts

The continued O&M dredging and subsequent upland and aquatic placement of dredged materials may provide avenues for invasive aquatic species to be re-distributed in the lower Columbia River. The rate or intensity of invasive dispersal is not expected to increase from the re-distribution of dredged material from the CR FNC to the existing Network or aquatic placement sites. The in-water placement of materials dredged from the CR deep-draft channel back into the Columbia River is not expected to create a net increase or decrease invasive species. Based on Corps’ sediment sampling, organic materials typically account less than one percent of the dredged sediments from the CR FNC deep-draft channel between RM +3.0 to 106.5. Site preparation for upland placements and upland placements are expected to temporarily eradicate invasive plant species from the footprint of the upland placement sites. Removed vegetation is typically buried on site in berms or under dredged materials.

5.2.5.2.1. No Action

Direct: The No Action alternative would not change the project ability to minimize spread of invasive species. The Corps implements strategies that minimize the likelihood of invasive species movement from project to project.

Indirect: There are no indirect impacts as a result of the No Action alternative.

5.2.5.2.2. Proposed Action

Direct: The Proposed Action alternative would not change the project ability to minimize spread of invasive species. The Corps implements strategies that minimize the likelihood of invasive species movement from project to project.

Indirect: There are no indirect impacts as a result of the Proposed Action alternative.

5.3. Physical Environment

5.3.1. Air Quality

The Clean Air Act (CAA) established a comprehensive program for improving and maintaining air quality throughout the United States. The focus of the CAA is to reduce ambient concentrations of air pollutants and toxins that degrade air quality; the reduction of air pollution in turn improves the human and biologic environment. The intent of the act is achieved through permitting of stationary sources, restriction of toxic substance emissions from stationary and mobile sources, and the establishment of National Ambient Air Quality Standards (NAAQS) as set by EPA. The CAA prohibits federal agencies from funding, authorizing, or approving plans, programs, or projects that do not meet or conform to the NAAQS requirements.

EPA sets the national air quality standards for six common pollutants as emitted by any stationary and mobile (marine and/or terrestrially based) source (as referred to as “criteria” pollutants). These standards consist of threshold levels for carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter 2.5 and 10, and sulfur dioxide. EPA transferred primary implementation and enforcement of the CAA authority for federal air quality standards to state, local, or tribal regulatory agencies. The delegated agency is responsible for establishing State Implementation Plan (SIP) specific to their region. The contents of a typical SIP fall into several categories: (1) State-adopted control measures which consists of either rules/regulations or source-specific requirements (e.g., orders and consent decrees); (2) State-submitted comprehensive air quality plans, such as attainment plans, maintenance plans rate of progress plans, and transportation control plans demonstrating how these state regulatory and source-specific controls, in conjunction with federal programs, will bring and/or keep air quality in compliance with federal air quality standards; (3) State-submitted "non-regulatory" requirements, such as emission inventories, small business compliance assistance programs; statutes demonstrating legal authority, monitoring networks, etc.); and (4) additional requirements promulgated by EPA (in the absence of a commensurate State provision) to satisfy a mandatory requirement. If the NAASQ is exceeded, the region is designated as a nonattainment area and mandated to implement measures to improve the region air quality through the implementation of a stricter SIP.

5.3.1.1. Affected Environment

The Columbia River from RM +3.0 to 106 bisects Washington and Oregon, and the majority of the river runs through areas removed from direct sources of air pollution. The cities of Longview, Kalama, and Vancouver of Washington state and the cities of Portland and St. Helens are the primary contributors to air pollution along the lower Columbia River. For this region, the CAA, as

delegated by EPA, is regulated by Oregon Department of Environmental Quality (DEQ) and Washington Department of Ecology (DOE) for the majority of air pollution contributors.

The lower Columbia River climate is characterized by wet winters, relatively dry summers, and mild temperatures throughout the year. Along the lower elevations of the immediate coast, normal annual precipitation is between 65 to 90 inches. Occasional strong winds strike the Oregon Coast, usually in advance of winter storms. Wind speeds can exceed hurricane force, and in rare cases have caused damage to structures or vegetation. Damage is most likely at exposed coastal locations, but it may extend into inland valleys as well. Such events are typically short-lived, lasting less than one day. The prevailing wind directions are The prevailing winds along the Lower Columbia River comes from the east out of the Columbia Gorge during the fall and winter months (from about October to March), and from the west off of the ocean during the spring and summer months (April to September).

The lower Columbia River currently meets the NAAQS.¹ In 1996, Portland of Oregon and Vancouver of Washington were listed as not meeting NAAQS; EPA designated these areas nonattainment status. Both Portland and Vancouver implemented a stricter SIP. In 2011, the region was removed from the nonattainment list. The region is currently meeting NAAQS; the maintenance SIP provides the region strategy for ensuring attainment status with a focus on emission reductions from on-road vehicles, non-road vehicles, paints and household products, and industry. Recently the Corps replaced the older combustion engines on their dredges in order to meet California Air Quality standards. The Port of Portland intends on updating the engine on the contract pipeline dredge. California Air Quality standards are stricter than those of Oregon and Washington.

5.3.1.2. Project Impacts

5.3.1.2.1. No Action

Direct: The No Action alternative would not change the project's ability to meet air quality standards. There would be slight decrease of project-based air emissions once upland sites reach capacity due to the reduction in use of excavation vehicles and heavy equipment. However, O&M dredging and in-water placement of dredged materials will continue and may increase due to increased dredging since less material will be placed in upland sites and sediments would accumulate quicker or sooner in the CR FNC.

Indirect: The No Action alternative would not change the project ability to meet air quality standards.

5.3.1.2.2. Proposed Action

Direct: The Proposed Action alternative would not change the project's ability to meet air quality standards. There would be a temporary and localized reduction in air quality during placement due to emissions from the dredge during dredging and aquatic placement of dredged materials, and from any earth-moving equipment used at upland/shoreline/beach nourishment sites. There also would be

¹ <http://www.deq.state.or.us/aq/forms/annrpt.htm>

temporary and localized increases in noise levels from this equipment. These impacts would be minor and temporary in nature, and would cease once dredging and placement is completed.

Indirect: The Proposed Action alternative would not change the project ability to meet air quality standards.

5.3.2. Climate Change

Climate is governed by incoming solar radiation and greenhouse effects that influence short-term, seasonal, and long-term weather patterns. The greenhouse effect is the result of certain naturally occurring atmospheric gases absorbing long-wave radiation emitted from the Earth. Absorption of this long-wave radiation in the atmosphere, as opposed to allowing it to be emitted back into space, warms the Earth. Greenhouse gases include (in the order of importance to the greenhouse effect): water vapor, carbon dioxide, methane, nitrous oxide and ozone. Anthropogenic activities such as the burning of fossil fuels (adding more greenhouse gases to the atmosphere) and clearing of forests (removing a natural sink for carbon dioxide), have intensified the natural greenhouse effect, causing climate change. Carbon dioxide emissions from the burning of fossil fuels are the most substantial source of anthropogenic greenhouse gases. Global atmospheric concentrations of carbon dioxide have risen almost 100 parts per million (ppm) since pre-industrial value of 280 ppm (OCCRI 2010)

Natural factors, which include solar variation and volcanic activity, also contribute to climate change. However, strong scientific evidence suggests that these factors alone do not fully explain the observed accelerated climate change within the past few decades.

5.3.2.1. Affected Environment

Climate change is likely to play an increasingly important role in determining the fate for wildlife species and the conservation value of habitats, in the Columbia River. It is expected that climate change would exacerbate long-term problems related to temperature, stream flow, habitat access, predation, and marine productivity (CIG 2004, ISAB 2007). According to the U.S. Global Change Research Program (USGCRP), the average regional air temperatures have increased by an average of 1.5°F over the last century (up to 4°F in some areas), with warming trends expected to continue into the next century (2009). Warming is likely to continue during the next century as average temperatures increase another 3 to 10°F (USGCRP 2009).

These changes would not be spatially homogeneous across the Columbia River. Areas with elevations high enough to maintain temperatures well below freezing for most of the winter and early spring would be less affected. Low-lying areas that historically have received scant precipitation contribute little to total stream flow and are likely to be more affected. Overall, about one-third of the current cold-water fish habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (USGCRP 2009). Precipitation trends during the next century are less certain than for temperature but more precipitation is likely to occur during October through March and less during summer months, and more of the winter precipitation is likely to fall as rain rather than snow (ISAB 2007, USGCRP 2009). Where snow occurs, a warmer climate would cause earlier runoff so stream flows in late spring, summer, and fall would be lower and water temperatures would be warmer (ISAB 2007, USGCRP 2009).

Higher winter stream flows increase the risk that winter floods in sensitive watersheds would damage spawning redds and wash away incubating eggs (USGCRP 2009). Earlier peak stream flows would also flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and the risk of predation (USGCRP 2009). Lower stream flows and warmer water temperatures during summer would degrade summer rearing conditions, in part by increasing the prevalence and virulence of fish diseases and parasites (USGCRP 2009). Other adverse effects are likely to include altered migration patterns, accelerated embryo development, premature emergence of fry, variation in quality and quantity of tributary rearing habitat, and increased competition and predation risk from warm-water, non-native species (ISAB 2007).

The earth's oceans are also warming, with considerable interannual and inter-decadal variability superimposed on the longer-term trend. Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances (USGCRP 2009). Ocean conditions adverse to salmon and steelhead may be more likely under a warming climate.

The effects of climate change to the Proposed Action could lead to a change in the timing of shoal formation from current changes due to precipitation, the extent of snowpack, and rain-on-snow events. These changes in weather patterns could influence seasonal river flows, subsequently influencing the presence of size of shoaling in the lower Columbia River, thereby influencing the timing of dredging and placement of materials. However, the proposed placement plan is a short-term project, lasting twenty years in duration. It is assumed that any effects climate change might have across the project area during this timeframe would be negligible and effects to any aquatic or terrestrial habitat would be immeasurable.

5.3.2.2. Project Impacts

5.3.2.2.1. No Action

Direct: The No Action alternative would not change the project's direct effects on climate change as discussed in the 2003 SEIS. The Corps implements strategies that minimize the project actions that could contribute to climate change.

Indirect: The No Action alternative would not change the project's indirect effects on climate change as discussed in the 2003 SEIS. The Corps implements strategies that minimize the project actions that could contribute to climate change.

5.3.2.2.2. Proposed Action

Direct: The Proposed Action alternative would not change the project's direct effects on climate change as discussed in the 2003 SEIS. The Proposed Action is a 20-year plan from when construction was completed in 2010. It is assumed that any effects climate change might have across the project area during this short timeframe would be negligible and effects to any aquatic or terrestrial habitat would be immeasurable. The Corps implements strategies that minimize the project actions that could contribute to climate change.

Indirect: The Proposed Action alternative would not change the project's indirect effects on climate change as discussed in the 2003 SEIS. The Proposed Action is a 20-year plan from when construction was completed in 2010. It is assumed that any effects climate change might have across the project area during this short timeframe would be negligible and effects to any aquatic or terrestrial habitat would be immeasurable. The Corps implements strategies that minimize the project actions that could contribute to climate change.

5.3.3. Geology and morphology

5.3.3.1. Affected Environment

Channels and banks of the Columbia River are deeply incised river valleys, where banks are typically vegetated and consist of basalt, silt, and clay deposit. The river thalweg is primarily comprised of fine and medium grained sand. The Columbia River has been highly modified by anthropogenic sources since the 1890s. Pre-1890s, the shore edge of the Columbia River was dynamic; there were sections of the Columbia River where sand dominated the morphology and other parts where silt/hardpan dominated. Present topography is a result of both the excavation of a portion of the deposited gravels by the Columbia River prior to the post-glacial 300 ft sea level rise. The lower Columbia River valley flooded during the sea level rise causing extensive deposition of silt and clay materials in a low energy estuarine-lacustrine environment. These deposits forms the majority of the bank materials that are found in the present-day Columbia River lowlands. Present river morphology is controlled by these erosion-resistant silt and clay materials (Dodge, 1971). Current thalweg depths are typically around 50 ft deep with deeper spots occurring along outside bends.

Since the 1890s the river has been highly modified by dredging operations and the installation of dams, pile dikes, and other structures that altered the movement of sediment. The Columbia River estuary (RM +3.0 to RM 35) is four to five miles wide bisected into two main channels, the north and south channel. The south channel is an extension of the main river channel upstream of the estuary and carries most of the upland river discharge. The navigation channel follows the south channel through the estuary. The river channel varies from 1,700 to 3,000 ft in the upper reaches of the lower Columbia (RM 35 to RM 145) in width and has minor side channels. Portions of the river have been modified by pile dikes and relic dredged material placement areas. River bends within the Columbia River system are typically very long and gradual. There are several tight bends that occur as a result of basalt cliff impediments. There still are back-bay areas and some shore areas that have silty/hardpan shore edge; however, many shore areas since the 1890s have received dredged sand. Areas of pile dike placement have accumulated migrated sand that may have otherwise not accumulated in absence of pile dikes. The dams provide flood protection measures, and as a result, natural scour and depositional processes have decreased in the lower Columbia River.

Several different types of shoaling occur within the CR FNC. The most common shoals occur in the mainstem Columbia River are continuous cutline shoals or sand wave (continuous or limited) formations. Cutline shoals are defined by bedload material that is moving in from the side slopes (parallel edges) of the channel, typically longer than 1,000 ft in length (upstream to downstream); shoaling is more continuous and stable. These kinds of shoals are more common in lower river. Sand waves shoals are where bedload material forms peaks and troughs perpendicular across the channel,

around 15 ft in height and 200 ft long (upstream to downstream); shoaling is more intermittent and unstable. These kinds of shoals are typically found in the upper reaches of the river. Low-energy accretionary depositional shoals (shoals formed by settling of sediment out of the water column due to low water movement through the area) are typically found in the lower energy side channels.

The estuary is 4 to 5 miles wide and extends upstream to about RM 25 of the Columbia River. Upstream of RM 25, the main river channel is 1,700-3,000 ft wide, with minor bifurcations. River bends tend to be gradual, except where basalt cliffs control the alignment. The bed of the main channel is composed of fine and medium sands. The natural riverbanks consist of 10- to 20-ft of clay-silt, overlying much deeper sand deposits. Sandy beaches occur only where dredged material has been placed along the shore. There has been little change in the river's location in the last 100 years.

5.3.3.2. Project Impacts

5.3.3.2.1. No Action

Direct: The No Action alternative would continue O&M dredging of the CR FNC to maintain a safely navigable deep-draft channel. Dredging would remove shoals that impair navigation within the channel and place those sediments either in-water or at upland sites in the Network. In-water placement would redistribute river sediments within the aquatic ecosystem and maintain their availability to riverine transport and depositional functions.

The No Action alternative would result in the loss of the Pillar Rock Island (projected erosion rates indicate the island would erode back into a shoal in 10 years). The island would revert to a shallow shoal retaining open shallow water characteristics and it would become more susceptible to increased scouring by natural high-flow energy events.

There are no impacts for the No Action alternative at the Puget Island sump. The No Action alternative would maintain the existing site capacities and site footprints.

Indirect: The No Action alternative at the Pillar Rock Island would result in an overall increase in shoaling along this reach. The morphology at the island would become more unstable due to the eventual loss of pile dikes along this reach.

No indirect effects from the No Action alternative are expected at the Puget Island sump or from the existing site capacities.

5.3.3.2.2. Proposed Action

Direct: The Proposed Action alternative would continue O&M dredging of the CR FNC to maintain a safely navigable deep-draft channel. Dredging would remove shoals that impair navigation within the channel and place those sediments either in-water or at upland sites in the Network. In-water placement would redistribute river sediments within the aquatic ecosystem and maintain their availability to riverine transport and depositional functions.

The Proposed Action alternative would restore Pillar Rock Island to its former extent, occupying up to 52 acres. Columbia River sands from adjacent shoals would be placed to restore the island's footprint over the next several years. The restoration of the island would maintain the shallow water and wetland habitats on the south side of the island, as well as pile dikes downstream of the island.

The Proposed Action alternative at the Puget Island sump would result in temporary excavation of the riverbed to create the sump, followed by the temporary placement and subsequent removal of dredged materials within the sump to the Puget Island upland placement site. These actions would not permanently change the deep-water or physical sediment characteristics of the riverbed. The Proposed Action alternative with revised site capacities would not have additional geological or morphological effects because the site footprints and dredged materials placed are unchanged.

Indirect: The Proposed Action alternative at the Pillar Rock Island would result in an overall increase in uplands along this reach and the lower estuary.

No indirect effects from the Proposed Action alternative are expected at the Puget Island sump or from the existing site capacities.

5.3.4. Water Resources

The following subsections for this section provide the baseline description and analysis of impacts from the O&M dredging program for the CR FNC and the Network to water resources: hydrology, water quality, and wetlands.

5.3.4.1. Hydrology

Executive Order 11988 (Floodplain Management) directs all federal agencies to refrain from conducting, supporting, or allowing actions in floodplains unless it is the only practicable alternative. Additionally, the Corps follows guidelines as set by Engineering Regulation (ER) 1165-2-26 for the operations and maintenance programs conducted by the Corps.

5.3.4.1.1. Affected Environment

Columbia River discharges are dependent on weather, reservoir operations, and ocean tides. The highest flows generally occur in May or June as a result of snowmelt in the upper watershed. Upstream reservoirs store water during this high flow period, which has reduced the 2-year flood peak at the Dalles, Oregon (RM 192) from 580,000 cubic ft per second (cfs) under natural conditions to 360 thousand cfs with regulation. Low flows, typically in the 100,000 cfs range, occur in September and October, after the snowmelt but before the winter rains. Water stored during the spring freshet is released during low flow periods to increase hydropower generation.

The lower river tributaries, such as the Willamette River, are influenced by rain and reach high sharp peak flows several days following storms and low-level snowmelt between November and March. Minimum flow occurs in the late summer months.

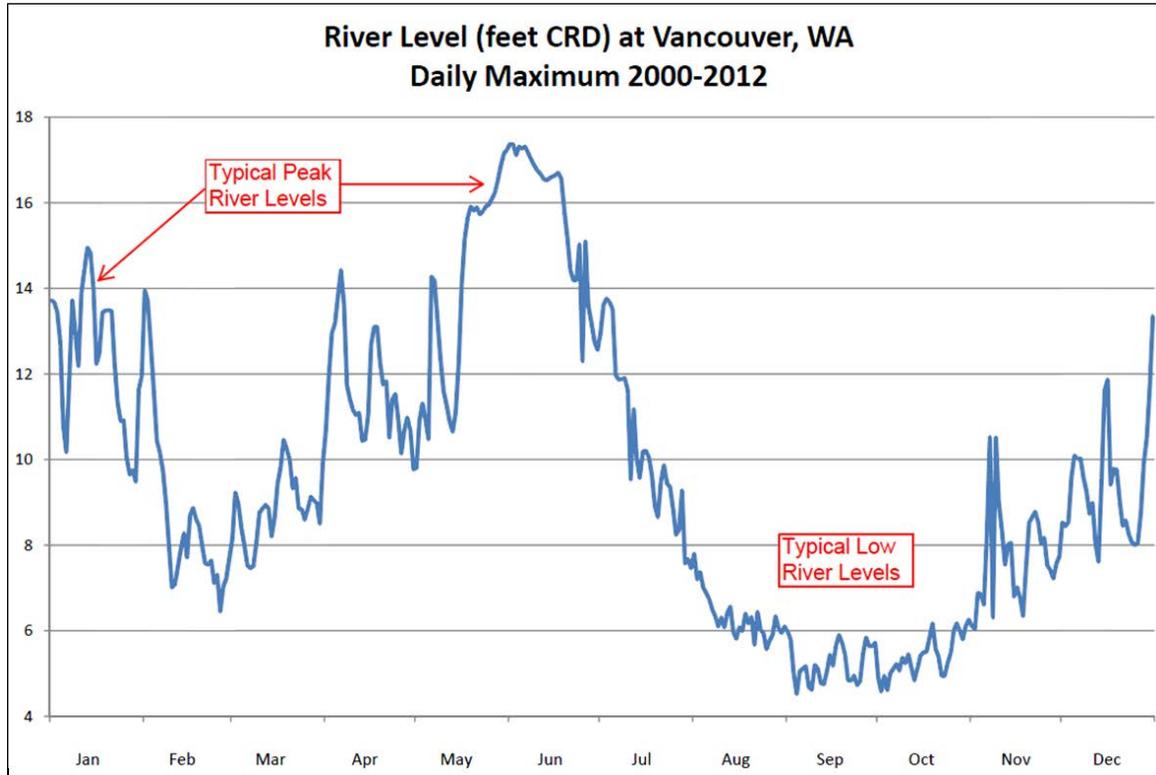


Figure 31. Typical High and Low Flows for Columbia River at Vancouver, Washington.

Peak river levels in the lower Columbia River generally occur in January and June, and minimum river levels occur August through October.

High tide entering the Columbia River from the Pacific Ocean takes about 5.5 hours to progress up the Columbia River from Astoria (RM 15) to the confluence of the Willamette River (RM 100). The tidal effect is greatest in the reaches downstream of RM 33 and during low flow periods. The instantaneous flow in the lower reaches changes constantly due to the effects of ocean tides, and can range from twice the mean daily value to negative values (upstream flow). Flow reversal can occur as far upstream as RM 90 during low flow periods.

Columbia River flows are maintained by spill regulation of upstream reservoirs; however, flow events can be affected by seasonal increases or decreases of rain/snow events. The Columbia River drains over 259,000 square miles. The average annual discharge at the Mouth of Columbia River is over 210,000 cfs. Winter and spring rain events are heavy and have caused winter/spring freshets to occur, with a late spring freshet occurring as the result of snow melt. Reservoirs upstream of RM 145 regulate the volume of water moving through the system.

Tidal influences on the Columbia River occur as far upstream as RM 145. The tidal range at the Mouth of Columbia River is approximately 8 ft and about 2.5 ft at the Port of Vancouver. Because of tidal influences, discharge rates can range from negative values during flood tide to double the mean

daily value at peak ebb flow. Tidal influences are much more pronounced during low river flows than high river flows.

5.3.4.1.2. Project Impacts

5.3.4.1.2.1. No Action

Direct: There are no direct impacts to the hydrologic regime resulting from the No Action alternative.

Indirect: There are no indirect impacts to the hydrologic regime resulting from the No Action alternative.

5.3.4.1.2.2. Proposed Action

Direct: There are no direct impacts to the hydrologic regime resulting from the Proposed Action alternative.

Indirect: There are no indirect impacts to the hydrologic regime resulting from the Proposed Action alternative.

5.3.4.2. Water Quality

The Clean Water Act (CWA) governs the release of pollutants into waterways. There are four applicable sections to the Proposed Action: section 401, section 402, section 404, and section 303(d). Section 401 requires certification from the state where the discharge to waters of the U.S. will occur. The certification is granted by the state certifying that the discharge will not violate the states' water quality standards. EPA retains jurisdiction in limited cases. Water Quality Certification (WQC) will be required from both Oregon and Washington. Section 402 authorizes the EPA, or states to which the EPA has delegated authority, to permit the discharge of pollutants under the National Pollutant Discharge Elimination System (NPDES) program. Section 404 prohibit the discharge of dredge or fill material into navigable waters without a permit from the Corps of Engineers. The Corps does not issue itself a 404 permit to authorize Corps discharges of dredged or fill material but does apply the 404(b)(1) guidelines when determining project impacts. Only when there is no practicable alternative would any discharge of fill material occur. A 404(b)1 analysis would be conducted prior to initiation of any new dredging and placement actions.

Section 303(d) of the CWA establishes that states are to list waters which are not meeting applicable water quality standards. The list includes priority rankings set by the states for the listed waters. Once the impaired waters are identified, Section 303(d) requires that the states establish total maximum daily loads (TMDLs) that would meet water quality standards for each listed waterbody. The Columbia River within the project area has been inventoried by the Washington DOE and the Oregon DEQ as having impaired water quality and is listed on the 303(d) list. The Columbia River is listed at some point along the Columbia River from RM 3 to 145 for these following elements: 1,2,4-Trichlorobenzene; 1,2-Dichlorobenzene; 2,3,7,8-Tetrachlorodibenzo-p-Dioxin; 2,3,7,8-Tetrachlorodibenzo-p-Dioxin Toxic Equivalent; 2,4,6-Trichlorophenol; 2,4-Dichlorophenol; 2-

Methylnaphthalene; 4,4'- Dichlorodiphenyl dichloroethane; 4,4'- Dichlorodiphenyldichloroethylene; 4,4'- Chlorodiphenyl Trichloroethane; Alpha-BHC; Anthracene; Arsenic; Beta-BHC; Bis(2-chloroisopropyl)ether; Chlordane; Dibenzofuran; Dieldrin; Dioxin; Dissolved Oxygen; Endosulfan I; Endosulfan II; Endosulfan Sulfate; Endrin; Endrin Aldehyde; Fecal Coliform; Fluoranthene; Fluorene; Gamma-bhc (Lindane); Heptachlor; Heptachlor Epoxide; Hexachlorobenzene; Hexachlorobutadiene; Hexachloroethane; Invasive Exotic Species; Low Molecular Weight Polycyclic Aromatic Hydrocarbons; Mercury, Nitrobenzene; Polychlorinated biphenyl; pH; Phenanthrene; Phenol; Pyrene; Temperature; Total Chlordane; Total Dissolved Gas.

Sediments from the FNCs are evaluated to determine if they are acceptable for in-water unconfined placement according to the requirements of the CWA and the MPRSA. The Corps has characterized sediments to be dredged in accordance with the regional and national dredge material testing manual protocols, Ocean Testing Manual, Inland Testing Manual, 2009 Northwest Regional Sediment Evaluation Framework (SEF), and previously under the 1998 Dredge Material Evaluation Framework (DMEF).

Project sediment testing is typically performed on the mainstem Columbia River on a 10-year rotational cycle unless an event occurs that would warrant more frequent sampling. The 10-year rotation allows for the continued, even management of both budget and labor while providing sediment quality information to allow dredging to proceed unobstructed. Projects dredged less frequently, such as the auxiliary side channel projects, are evaluated, sampled, and tested as required by the SEF. A brief description of recent sediment quality sampling results is provided below for the Project area.

Columbia River FNC, deep-draft channel and associated turning basins (RM +3.0 to RM 106.5) – The 2008 analyses indicated a mean grain-size of 92% sand. Total organic carbon averaged 0.25%. The Oregon Slough reach of the deep-draft channel was tested in 2005. Mean grain size for all the samples is 0.40 mm, with .037% gravel, 48.15% sand, 41.925% silt, and 9.875% clay.

The detailed results of the characterizations highlighted above are available upon request. Based on these results, the dredged materials have been determined suitable for unconfined aquatic placement without further testing.

5.3.4.2.1. Affected Environment

Operations and Maintenance of the Network is currently covered by DOE WQC Order #9765 and DEQ WQC File Number NWPOP-CLA-F05-001-FR. The Corps has submitted a Joint Aquatic Resources Permit Application to Washington DOE and a Joint Permit Application to Oregon DEQ for the updates to the Network as described in the Proposed Action.

The placements of material on shorelines have already been evaluated in the 2003 SEIS and certified in prior WQC certifications from Oregon and Washington. The construction and operation of the proposed Puget Island sump is no different than the dredging method and effects for the operation of in-water pipeline dredging with upland placement. The impacts of dredging, in-water placement, and upland placement have already been evaluated in the 2003 SEIS and prior WQCs.

5.3.4.2.2. Project Impacts

5.3.4.2.2.1. No Action

Direct: The No Action alternative would have no placement of dredged material would occur on the Pillar Rock Island's northern shoreline or uplands. The Puget Island sump would not be constructed for use nor would it be operated. There would be no impacts to water quality for the No Action alternative. The direct impacts of using the existing Network without updating the capacity are not different than what was disclosed in the 2003 SEIS and evaluated in prior WQCs.

Indirect: It is expected that the upland dredged material sites would run out of capacity, requiring more placement of dredged material back in-water than is currently conducted. In-water placement likely result in the reformation shoals within the navigation channel, thereby increasing operation and maintenance actions over time. This increase in operation and maintenance action is not likely to change the impact to water quality beyond what was evaluated in the 2003 SEIS or prior WQCs.

5.3.4.2.2.2. Proposed Action

Direct: Placement of dredged material on the Pillar Rock Island northern shoreline would cause temporary water quality impacts where the material is discharged onto the beach. This discharge would increase turbidity in the water/shore interface zone as sediment is placed both directly into the water and/or subsequently moved by earth-moving equipment into the water to create the shoreline profile. The turbidity plume is not expected to extend outside of the immediate placement area because the material is sand with minimal fines, which settles to the bottom very quickly. It is expected that the shoreline would be subsequently eroded by the hydraulic processes along this reach. All construction equipment would follow a spill management plan. It is expected that the use of construction equipment and materials would not impact water quality. Shoreline placement has previously been evaluated in the 2003 SEIS and prior WQCs from both states.

There may be a temporary and localized reduction in water quality during the initial construction and subsequent operation of the Puget Island sump. These impacts would be minor and temporary in nature, and would cease once dredging/placement is completed. Although there is some evidence that disposal of fine sediments can create a situation that decreases dissolved oxygen in the water column, that situation does not occur in the mainstem Columbia River. The sediment dredged is primarily sand (<2% fines) and therefore, it is unlikely that dissolved oxygen would be impacted by dredging and placement of this sandy material in the proposed sump. It is also true that toxins found in the sediment adhere to fine-grained material, not sand (EPA 1991). Because toxins have not been detected during sediment testing under the SEF, there is no expectation of a water quality being impacted by re-suspension of toxins during placement.

There are no changes to the placement footprint or in the range of uses for the Network. Therefore, the water quality effects from upland placement are not different than what was disclosed in the 2003 SEIS and evaluated in prior WQCs. Any construction and the use of associated equipment during the dredging and placement action for the use of Pillar Rock Island, Puget Island Sump, and the updated Network would not measurably affect water quality beyond levels disclosed in the 2003 SEIS and prior WQCs.

Indirect: Shoreline placement at Pillar Rock Island would indirectly protect the structural integrity of the two pile dikes downstream of the placement site. In turn, these pile dikes would continue to protect the shallow water habitat on the south side of the island by deflecting high flows away from the area and preventing external disturbances on the water quality within the aquatic habitat.

It is expected that there would be no indirect effects to water quality from the construction and operation of the Puget Island sump. There would be no permanent water quality impact at or adjacent to the project area. There are no expected indirect impacts to the water quality within the deep-water migratory corridor up or downstream from the project area.

There are no additional indirect impacts to water quality expected for the updated Network capacities.

5.3.4.3. Wetlands

Executive Order 11990 directs federal agencies to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. In planning their actions, federal agencies are required to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. Only when there is no practicable alternative would any discharge of fill material occur. It would not be known whether there is a practicable alternative to the placement in what might be a wetland until the dredged material placement site is identified for placement action the preceding season. A 404(b)1 analysis would be conducted for all discovered wetlands and individual site practicable alternative(s) would be developed prior to placement action.

5.3.4.3.1. Affected Environment

As a part of the CRCIP, a wildlife/wetland mitigation plan was developed for offsetting anticipated impacts to agricultural, wetland, and riparian environments. The mitigation plan was developed for planned impacts incurred during the channel deepening and for the first 20 years of CR O&M dredging/placement actions. In the 2008 SE, the anticipated wetland impacts were reduced to from 20 acres to 16.20 acres. To offset 16.20 acres of anticipated wetland impact, the Corps completed 89.60 acres of wetland mitigation in 2010. Currently, none of the anticipated wetland impacts in the 2003 SEIS or 2008 SE have occurred. Since the Corps has not filled any wetlands, the Corps has a wetland impact balance of 16.20 acres of wetland fill.

Based on the 2012 usage plan of the dredged material placement sites, the anticipated wetland impacts decreased from 16.20 acres to 5.40 acres. The 5.40 acres of wetland fill would be entirely within the Puget Island upland placement site. One dredged material placement site, Mt. Solo, with an estimated 10.8 acres of wetlands impacts, was removed from the Network due to an external real estate conflict. By the time the real estate conflict was recognized, all 89.60 acres of wetland mitigation for the expected 16.20 acres of wetland impacts were constructed.

The Corps has delineated wetlands on upland sites not previously present during the 1999 EIS and 2003 SEIS site surveys and 2008 SE. These artificial wetlands have formed as a result of past dredged material placement and site grading practices. Wetlands have unintentionally formed in low-

lying, man-made depressions left from placement actions (Hump Island Wetland Delineation Report, Corps, August 2013; Rice Island Wetland Delineation Report, Corps, August 2013; Lower Deer Island Wetland Delineation Report, Corps, August 2013; Tenasillahe Island Wetland Delineation Report, Corps, Oct 2013). A 0.17-acre palustrine scrub-shrub wetland on Tenasillahe Island is within a Corps placement site. On Rice Island, a man-made settling pond and a 0.06-acre palustrine emergent wetland were delineated within the placement area footprint. Neither of the aquatic resources are natural features and were dominated by non-native vegetation. No wetlands were delineated within the placement site boundaries on Lower Deer Island or Hump Island.

Pillar Rock Island currently has approximately 430 acres of protected tidal flats and marsh located 250 ft to the south of the placement site. They include approximately 400 acres of the intertidal flats and 30 acres of estuarine wetlands. There are no wetlands known within the footprint of the Pillar Rock Island placement site. The Puget Island sump is not considered wetland habitat. It is classified as open deep-water, riverine habitat. The Corps plans to conduct additional wetland delineations on upland placement areas prior to their use over the next five years, as needed.

5.3.4.3.2. Project Impacts

5.3.4.3.2.1. No Action

Direct: The No Action alternative would not place dredged materials on the Pillar Rock Island northern shoreline. The Puget Island sump would not be constructed for use and no wetland effects would occur.

Wetland impacts from placing dredged materials in the current Network is different than what was disclosed in the 2003 SEIS and 2008 SE. Placement of dredged material at Rice Island would permanently fill the 0.06-acre wetland. The Corps would permanently fill the 0.17-acre wetland on Tenasillahe Island. Therefore, the Corps anticipates 0.23 acre of permanent wetland impact at these two sites in the No Action alternative. Additionally, the Corps estimates an impact to 5.40 acres of wetlands on Puget Island. The impact to the Puget Island Sump was previously evaluated in the 2003 SEIS and the 2008 SE and no wetland impacts are expected. The Corps anticipates filling a total of 5.63 acres of wetlands, leaving a remaining wetland impact balance of 10.57 acres in subsequent years.

For the No Action alternative, the Corps would continue to delineate wetlands on upland placement sites prior to placement for the first 20 years of the CR O&M program since deepening was completed in 2010. The Corps would follow all applicable laws, regulations, manuals, and regional supplements for delineating wetlands as sites are planned for placement. The Corps would determine the need to fill any wetlands delineated in the future. If additional wetlands would need to be filled, the Corps would update the wetland impact balance. The Corps would continue to coordinate this course of action with DEQ and DOE as the remaining 10.57 acres of wetland impact balance are identified. The Corps does not expect to exceed the total 16.20 acres of wetland credit for the next 10 years of CR O&M dredging/placement actions.

Indirect: There are indirect wetland impacts for the No Action alternative at Pillar Rock Island. Pillar Rock Island would eventually erode away, resulting in fragmentation and partial loss of the 50 acres of estuarine wetlands that are currently protected from main channel flows.

Not creating or operating the Puget Island sump is not expected to have indirect wetland impacts. No additional indirect wetland impacts are expected from the using the existing Network in the No Action alternative. Existing site use BMPs (e.g. silt fencing, controlled access) would be used to avoid secondary impacts to wetlands adjacent to placement areas.

5.3.4.3.2.2. Proposed Action

Direct: Placement of dredged material would occur on the Pillar Rock Island northern shoreline, in shallow water. The Puget Island sump would be constructed for use in deep-water habitat. There would be no direct impacts to wetlands for the Proposed Action alternative as these two sites.

Wetland impacts from placing dredged materials in the current Network is different than what was disclosed in the 2003 SEIS and 2008 SE. Placement of dredged material at Rice Island would permanently fill the 0.06-acre wetland. The Corps would permanently fill the 0.17-acre wetland on Tenasillahe Island. Therefore, the Corps anticipates 0.23 acre of permanent wetland impact at these two sites in the No Action alternative. Additionally, the Corps estimates an impact to 5.40 acres of wetlands on Puget Island. The impact to the Puget Island Sump was previously evaluated in the 2003 SEIS and the 2008 SE and no wetland impacts are expected. The Corps anticipates filling a total of 5.63 acres of wetlands, leaving a remaining wetland impact balance of 10.57 acres in subsequent years.

For the Proposed Action alternative, the Corps would continue to delineate wetlands on upland placement sites prior to placement for the first 20 years of the CR O&M program since deepening was completed in 2010. The Corps would follow all applicable laws, regulations, manuals, and regional supplements for delineating wetlands as sites are planned for placement. The Corps would determine the need to fill any wetlands delineated in the future. If additional wetlands would need to be filled, the Corps would update the wetland impact balance. The Corps would continue to coordinate this course of action with DEQ and DOE as the remaining 10.57 acres of wetland impact balance are identified. The Corps does not expect to exceed the total 16.20 acres of wetland credit for the next 10 years of CR O&M dredging/placement actions.

Indirect: There are no indirect wetland impacts for the Proposed Action alternative because no increase in wetland habitat is expected within the lower Columbia River from shoreline placement on Pillar Rock Island or the use of the Puget Island sump.

The impacts of using the current Network is different than what was disclosed in the 2003 SEIS or 2008 SE. For the Proposed Action alternative, the Corps would continue to delineate all future wetlands discovered on upland placement sites prior to placement for the next 20-year duration of the CR O&M program. The Corps would determine the need to fill any wetlands delineated in the future. If additional wetlands would need to be filled, the Corps would update the wetland impact balance. The Corps would continue to coordinate this course of action with DEQ and DOE as the remaining 10.57 acres of wetland impact balance are used. The Corps does not expect to exceed the

total 16.20 acres of wetland credit for the next 10 years of CR O&M dredging/placement actions. Existing site use BMPs (e.g. silt fencing, controlled access) would be used to avoid secondary impacts to wetlands adjacent to placement areas.

5.4. Human Environment

5.4.1. Population, Socio-Economic, and Columbia River resources

5.4.1.1. Affected Environment

The project area demarcates the Washington and Oregon state border, with Pacific County, Wahkiakum, Cowlitz, Clark, and Skamania County of Washington state; and Clatsop, Columbia, and Multnomah County of Oregon state lying directly adjacent to Columbia River. Approximately 1.3 million people live along the lower Columbia River. The river runs through the Pacific Northwest's second largest population center, the Portland/Vancouver metro area. The metro area spans the Oregon/Washington border and includes counties not directly adjacent to the Columbia River. The racial composition of the counties that border the Columbia River (with the exception for Multnomah County of Oregon) as a whole are underrepresented when compared to the national statistics.

A wide range of property uses and activities are observed along the Columbia River and associated upland sites, such as: agricultural, commercial, ecosystem restoration, industrial, recreational, residential, etc. A fair amount of properties adjacent to the Columbia River rely on the river for important and critical components of agricultural and commercial operations on their property. The CR is the gateway for global imports from the Columbia-Snake River navigation system. The federal deep-draft navigation channel is important to the regional, national, and global economy. It is estimated that in 2011, the CR FNC supported an annual \$30 billion import/export industry, transporting approximately 55 million metric tons of goods (U.S. Department of Transportation, Maritime Administration, 2011). Approximately \$16 billion worth of U.S. products was exported to the world markets. Currently, approximately \$14 billion annually are imported and exports from the CR and Snake River system. More than 12,000 commercial vessels and 100,000 recreational/charter vessels navigate through the CR FNC annually. According to the Pacific Northwest Waterways Association, more than 40,000 jobs along the lower Columbia River are directly dependent on seaport activity.

The Columbia River and its tributaries support treaty, non-treaty commercial, and recreational fisheries. These fisheries are highly regulated by state, federal, and tribal entities. A wide range of fish and aquatic species are harvested from the Columbia River. There are 13 ESA-listed Evolutionary Significant Units (ESU) of salmon that migrate into the Columbia River system. Additionally, five other ESA-listed fish species use the Columbia River system in some capacity. Overall, there are over 120 species of fish and aquatic species that are harvested from this region. The Columbia River supports a 410 million dollar fish industry (salmon, crab, groundfish, etc.).

The Columbia River is major recreational resource for a variety of shoreline, on-water and in-water activities. Recreational use of the Columbia River occurs year-round; river-based tourism and recreational activities are the driving economic force for a lot of the towns situated along the

Columbia River. Fishing, hunting, swimming, water sports, and sightseeing are among the most popular activities to engage in with the Columbia River. Many attempts have been undertaken by various agencies to quantify the recreational opportunity spectrum for the Columbia River. Given the wide range of recreational opportunities and large geographic range the Columbia River encompasses, it is difficult to fully encapsulate the extrinsic and intrinsic value of recreation for this region.

Land ownership in the lower Columbia River is comprised of holdings by private, corporate, and governmental entities (local, state, and federal). Primary categorization of holdings is forest and farmlands in the lower Columbia River, interspersed with urban and industrial areas in the upper reaches of the lower Columbia River. Land uses immediately adjacent to the river have not changed dramatically since the 2003 SEIS. There are five deep-draft and three smaller ports situated along the lower Columbia River. These eight ports own, operate and lease holdings for marine based commerce and industry along the river. Various governmental entities own, operate, and lease holdings for various uses along the river.

Approximately 6% of the Columbia River water is diverted for agricultural use. Additionally, municipal and industrial users draw on the Columbia River for use. Dams on the Columbia River (upstream of the proposed project area) generate inexpensive hydroelectric power. Approximately 60% of the Pacific Northwest electricity is generated by hydropower.² There are multiple recreational uses along and on the Columbia River. A few of the popular activities on the Columbia include boating, hunting/fishing, windsurf sports, and bird watching. All of these uses in turn contribute to the regional and national economic base. Beach nourishment and upland placement sites are mixed use and ownership sites. Some beach nourishment and upland sites are publicly accessible and utilized as recreational areas. Other sites are closed off to the public, while other sites are maintained as restoration areas.

Pillar Rock Island is not easily accessible by the public. Access to Pillar Rock Island only be gained by boat and may be used as a recreational area. Puget Island sump is not accessible by the public. Maritime and recreational activities may occur within the vicinity of the project area. Access and use of the Network has already been analyzed in the 2003 SEIS and is not further evaluated in this section.

5.4.1.2. Project Impacts

5.4.1.2.1. No Action

Direct: No placement of dredged material would occur on the Pillar Rock Island northern shoreline. The Puget Island sump would not be constructed for use. There would be no changes to Columbia River use opportunities as a result of the No Action alternative.

Indirect: Pillar Rock Island would eventually erode away, potentially precluding anticipated recreational use of the site. Approximately 500 acres of the Lewis and Clark National Wildlife Refuge (approximately 35,000 acre) would become shallow water or deepwater recreational waters

² http://www.bpa.gov/power/pg/fcrps_brochure_17x11.pdf

instead of uplands, riparian edge, estuarine wetlands, and intertidal flats. The island would likely remain a shallow water shoal, usable during low water events, and a hazardous shoal the rest of the time. There is the potential for lost recreational opportunity. Aside from lost recreational opportunity, there are no indirect effects to the population or socio-economic resources for the No Action alternative at Pillar Rock Island.

The Puget Island sump would not be used to place materials on the Puget Island upland site. There are no indirect effects to the population or socio-economic resources for this reach from the No Action alternative.

5.4.1.2.2. Proposed Action

Direct: Placement of dredged material would occur on the Pillar Rock Island northern shoreline, maintaining site access by boat. Recreational and fishing users would continue to use this area when placement actions are not occurring. The Puget Island sump would be constructed for use. Maritime users may not be able to transit through this reach during pump-out operations. There would be a discountable change to Columbia River use opportunities as a result of the Proposed Action alternative.

Indirect: Pillar Rock Island would remain available for recreational use. There would be no change to the Lewis and Clark National Wildlife Refuge footprint. There are no indirect effects to the population or socio-economic resources for the Proposed Action alternative at Pillar Rock Island.

The Puget Island would be constructed. There are no indirect effects to the population or socio-economic resources for this reach.

5.4.2. Archaeological and Historic Resources

The National Historic Preservation Act of 1966 (NHPA), as amended, sets forth national policy and procedures regarding historic properties, defined as districts, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places (NRHP). Section 106 of NHPA requires federal agencies to take into account the effects of their undertakings on such properties and to allow the Advisory Council on Historic Preservation (ACHP) the opportunity to comment on those undertakings, following regulations issued by the ACHP (36 CFR 800). The Archaeological Resources Protection Act (ARPA) applies when a project may involve archaeological resources located on federal or tribal land. ARPA requires that a permit be obtained before excavation of an archaeological resource on such land can take place.

5.4.2.1. Affected Environment

A detailed description of cultural resources within the various project areas are provided in the 1999 EIS and 2003 SEIS (Corps 1999 and Corps 2004), Gilbow (et al, 1981), and Minor and Musil (1998). Two additional actions presented in this EA were not analyzed for cultural resources in the EIS or SEIS. These are the Puget Island Sump and the modification of Pillar Rock Island material placement site. This modification involves changing Pillar Rock from an upland placement site to a combined upland placement and beach nourishment site.

The proposed Puget Island sump location is a dynamic area of shifting sand wave shoals. These sand waves grow in height while they migrate downstream, which occurs as sediment erodes from the upstream face, then deposits in the downstream trough and is buried by additional material eroded from the upstream face. This movement occurs in a layer only a few sand grains thick. Through this mechanism, all the individual grains in a sand wave are exposed to flow, eroded, transported, deposited, buried, and then eventually exposed again as the sand wave migrates downstream. When the river discharge is less than 300 kcfs (thousand cubic feet per second), bedload transport is small and sand waves move only a few feet per day. However, bedload transport increases rapidly when the discharge exceeds 400 kcfs and sand wave movement can be in the range of 20 ft per day or higher. Multi-beam bathymetry data taken in January 2014 from a Corps survey vessel of proposed area shows no anomalies on the river bottom.

Pillar Rock Island is a shifting shallow sandy bar, historically almost fully inundated during high tides. Based on both review of historic aerial photographs dating from 1939 to 2010, and the Corps placement study (Corps 2013a), the proposed project area has been created by the Corps through past dredging activity. This area of the island has occasionally been either completely inundated or washed away. The island as a whole has been in use as a dredged material placement site by the Corps for decades.

5.4.2.2. Project Impacts

5.4.2.2.1. No action

Direct: No placement of dredged material would occur on the Pillar Rock Island northern shoreline. The Puget Island sump would not be constructed for use. There would be no changes to Columbia River cultural resources as a result of the No Action alternative.

Indirect: The Puget Island sump would not be used to place materials on the Puget Island upland site. There are no indirect effects to cultural resources for this reach from the No Action alternative.

Pillar Rock Island, an island created by Corps activity, would eventually erode away. There are no indirect effects to cultural resources for the No Action alternative at Pillar Rock Island.

5.4.2.2.2. Proposed action

Direct: Pillar Rock Island is a shifting shallow sandy bar, historically almost fully or completely inundated during high tides. This island has occasionally been either completely inundated or washed away. The island as a whole has been in use as a dredge disposal site by the Corps for decades. Based on both review of historic aerial photographs dating from 1939 to 2010, and the Corps placement study (Corps 2013a), the proposed project area has been created by the Corps through past dredging activity. The Proposed Action has no potential to effect cultural resources. Multi-beam bathymetry data taken in January 2014, and reviewed by Corps cultural resources staff, revealed no anomalies on the river bottom at the proposed sump location. There is no potential for historic properties, particularly shipwrecks or related material, eligible for listing to the NRHP to exist. Due to these conditions, this action has no potential to effect cultural resources.

Indirect: There are no indirect impacts to cultural resources from the Proposed Action alternative.

5.4.3. Visual Quality

The NEPA of 1969 establishes that the federal government use all practicable means to ensure all Americans access to safe, healthful, productive, and *aesthetically* and culturally pleasing surroundings (42 USC 4331[b][2]).

5.4.3.1. Affected Environment

The physiographic setting of the Columbia River is varied from RM +3.0 to 106.5; the two primary geographic settings along this river are estuarine and riverine. Undeveloped, rural, and urban environments interface with the physiographic settings upon which they are situated. The undeveloped environment along the Columbia River has been indirectly and directly modified since the advent of regional industrialization in the 1800s.

As situated at any point within the river, the scenery may be comprised of completely natural elements, a mixture of natural and anthropogenic features, and anthropogenic features. Depending on a particular stretch of the river, natural elements of the viewshed may be comprised of well-established riparian vegetation, naturally occurring sandy shorelines and islands, tidal mudflats, basaltic cliffs hemming in the river, and low-lying plains and shallow vegetated embayments. A combination of natural and anthropogenic features may include the natural elements of the viewshed interspersed among agricultural fields (fences), human settlement (houses, docks, dike fields), industrial complexes (mills, dredged material placement sites), transportation corridors (roads, railways), and human created sandy shorelines. These elements are surrounded by or partially blocked from view by riparian vegetation or vegetated dikes. The anthropogenic setting occurs most frequently in places with a sizable population that supports industry. These stretches of the river are often sparsely vegetated and lined with concrete riprap, houses and businesses, industrial complexes, and transportation amenities (railroads, roads, docks, piers).

5.4.3.2. Project Impacts

5.4.3.2.1. No Action

Direct: There are two primary actions that may impart visual changes to the overall landscape, the dredging and placement action and resulting land changes of upland and shoreline dredged material placement. The use of equipment during the dredging and placement action is sporadic and temporary visual disturbance on the landscape. Dredges and associated equipment move within the Network and rarely remain in one location more than 2 to 3 weeks. The use of these equipment are considered a temporary detractor from the viewshed and do not permanently effect the aesthetic properties of the project area. Removal of low-lying vegetation may draw focused attention to an upland site; it is expected that the landscape would revert back to vegetated form over time. There are no additional unique visual resources that would be impacted by the No Action alternative.

Indirect: There are no indirect impacts the visual viewshed for the No Action alternative.

5.4.3.2.2. Proposed Action

Direct: There are two primary actions that may impart visual changes to the overall landscape, the dredging and placement action and resulting land changes of upland and shoreline dredged material placement. The use of equipment during the dredging and placement action is sporadic and temporary visual disturbance on the landscape. Dredges and associated equipment move within the Network and rarely remain in one location more than 2 to 3 weeks. The use of these equipment are considered a temporary detractor from the viewshed and do not permanently effect the aesthetic properties of the project area. Removal of low-lying vegetation may draw focused attention to an upland site; it is expected that the landscape would revert back to vegetated form over time. There are no additional unique visual resources that would be impacted by the Proposed Action alternative.

Upland sites may appear larger within the Network as a result of increased height relevant to surroundings when viewed from a distance. However, the location of the placement sites are away from highly trafficked corridors and large population centers and are not within areas of high scenic value or visible from scenic highways. Placement of material on the Pillar Rock Island is not expected to change the visual landscape of the island. With exception for temporary visual disturbance during the use of the sump, there is no prolonged impact to the Puget Island sump viewshed.

Indirect: There are no indirect impacts the visual viewshed for the No Action alternative.

5.4.4. Hazardous Materials

Hazardous materials including hazardous substances and wastes are regulated by many federal laws. Statutes govern the generation, treatment, storage and disposal of hazardous materials, substances, and waste, and the investigation and mitigation of waste releases, air and water quality, human health, and land use.

The primary federal laws regulating hazardous wastes/materials are the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Resource Conservation and Recovery Act of 1976 (RCRA). The purpose of CERCLA, often referred to as “superfund,” is to identify and clean up abandoned contaminated sites so that public health and welfare are not compromised. RCRA provides for “cradle to grave” regulation of hazardous waste generated by operating entities.

5.4.4.1. Affected Environment

No hazardous waste sites are known to be present in the project area, and the likelihood of undiscovered hazardous waste sites in the project area is very low. If hazardous materials are discovered during construction, the appropriate federal, state, and local agencies would be notified.

5.4.4.2. Project Impacts

5.4.4.2.1. No Action

Direct: There are no hazardous waste sites within the No Action project area. As disclosed in the 2003 SEIS, there are no new direct impacts to the human or wildlife habitat from hazardous materials.

Indirect: Since there are no new direct impacts from hazardous materials, there would be no new indirect impacts resulting from the No Action alternative.

5.4.4.2.2. Proposed action

Direct: There are no hazardous waste sites within the Proposed Action project area. As disclosed in the 2003 SEIS, there are no new direct impacts to the human or wildlife habitat from hazardous materials.

Indirect: Since there are no direct impacts from hazardous materials, there would be no new indirect impacts resulting from Proposed Action alternative.

5.4.5. Construction and Dissuasion Impacts

Construction impacts including timing of action, location of construction, and duration are highly variable for the Corps' CR O&M program. Various statutes govern the impact of construction and dissuasion on human and wildlife environment. Air and water quality, human health, and land use must be taken into consideration during construction of a project.

5.4.5.1. Affected Environment

The Corps CR O&M program involves terrestrial site preparation, including the construction of landing ramps, shoreline grading, physical demarcation of the footprint (flagging, berm building, etc.), vegetation removal that is necessary to facilitate dredged material placement. There is no difference in dredging method for the construction of a sump versus operation and maintenance use of a sump; the impacts for the use of a sump have been evaluated throughout this EA and is not considered further in this section.

There is potential for hazardous material spills to occur during any construction or operations and maintenance actions conducted for the CR O&M program. If a spill occurs, the Corps follows a Spill Response Plan (the Plan). The Plan provides a single consolidated document to meet multiple spill response planning requirements as identified under Occupational Safety and Health Administration's Standard, RCRA's Contingency Plan, Superfund Amendment and Reauthorization Act - Title III's Emergency Planning and Community Right To Know Act, the Oil Pollution Act, the CWA, and the State, Area, Regional, and National Contingency Plans (NCP) for spill response. Implementation of the NCP requires a nationwide network of regional response plans. This Plan is a part of that nationwide network. Operations Project Managers, Dredge Incident Commanders, and emergency-system First Responders use this plan as their primary guidance for responding to oil and hazardous

substance spill emergencies in the Portland District. The following Best Management Practices (BMPs) and Spill Control (Table 8) measures are currently in place for the CR O&M program and would be applicable for the Proposed Action.

Table 8. Proposed Minimization Practices and BMPs for Dredging.

Measure	Justification	Duration	Management Determination
Hopper Dredging			
Reverse purging of intake lines shall not be done with dragheads more than 3 ft off the bottom. If water is pumped through the dragheads to clean the hopper, the dragheads must be -20 ft below the surface while dredging at the Mouth of the Columbia River, and the Columbia River RM 3 to RM 106.5; and -9 ft for RM 106.5-145 and the shallow-draft side channels.	This restriction minimizes or eliminates entrainment of juvenile salmon during normal dredging operations.	Continuous during dredging operations.	Maintain until new information becomes available that would warrant change.
Dredging in shallow water areas (less than 20 ft) outside of the Columbia River mainstem should occur only during the recommended ESA in-water work periods for the Columbia River.	The top 20 ft of the water column is considered salmon migratory habitat. Dredging or disposal in these areas could adversely impact salmonids, delay migration or reduce or eliminate food sources.	Continuous during dredging and disposal operations.	Maintain until new information becomes available that would warrant change.
Pipeline Dredging			
Maintain dragheads and/or cutterheads such that they do not exceed an elevation of 3 ft off the river bottom for dredging at the Mouth of the Columbia River, and the Columbia River RM 3 to RM 106.5; -9 ft for RM 106.5-145; and -9 ft for the shallow-draft side channels.	This restriction minimizes or eliminates entrainment of juvenile salmon during normal dredging operations.	Continuous during dredging operations.	Maintain until new information becomes available that would warrant change.
Typically, dredging in shallow water areas (less than 20 ft) only occurs during the recommended ESA in-water work periods for the Columbia River.	The top 20 ft is considered salmon migratory habitat. Dredging or placement in these areas could adversely impact salmonids, delay migration or reduce or eliminate food sources.	Continuous during dredging and placement operations.	Maintain until new information becomes available that would warrant change.
General Provisions for All Dredging			
The contractor shall not release any trash, garbage, oil, grease, chemicals,	The provision is enacted for the protection of water	Life of contract or action.	If material is released, it shall be immediately removed and the

Measure	Justification	Duration	Management Determination
or other contaminants into the waterway.	resources.		area restored to a condition approximating the adjacent undisturbed area. Contaminated ground shall be excavated and removed and the area restored as directed. Any in-water release shall be immediately reported to the nearest U.S. Coast Guard Unit for appropriate response.
The contractor, where possible, will use, or propose for use, materials that may be considered environmentally friendly in that waste from such materials is not regulated as a hazardous waste or is not considered harmful to the environment. If hazardous wastes are generated, disposal shall be done in accordance with 40 CFR parts 260-272 and 49 CFR parts 100-177.	The provision describes the accepted disposal of hazardous wastes.	Life of contract or action.	If material is released, it shall be immediately removed and the area restored to a condition approximating the adjacent undisturbed area. Contaminated ground shall be excavated and removed and the area restored as directed. Any in-water release shall be immediately reported to the nearest U.S. Coast Guard Unit for appropriate response.

Where site preparations are deemed necessary, earth-moving equipment (bulldozers, tractors, etc.) is used to construct berms and dikes around the perimeter of upland dredged material placement areas to contain the slurry mixture as it is discharged from the outfall pipe (Figure 32). In addition, the site is graded to maximize the capacity of the dredged material placement footprint and provide space for the settling ponds.

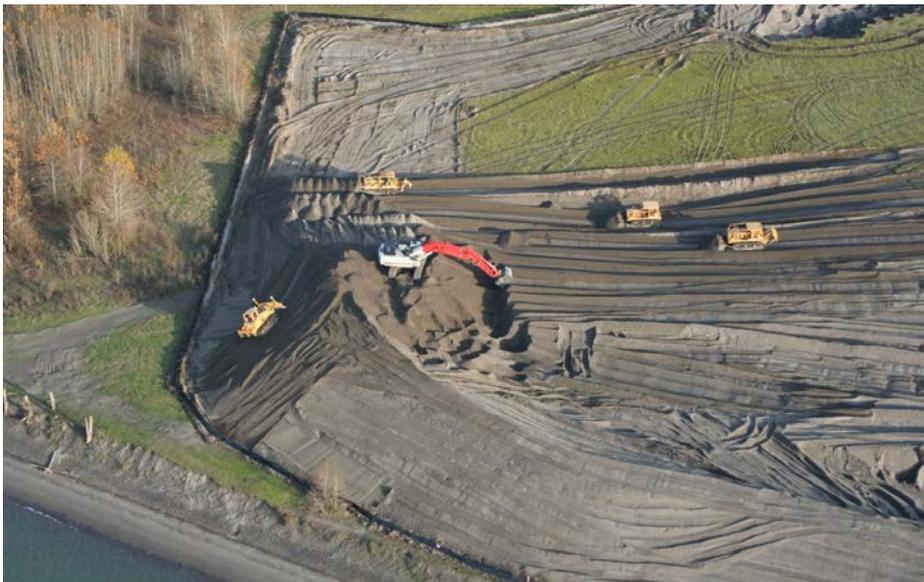


Figure 32: Site preparations and dike building for placement of dredged materials (at Northport).

If there is not sufficient water depth for the equipment barge to land at an existing shoreline, a landing ramp and access road is constructed from material on the placement site to gain access to the island (Figure 33). Some shoreline grading at the landing location may also be necessary to facilitate equipment access to other portions of the island. Typical site preparations at upland sites include grading a slope for the incoming dredged material pipe (Figure 34).



Figure 33. Typical build out of a barge landing (Rice Island).



Figure 34. Grading slope for incoming dredged material pipe.

Site preparations may take anywhere from several days to several weeks to complete, depending on the existing condition of the site. If a site has little-to-no vegetation, was used recently where some berms or dikes remain in place, the necessary site preparations would be minimal and could be completed within 1-3 days. Conversely, if a site has substantial vegetation and/or has not been used recently, preparations could take several weeks to clear vegetation, construct dikes and re-grade the area for dredged material placement.

Prior to placement of sediments in the summer/fall, additional site preparations at all sites would include the staging, stockpiling and placement of pipes and valves for sediment discharge. When pipes and other material are not stockpiled on the landing barge, they are stockpiled in the staging area within or near the placement footprint. Unless there are permanent weirs (i.e. Gateway and West Hayden Island) and outfall pipes on site, temporary weirs and outfall pipes are re-used as the dredge moves from site to site (Figures 35 and 36). At upland sites requiring the installation of temporary weirs and outfall pipes, these actions would occur immediately prior to placement and disassembly would occur immediately after placement.



Figure 35. Weir and berm structure, in operation (Rice Island upland placement site).

Equipment, vehicles and pipes are staged above the scarp of the existing dredged material placement footprint at shoreline placement sites prior to actual sediment placement (Figure 37). These staging areas are typically 50 ft by 90 ft (~0.10 acre) and are located as close to the shoreline as safely feasible. During placement inspections, the exact location of the 0.10-acre staging area can be located to avoid or minimize impacts. Similar to site preparations at upland sites, early preparations may be necessary in the upland areas at shoreline sites to accommodate the staging area.



Figure 36. Outfall pipes discharging water back to river after dredged material has settled out (Rice Island upland placement site).

Dissuasion actions that coincide with site preparations are intended to minimize site use by larks and other migratory birds where active dredged material placement would occur during the breeding season. The Corps implements early-season (February-March) dissuasion. All dissuasion practices are intended to discourage nesting, roosting, and/or foraging behaviors, with the ultimate intent to avoid, minimize, and reduce impacts to adults, juveniles, and/or nestlings during the breeding season. No active dissuasion of streaked horned lark would occur during the breeding season (15 April through 15 August).

As a requirement of the NMFS 2012 BiOp, Terms and Conditions 1(k), if avian predators (piscivorous birds) are identified in the action area, hazing actions would be implemented to intentionally flush birds and discourage nesting on upland placement sites. If nesting activity is observed on placement sites, the Corps would actively discourage these behaviors, including egg collection (as authorized by USFWS take permit). Alternates to intentional hazing and dissuasion actions include the use of physical barriers (nets and fencing, flagging, etc.) and habitat modifications (vegetation removal, trenching, mounding, etc.) would be implemented to minimize the extent and suitability of habitat available for foraging and nesting. These activities would include human presence and may involve the use of vehicles.

Currently, dissuasion of piscivorous birds only occurs on portions of Rice, Miller Sands and Pillar Rock islands, which are potential habitat for Caspian terns. In these areas, vegetation is manipulated (planted), silt fences are constructed to reduce preferred tern habitat and terns are hazed from the island to prevent occupation and nesting (Stinson 2005). These actions accelerate the development of dense vegetation, reducing the availability of bare ground and precluding the use of these areas as



Figure 37. Staging equipment on top of the bank at Sand Island beach nourishment site.

nesting and foraging habitat for terns or streaked horned lark. Similarly, hazing actions directed at terns can have adverse effects to larks, when active dissuasion occurs in suitable streaked horned lark nesting habitat. Currently, the Corps does not dissuade terns from suitable streaked horned lark nesting habitat on Rice Island, Miller Island, and Pillar Rock Islands.

5.4.5.2. Project Impacts

5.4.5.2.1. No Action

Direct: The physical movement or displacement of sand, vegetation, and other habitat features would fundamentally alter site characteristics and habitat suitability (either making it more or less suitable, depending on the preparations specific to the placement plan). Vegetation removed during site preparations would be buried or made unavailable to nesting birds. If the habitat was suitable for nesting, it is likely that this habitat would no longer be suitable following site preparations. During the winter and early spring, vegetation likely provides a buffer against severe weather and predators. The removal of this vegetation is expected to result in wide open expanses of exposed sand, forcing individuals to seek shelter on unused portions of the placement sites with suitable habitat conditions. The process of removing vegetation using vehicles and earth-moving equipment would disturb the soil surface, mixing layers of the soil and exposing seeds and insects that were previously buried and inaccessible to foraging songbirds. There may be a short-term benefit to larks immediately following vegetation removal. Seeds would likely be knocked off branches and insects would be exposed when leaf litter is moved during vegetation clearing. This additional foraging material would be valuable during the winter season when forage and prey items are scarce. While there may be a short-term benefit, increased exposure resulting from vegetation removal could also lead to increased predation. However, most recorded predation events occur to juveniles during the nesting season. Streaked horned larks present on the placement sites in the winter/spring are expected to be fully mobile and able to escape most predators. While the lack of vegetation cleared during site preparations would

expose streaked horned lark to increased predation, predators would also be likewise exposed and it is expected that healthy adult larks (not injured or sick) would be able to escape predators.

Overall, the number of individuals directly affected by site preparations is expected to be low and should not result in any direct mortality. Efforts have been made in recent years to identify active nests in the Network and avoid these areas. As previously stated, site preparations and dissuasion activities should minimize direct effects to adult streaked horned larks, as these actions occur outside of the breeding season and any reductions to the suitability of placement sites for nesting would occur before the onset of the breeding season. Dredged material placement activities generally include access, equipment staging and set-up, site grading, placement of weirs and outfall pipes using earth-moving equipment, berm construction and discharge of the sand-water slurry into the placement footprint. Based on the results of sediment quality testing described above, no effects to streaked horned lark or their habitat are expected as a result of the quality of the dredged sediments placed on upland or shoreline sites. Following placement of dredged materials, all equipment is removed from the site.

As discussed above, all temporary equipment (weirs, outfall pipes, valves, etc.) is removed from a placement site following placement of dredged materials. In addition, any habitat modifications (grading, trenching, mounding) that is prescribed would be implemented immediately following placement of materials. The Corps anticipates direct effects to streaked horned lark resulting from these actions to be negligible, as no birds are expected to be present in the placement footprint at the conclusion of a placement event.

Individuals in areas adjacent to the placement footprint (but outside of the placement boundary) are expected to experience similar effects to actions in the placement footprint, including flushing adults and/or young, increased exposure of individuals to weather and predation, nest abandonment and/or destruction. In addition, juveniles and young-of-the-year birds that move into the dredged material placement footprint are expected to have sufficient flight capabilities to flush from the area upon initiation of active material placement or other disturbances. If adults are repeatedly flushed from nests as a result of human disturbance during post-placement modifications, nest abandonment, increased predation of adults and nestlings, decreased foraging opportunities, and increased energetic expenditures could occur.

Indirect: Similar to the indirect effects resulting from the placement of dredged materials and habitat succession, some post-placement actions are expected to result in beneficial effects to streaked horned lark. Where settling ponds are left undisturbed, vegetation is expected to establish sooner and create suitable habitat conditions favored by streaked horned lark for nesting. Conversely, dissuasion materials may be installed to prevent streaked horned lark use of an area where anthropogenic use could be detrimental to streaked horned lark. In these instances, while the loss of potential habitat could adversely affect birds by reducing the amount of nest habitat, these dissuasion actions would reduce direct harm or mortality of individuals later in time.

5.4.5.2.2. Proposed Action

Direct: Dissuasion to avian predators and streaked horned lark is not expected to result in direct mortality of adults, rather, dissuasion and hazing activities are expected to directly affect or alter

adult behavior. Direct effects include flushing of adults, flushing adults from nests, increased exposure of eggs/young to environmental conditions, increased risk of nest predation, accident injury to eggs/young, nest abandonment, and nest failure from activity in nesting habitats. Indirect effects include the loss of suitable nesting habitat that could result in decreased nest success. Indirect effects resulting from dissuasion include modifications to habitat that preclude the use of suitable nesting habitat, thereby indirectly affecting individuals. However, habitat availability is not assumed to be a limiting factor in the action area (Pearson et al. 2008, Schapaugh 2009, and Camfield et al. 2011).

Indirect: Similar to the indirect effects resulting from the placement of dredged materials and habitat succession, some post-placement actions are expected to result in beneficial effects to streaked horned lark. Where settling ponds are left undisturbed, vegetation is expected to establish sooner and create suitable habitat conditions favored by streaked horned lark for nesting. Conversely, dissuasion materials may be installed to prevent streaked horned lark use of an area where anthropogenic use could be detrimental to streaked horned lark. In these instances, while the loss of potential habitat could adversely affect birds by reducing the amount of nest habitat, these dissuasion actions would reduce direct harm or mortality of individuals later in time.

5.5. Cumulative Impacts

Cumulative effects are defined as, “the impact on the environment which results from the incremental impact of an 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). Cumulative impacts can result from individually minor, but can collectively become a measureable impact actions taking place over a period of time. Resources determined not to have the potential to result in measurable cumulative effects were not addressed in this analysis. These resources include: geology, coastal processes, hydrology, sediment quality, cultural / historic and recreation. In general, effects of a particular action or group of actions would be considered to have a measureable cumulative impact if one of the following conditions are met:

- Effects of several actions occur in a common location;
- Effects are not localized (i.e., can contribute to effects of an action in a different location);
- Effects on a particular resource are similar in nature (i.e., affects the same specific element of a resource); and
- Effects are long-term (short-term impacts tend to dissipate over time and cease to contribute to cumulative impacts).

Noting that environmental impacts may result from many diverse sources and processes, Council on Environmental Quality (CEQ) guidance observes that “no universally accepted framework for cumulative effects analysis exists,” while noting that certain principles have gained acceptance and “the list of environmental effects must focus on those that are truly meaningful.” Assessing cumulative impacts may involve assumptions and uncertainties because data on the environmental effects of other past, present, and reasonably foreseeable actions are often incomplete or unavailable. As a result, impacts on resources often must be expressed in qualitative terms or as a relative change. For this section cumulative impacts were assessed using guidance from CEQ.

Geographic boundaries for the analyses of cumulative effects vary for each resource. The proposed temporal boundary for analyses of cumulative impacts is the late 1880s, when the original authorization of the federal channels and the North and South Jetties first occurred and to the extent that they have had lasting effects contributing to cumulative impacts. The reasonably foreseeable nature of potential future actions helps define the forward-looking temporal boundary. While ongoing maintenance and placement activities could continue for many more years and could contribute to cumulative impacts during that timeframe, it would be speculative to consider actions beyond what is reasonably foreseeable. Given this limitation, the forward-looking temporal boundary has been established at about 10 years, which is a reasonable timeframe by which the reasonably foreseeable future actions identified below would likely be completed. Cumulative impacts are those that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of the proposed project. A cumulative effect assessment looks at the collective impacts posed by individual land use plans and projects. Cumulative impacts can result from individually minor, but collectively substantial impacts taking place over a period of time.

Cumulative impacts on resources in the project area may result from the impacts of operating and maintaining the Columbia River project together with other past, present, and reasonably foreseeable projects such as residential, commercial, industrial, and other development, as well as from agricultural activities and the conversion to more intensive types of agricultural cultivation. Such land use activities may result in cumulative effects on a variety of natural resources such as species and their habitats, water resources, and air quality. Additionally, they can also contribute to cumulative impacts on the urban environments such as changes in community character, traffic volume and patterns, increased noise, housing availability, and employment. A definition of cumulative impacts under NEPA can be found in 40 CFR 1508.7 of the CEQ Regulations.

5.5.1. Affected Environment

This section identifies past, present, and reasonably foreseeable projects that could incrementally contribute to resources affected by the Proposed Action.

Past actions relevant to the cumulative analysis in this EA are those that have previously taken place and are largely complete, but that have lasting effects on one or more resources that would also be affected by the Proposed Action. For these past actions, CEQ guidance states that consideration of past actions is only necessary to better inform agency decision-making. Typically the only types of past actions considered are those that continue to have present effects on affected resources. Past actions are summarized below and their effects, which have resulted in the existing conditions, as described in Section 5.

- Early settlement of the Columbia River Basin during the late 1800s and early 1900s.
- Authorization of the Federal Navigation Channel and associated navigation projects (side channels, basins, anchorage areas) by the Rivers and Harbors Acts of 1878, 1884, 1892, 1902, 1910, 1912, 1919, 1930, 1933, 1935, 1937, 1938, 1945, 1946, 1954, and 1960.
- Construction, maintenance and periodic reconstruction of the jetties at the MCR by the Corps.
- Construction, maintenance and periodic reconstruction of pile dikes, levees, and bridges in, over, or adjacent to the Columbia River.

- Continued use, maintenance, and operation of multi-purpose dams in the Columbia River and Willamette River basins.
- Continued human use and modification of the Columbia River estuary, the surrounding area, and tributaries feeding into the river up until the passing of the CWA. This included clearing for timber harvest and agricultural development, urban development of towns and cities near the shoreline, highways and railroads, and power and utility lines.
- Navigation facilities (including both commercial and recreational docks and marinas) constructed and maintained by various ports along the Columbia River.
- Corps' annual maintenance dredging and placement activities.
- Recreational facilities established by federal, state, and local agencies.
- Federal permits for aquatic and wetland impacts within the lower Columbia River, lower Willamette Rivers, and tributaries.
- Commercial and residential development that has occurred in the area.

The Columbia River has been substantially altered from the 1800s by early settlement, timber harvest and fishing, agriculture, population growth and the commercial/industrial and residential developments and the resulting introduction of non-native species, and; rivers and streams have been physically altered; and fish and wildlife resources have been impacted by habitat alteration or loss. Changes in public expectations concerning how resources are managed began in the 1970s, and today the protection of unique ecosystems, such as coastal estuaries, has increased with the support of stricter environmental regulation.

Present actions are those that are currently occurring and also result in impacts to the same resources as would be affected by the Proposed Action. Present actions generally include on-going use activities (waterfront activities) and recently completed development (new or replaced docks, dredging, waterfront development). Similar to past actions, relevant present actions have largely been captured in Section 5 of this EA.

Reasonably foreseeable future actions are those actions that are likely to occur and affect the same resources the Proposed Action. For a future action to be considered reasonably foreseeable, there must be a level of certainty that it would occur. This level of certainty is considered met with the submission of a formal project proposal or application to the appropriate jurisdiction, approval of such a proposal or application, inclusion of the future action in a formal planning document, or other similar evidence. For future actions in the proposal stage, the action also must be sufficiently defined in terms of location, size, design, and other relevant features to allow for meaningful consideration in the cumulative analysis. Present and reasonably foreseeable actions include many of the same operational and maintenance activities described in the above list. To determine whether there are other present and/or future actions reasonably certain to occur in the Project Area, Corps studies of the area were reviewed, outstanding Corps regulatory permits were reviewed for proposed large-scale actions and county planning offices queried. The following actions were identified as being reasonably certain to occur over the next ten years:

Corps actions:

- Mouth of Columbia River Jetty Rehabilitation Project: continuing to support the functional life of the north and south jetties and maintaining deep-draft navigation through the entrance. The project still requires environmental review, final design and funding. However, it is

anticipated that maintenance and/or rehabilitation of the existing jetties would be needed within the next 10 years.

- Mouth of Columbia River, Columbia River, and auxiliary side channels Federal Navigation Project: Continued annual maintenance dredging and placement activities associated with Columbia River are expected.
- General Investigation studies.
- Maintenance of Columbia River pile dike system.
- Management of a piscivorous bird colony on East Sand Island.

Port actions:

- Port of Kalama
 - Industrial manufacturing facility and dock
 - Maintenance dredging sampling and analysis plan
 - Overwater maintenance activities
 - Long-term additional dock or berth
- Port of Longview:
 - Berth 4 redevelopment
 - Wetland and log pond fill
 - Deepening of Berth 6 and 7
 - Berth 1 and 2 repair
 - Wetland fill and construction at Barlow Point
- Port of Portland
 - WHI and TRIP Phase 1 wetland mitigation modification
 - HIO wetland delineation and permit
 - Jewitt Lake delineation
 - Wetland fill on NE 33rd development
 - Wetland fill for PDX runway 3/21 project
 - Terminal wide maintenance
 - Terminal wide sediment sampling
 - PDX fire boat dredging and sediment characterization
 - Fender piling replacement
 - T6 (Terminal) maintenance dredging
- Port of Vancouver
 - Fender piling maintenance
 - Maintenance dredging
 - T4 bank stabilization
 - T5 Potash facility modifications
 - T5 West
- Other Corps permit actions
 - City of Warrenton Hammond Boat Basin dredging
 - City of Portland Parks and Recreation in-water placement of dredged materials
 - Port of St Helens in-water placement of dredged materials
 - Oregon LNG terminal (FERC) at the mouth of Skipanon Channel
 - Karlson Island Restoration Project
 - Reconstruction/Upgrade of Westport Ferry Terminal

5.5.2. Effects

This section analyzes the potential cumulative impacts for each of the environmental resource categories in which the implementation the Proposed Action might contribute to cumulative impacts when considered with other past, present, and reasonably foreseeable actions. Resources determined not to have the potential to result in cumulative effects were not addressed in this analysis. These resources include: geology, coastal processes, hydrology, sediment quality, cultural/historic and recreation. Since environmental analyses for some of the listed activities are not complete or do not include quantitative data, cumulative impacts are addressed qualitatively. As in the analysis of environmental consequences discussed in Section 5, the No Action alternative serves as the reference point against which cumulative effects are measured. This analysis uses the same thresholds of measurable impacts used to assess the environmental impacts of the No Action and the Proposed Action.

Water Quality: The geographical boundary for this resource is confined to the lower Columbia River watershed.

The identified past, present and future reasonably foreseeable actions, when combined with the effects of the No Action or the Proposed Action, could incrementally increase water turbidity and suspended sediments, and increase the risk of petroleum spills during dredging and placement activities within Columbia River and at placement sites. New development projects would also result in long-term increases in impervious surfaces and associated runoff into the watershed. However, the identified present and future actions are required to adhere to local, state, and federal surface and stormwater control regulations and best management practices, which are designed to limit negative impacts to surface waters from both construction and ongoing operations. Compliance of present and future projects with these regulations, which are subject to change based on regional assessments, would minimize adverse cumulative impacts.

There is a *de minimus* degree of effects between the No Action and Proposed Action for cumulative water quality effects.

Air Quality: The geographical boundary for this resource includes the Project Area (upland, shoreline, and in-water) along with the waterfront communities from about RM +3.0 to RM 106.5 of the Columbia River.

The identified past, present and future reasonably foreseeable actions, when combined with the effects of the No Action or the Proposed Action, could incrementally increase in-air and in-water noise levels within Columbia River. However, these impacts would be temporary in nature (reaching highest levels during construction). Both upland and in-water noise levels must meet specific thresholds during construction activities to avoid and minimize impacts to ESA-listed species. Any future project in the area would also need to assess, minimize and/or mitigate for both construction and operational in-air noise levels that could impact nearby residents. While ongoing maintenance dredging takes place throughout the Columbia River basin, additive increases in noise are unlikely to impact nearby residents as most of the reasonably foreseeable future projects are not located immediately adjacent to residential areas. Therefore, cumulative noise impacts from the Proposed

Action, in combination with past, present and reasonably foreseeable actions, are less than what would be considered a measureable impact.

The geographical boundary for cumulative air quality effects is the NAAQS Air Quality monitoring area. Cumulative projects, as well as the Project, would have to comply with EPA standards and the Air Quality Program. The Air Quality Program protects the region's air through program planning development and guidance, industrial source control, major new source review, coordination of permit and plan review programs, data analysis and reporting, and regulation. Compliance with these regulatory agencies would minimize cumulative impacts from the Project.

There is a *de minimus* degree of effects between the No Action and Proposed Action for cumulative air quality effects.

Biological: The geographical boundary for this resource is the lower Columbia River Basin. Past development within the Columbia River basin has resulted in losses of aquatic and riparian habitats, which has caused adverse impacts to fish and wildlife resources. Most of the losses were due to filling, hydrologic alterations (including channelization, diking and draining of wetlands), and upland forestry practices to support development, industry and agriculture uses. In-water biological resources have been impacted by commercial and recreational fishing activities. These actions occurred in a regulatory landscape very different from what exists today.

Completion of present reasonably foreseeable projects has the potential to directly and indirectly impact biological resources in the Columbia River cumulatively for the No Action and Proposed Action alternative. Direct impacts include the physical removal of habitat through dredging, burial of habitat or conversion of a habitat. Indirect cumulative impacts to biological resources are a result of temporary increases in turbidity, in-air noise and in-water noise. For example, dredging or filling in areas previously undisturbed, and at the same time, could fragment shallow water habitat used for feeding, shelter and migration by ESA-listed salmon and other aquatic species. However, many of the foreseeable projects are already working with federal, state and local resource agencies to adhere to conservation measures and BMPs (in-water work windows to avoid key migration times for salmonids, etc.); and, developing mitigation plans to offset adverse impacts on biological resources. Future land uses are also required to comply with local land use and shoreline plans and even more specific local area plans (i.e. the local comprehensive land use plans for counties in Washington and Oregon; these plans provide policies to guide management and planning of land activities that may affect the Columbia River). Compliance of future development with these plans and applicable BMPs and conservation measures would minimize direct and indirect cumulative impacts to biological resources.

Socioeconomic: The geographical boundary for this resource extends to towns situated along the Columbia River from the mouth to Lewiston, Idaho, and to the greatest extent, nationally and globally. The No Action or the Proposed Action for the CR FNC project would incrementally benefit socioeconomic resources in the region by providing continued reliable navigational access within the Columbia River. It is estimated that the Columbia River FNC currently supports a 30 billion dollar import/export industry, transporting approximately 55 million metric tons of goods. Growth in the volume of export bulk within the Pacific Northwest is expected to increase at a rate of 5.2% through

2030.³ Reliable access would allow existing maritime commerce to continue and would continue to support growth of new or improved facilities to expand the maritime industry in the region. The current regulatory framework ensures compliance of future development with applicable laws and implemented conservation measures would minimize direct and indirect cumulative impacts to natural and cultural resources while supporting a robust import/export industry.

There is a *de minimus* degree of effects between the No Action and Proposed Action for the cumulative socioeconomic resources for this project.

5.5.3. Determination of Cumulative Impact

This cumulative effects analysis considered the effects of implementing the Proposed Action against the No Action alternative in association with past, present, and reasonably foreseeable future actions by the Corps and other parties in and adjacent to the Project Area. Cumulative impacts could result for the resources identified above, these impacts would be minimized through the Corps proposed conservation measures and the fact that all projects would be required to avoid, minimize and mitigate any measurable impacts through the current environmental review and regulatory process (i.e. monitoring and mitigation are required for new development projects that impact environmental resources). The required regulatory review also results in coordination between many of the resource agencies and between those agencies proposing action(s).

³ <http://www.wsdot.wa.gov/NR/rdonlyres/E1743FB8-9376-4A4C-8316-14283E42A5F7/0/PNW2011PortRailForecastFinalReport.pdf>

6. COMPLIANCE WITH ENVIRONMENTAL LAWS

6.1. Environmental Evaluation and Compliance

The following laws provide environmental standards for operation and maintenance activities at Corps civil works projects, associated lands, and outgrant, and are related to environmental stewardship. The Proposed Action must also comply with these environmental laws and executive orders.

6.1.1. National Environmental Policy Act

This Environmental Assessment satisfies the requirements of the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321 et seq.) as discussed therein within this document.

6.1.2. Bald and Golden Eagle Protection Act

This Act provides for the protection of bald and golden eagles by prohibiting the taking, possession, and commerce of such birds, except under certain specified conditions. The Corps uses BMPs to avoid effects to bald eagles. The proposed project does not involve forestry practices, use of aircraft or other motorized equipment, blasting, or other work that can result in loud or intermittent noises within 660-ft of an active or alternate eagle nest between 1 January and 15 August. The Proposed Action would not disturb bald or golden eagles and therefore *complies with* the Bald and Golden Eagle Protection Act.

6.1.3. Clean Air Act

The Clean Air Act of 1970 (CAA), as amended, established a comprehensive program for improving and maintaining air quality throughout the United States. The intent of the Act is achieved through permitting of stationary sources, restriction of toxic substance emissions from stationary and mobile sources, and the establishment of National Ambient Air Quality Standards. Noise pollution is addressed through Title IV of the Act. The Proposed Action would have short-term intermittent reduction in air quality during construction from construction equipment. There would also be short-term intermittent increase of noise levels from the operation of construction equipment. Noise impacts would be minor and temporary in nature and would immediately return back to background levels at the completion of the project. The Proposed Action would be *in compliance* with the CAA.

6.1.4. Clean Water Act

The Clean Water Act (CWA) governs the release of pollutants into waterways.

Section 401 – Requires certification from the state that a discharge to waters of the U.S. in that state would not violate the states' water quality standards. EPA retains jurisdiction in limited cases. Oregon DEQ posted the Water Quality Certificate (WQC) on Public Notice. The Corps is coordinating with the States of Oregon and Washington to extend or revise WQCs prior to initiating the Proposed Action of shoreline placement or construction and subsequent operation and

maintenance of the Puget Island sump. The Corps has current WQCs from Oregon and Washington for the use of the existing Network.

Section 402 – Authorizes the EPA, or states to which the EPA has delegated authority, to permit the discharge of pollutants under the NPDES program. The navigation program is not required to obtain a NPDES permit because dredged material is exempt (40 CFR 122.3(b)).

Section 404 – Regulates the discharge of dredged or fill material into waters of the United States. The EPA has delegated permitting under Section 404 of the CWA to the Corps. However, the Corps does not issue itself a 404 permit for discharges of dredged or fill material, but the Corps does apply the 404(b)(1) guidelines (40 CFR Part 230). Only when there is no practicable alternative would any discharge of fill material occur in waters of the U.S., including wetlands. The discharge of dredged materials from the Columbia River into the Columbia River during in-water placement has not net loss of aquatic functions and values and the temporary effects of in-water placement comply with the guidelines. It would not be known whether there is a practicable alternative to the placement of dredged materials in wetlands on upland placement sites until the contracting process concludes and reveals whether the contractor can provide a suitable and acceptable dredged material placement site. However, wetlands within placements are not natural wetlands and wetland mitigation has been completed during the CRCIP. The CRCIP's 16.20 acres of wetlands mitigation would mitigate for impacts to man-made wetlands within the Network. The avoidance of artificial wetlands within upland placement site would make the site impracticable for the placement of dredged materials. Therefore, the Proposed Action complies with the 404(b)(1) guidelines.

6.1.5. Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) encourages coastal states to develop and implement coastal zone management plans that are consistent with national policies to preserve, protect, develop, and where possible, restore or enhance, coastal zone resources. Section 307 of the CZMA requires that any federal action occurring in or outside of the coastal zone which affects coastal land or water uses or natural resources must be consistent with the state's Coastal Management Program. The Corps is currently working with the Oregon and Washington Coastal Management Programs and would ensure the dredging and placement actions proposed within this EA are *in compliance* with CZMA to the maximum extent practicable.

6.1.6. Comprehensive Environmental Response, Compensation, and Liability Act and Resource Conservation and Recovery Act

This Act established a method to assign liability to parties responsible for the release of hazardous wastes, and established a trust fund to pay for their cleanup to reduce associated dangers to public health and the environment.

The Proposed Action is not within the boundaries of a designated Superfund site as identified by the EPA or the states of Oregon or Washington for a response action under CERCLA, nor are the project sites on the National Priority List (<http://www.epa.gov/superfund/sites/npl/index.htm>); therefore, this Act is *not applicable* to the Proposed Action. There is no indication that any hazardous, toxic, and

radioactive wastes are in the vicinity of the Network. Any presence of these types of wastes would be responded to within the requirements of the law and Corps' regulations and guidelines.

6.1.7. Endangered Species Act

In accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed or proposed species within NMFS and USFWS jurisdiction. Any incidental take as a result of the construction and operation and maintenance of the CR FNC and Network has been coordinated between NMFS, USFWS, and the Corps.

In accordance with Section 7(a)(2) of this Act, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed or proposed threatened or endangered species. Information on federally listed species and designated critical habitat is presented in this EA. The NMFS issued a Biological Opinion with an incidental take statement on 11 July 2012, as reviewed in section 5.2.4. The Corps has re-initiated ESA consultation with the USFWS for effects to streaked horned larks. The Corps received a Letter of Concurrence from the USFWS on 29 September 2010 for non-lark species, as reviewed in section 5.2.4.

6.1.8. Executive Order 13175, Consultation and Coordination with Indian Tribal Governments

Federal agencies shall establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, and strengthen the United States government-to-government relationships with Indian tribes. Government-to-government coordination for cultural and natural resources was coordinated via letter correspondence (3 December 2013) with the Confederated Tribes and Bands of the Yakama Nation, the Cowlitz Indian Tribe, the Confederated Tribes of Grand Ronde, the Confederated Tribes of Siletz Indians of Oregon, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Confederated Tribes of the Warm Springs.

6.1.9. Executive Order 12898, Environmental Justice

This order requires federal agencies to minimize health impacts on subsistence, low-income or minority communities, ensuring no persons or group of people bear a disproportionate burden of negative environmental impacts resulting from the execution of this country's domestic and foreign policies. No subsistence, low-income or minority communities would be affected by the proposed activities because the project area is uninhabited and therefore there would be no change in population, economics or other indicator of social well-being. Consequently, the Proposed Action is *in compliance* with this Order because no environmental justice implications exist for the proposed project.

6.1.10. Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance

Federal agencies shall increase energy efficiency; measure, report, and reduce their greenhouse gas emissions from direct and indirect activities; conserve and protect water resources through efficiency, reuse, and stormwater management; eliminate waste, recycle, and prevent pollution; leverage agency acquisitions to foster markets for sustainable technologies and environmentally preferable materials, products, and services; design, construct, maintain, and operate high performance sustainable buildings in sustainable locations; strengthen the vitality and livability of the communities in which federal facilities are located; and inform federal employees about and involve them in the achievement of these goals. The proposed activities are *in compliance* with this Order because all actions would be conducted in a manner as to prevent pollution and chemical spills by following construction, operations and maintenance BMPs.

6.1.11. Executive Order 11988, Floodplain Management

Executive Order 11988, Floodplain Management requires federal agencies to consider how their actions may encourage future development in floodplains, and to minimize such development. The Proposed Action would not affect development of floodplains or the management of floodplains. Due to the nature and purpose of the action, some of the project must extend through the floodplain and into the river. Also, the majority of the dredged material placement sites are in hard-to-reach areas where no future development in the near-by vicinity of the project is expected. Finally, the dredged material placement site locations occurred after extensive consideration by the Corps and was chosen, for among other reasons, for the fact that the area was already impacted and alternative locations would likely result in additional impacts.

6.1.12. Executive Order 13112, Invasive Species

Federal agencies are required to combat the introduction or spread of invasive species in the United States. This order defines invasive species as “any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, this is not native to that ecosystem whose introduction does or is likely to cause economic or environmental harm or harm to human health.” The Corps would follow BMPs to minimize the spread of invasive species.

6.1.13. Executive Order 13186, Migratory Birds

This order further strengthens the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act, the Fish and Wildlife Coordination Act (FWCA), the ESA and the NEPA. Federal actions resulting in any “take” (intentional or otherwise) of a migratory bird are required to develop Memoranda of Understanding with USFWS to promote the conservation of migratory bird populations and resources. Activities related to dissuasion of piscivorous species have been coordinated with USFWS. Activities related to the management of migratory species are currently being coordinated with USFWS. There would be no intended impact to any migratory birds resulting from the proposed activities; therefore, the actions are *in compliance* with this Order.

6.1.14. Executive Order 11990, Protection of Wetlands

The purpose of this executive order is to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. In planning their actions, federal agencies are required to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. Only when there is no practicable alternative would any discharge of fill material occur. It would not be known whether there is a practicable alternative to the placement of dredged material wetlands until the site surveys have been conducted. The Corps would determine the ability to practically avoid wetland. If additional wetlands would need to be filled, the Corps would update the wetland impact balance. The Corps would continue to coordinate this course of action with Oregon DEQ and Washington DOE as remaining acres wetland impact balance are used. The Corps does not expect to exceed the 16.20 acres of wetland credit in the first 20 years of CR O&M dredging/placement actions after construction of the 43-ft channel.

6.1.15. Farmland Protection Policy Act

This Act, without authorizing federal agencies to regulate the use of private or non-federal lands, encourages federal agencies to minimize the impact of federal programs on the unnecessary and irreversible conversion of farmland (prime or unique) to nonagricultural uses. It follows that federal programs shall be administered in a manner that, as practicable, would be compatible with state and local government and private programs and policies to protect farmland. The Proposed Action is *in compliance* with this Act because the activities would not occur on lands utilized for agricultural purposes, nor would the landscape be converted to alternative land uses.

6.1.16. Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661 *et seq.*) directs federal agencies to prevent the loss and damage to fish and wildlife resources in; specifically, wildlife resources shall be given equal consideration in light of water-resource development programs. Consultation with the USFWS is required when activities result in the control of, diversion or modification to any natural habitat or associated water body, altering habitat quality and/or quantity for fish and wildlife. For the Corps, all coordination under this Act is in accordance with the 2003 SEIS FWCA analysis developed by federal and state resource agencies. The USFWS FWCA Report was finalized by USFWS. This report was reviewed 11 March 2014. All actions related to the proposed project within the Network are included in this Coordination Agreement and because the Proposed Action will not modify any new natural habitats or water bodies, there will be *no negative effect* to fish and wildlife habitat. This activity was consistent with the act, therefore no further action or coordination was necessary. Additionally, coordination with USFWS is ongoing for this program.

6.1.17. Magnuson-Stevens Fishery Conservation and Management Act

Also known as the Magnuson-Stevens Fishery Conservation and Management Act (MSA) is designed to actively conserve and manage fishery resources found off the coasts of the United States, to support international fishery agreements for the conservation and management of highly migratory species. The MSA established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for fisheries regulated under a federal fisheries management plan. Federal agencies

must consult with the NMFS on all federal actions authorized, funded, or carried out by the agency that may adversely affect EFH.

The NMFS 2012 BiOp provided two conservation recommendations to avoid and reduce adverse effects to EFH, as reviewed in section 5.2.4. Therefore, the project is *in compliance* with the MSA.

6.1.18. Marine Mammal Protection Act

This Act established a federal responsibility to conserve marine mammals within waters of the United States. With certain specified exceptions, the Act establishes a moratorium on the taking and importation of marine mammals, as well as products taken from them, and establishes procedures for waiving the moratorium and transferring management responsibility to the states. Marine mammals (or their parts) could potentially occur in the project area. It is possible that the Proposed Action could disturb the federally listed Steller sea lion and other pinnipeds with the movement of dredges through the Network as material is placed, but it is unlikely that the effects would rise to the level of harm or harassment. Impacts to this species were evaluated and are described in the BA submitted to NMFS⁴ and are discussed in this EA. No adverse impacts are expected to Steller sea lions from the Proposed Action. In its Biological Opinion, the NMFS set forth terms and conditions in order to minimize impacts of the Proposed Action on marine mammals in the project area.

6.1.19. Marine Protection, Research, and Sanctuaries Act

This Act is also known as the Ocean Dumping Act, prohibits the dumping of materials into the ocean that would degrade or endanger human health or the marine environment. Dredged material may be placed into the Deep Water Site. The use of this site has been coordinated in the 2003 SEIS and remains consistent with the Proposed Action.

6.1.20. Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) makes it unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Provisions are in place for the protection of migratory bird, part, nest, egg or product. Under the MBTA, “migratory birds” essentially include all birds native to the U.S. and the Act pertains to any time of the year, not just during migration. The Proposed Action could displace birds by causing flushing, altering flight patterns, or cause other behavioral changes; however, it is not expected that effects would rise to the level of harm or harassment. Dissuasion of birds from particular placement sites has been evaluated.

Adverse effects to streaked horned larks would be evaluated upon completion of the pending re-initiation of ESA consultation with the USFWS, as reviewed in section 5.2.4.

6.1.21. Wild and Scenic Rivers Act

⁴ *Proposed Nearshore Disposal Locations at the MCR July 2012*

This Act applies only to rivers designated by Congress as “wild and scenic” in order to safeguard the special character of these rivers. Under this Act, federal agencies may not assist the construction of a water resources project that would have a direct and adverse effect on the free-flowing, scenic, and natural values of a federally designated wild or scenic river. The Columbia River along this reach is not designated as a Wild and Scenic River⁵; as a result, this Act is *not applicable* to the Proposed Action.

6.2. Cultural Resources

The following laws govern the identification, designation, and protection of historic and archeological resources whenever an action is authorized, funded or carried out by the federal government. Coordination of any investigations and determinations, and recommendations regarding preservation procedures are the sole responsibility of a Corps district archeologist. The archeologists primarily conduct their reviews for compliance with the following:

- Antiquities Act of 1906, 16 U.S.C. 431, 432, 433.
- Archeological and Historical Preservation Act of 1960, 16 U.S.C. 469-469c.
- National Historic Preservation Act of 1966, 16 U.S.C. 470 et seq. (NHPA)
- Protection and Enhancement of the Cultural Environment, Executive Order 11593 (36 FR 8921; 13 May 1971).
- American Indian Religious Freedom Act of 1978, 42 U.S.C. 1996.
- Archaeological Resources Protection Act of 1979, 16 U.S.C. 470aa-470mm. (ARPA)
- Native American Graves Protection and Repatriation Act of 1990, 25 U.S.C. 3001. (NAGRPA)
- Indian Sacred Sites, Executive Order 13007 (61 FR 26771; 29 May 1996)

The project has a monitoring plan in place in order to ensure that there will be no impacts to any resources that may be discovered or in place. NHPA, NAGPRA, and ARPA specify the need to work with SHPO prior to and during the duration of the project.

6.2.1. National Historic Preservation Act

Section 106 of the NHPA requires agencies to consider the potential effects of their projects and undertakings on historic properties eligible for, or listed on, the National Register of Historic Places. Historic properties include archaeological sites or historic structures or the remnants of sites or structures. To determine the potential effect of the project on known or unknown historic properties, the following items are analyzed: the nature of the proposed activity and its effect on the landscape; the likelihood that historic properties are present within a project area; whether the ground is disturbed by previous land use activities and the extent of the disturbance; reviewing listings of known archeological or historic site locations, including site data bases and areas previously surveyed or listings of sites on the NRHP.

The Corps professional cultural resources staff has made a determination of no potential to effect for the two new projects following these findings and recommendations. While the Corps has made this

⁵As verified through this link: <http://www.rivers.gov/wildriverslist.html>

determination for the two new actions outlined in this EA, it has determined to begin an internal review process of all the undertakings associated with its larger navigation mission. This mission is to maintain and operate the mainstem Columbia River FNC and nine side channel FNCs from the Mouth of the Columbia River (MCR), Columbia River mile (RM) -3 to 3; the Columbia and Lower Willamette (C&LW), RM 3 to 106.5; and Vancouver to the Dalles, RM 106.5 to 145. In December 2013 the Corps notified the Washington and Oregon SHPO's and all potentially affected Native American Tribes of this intention to review and potentially conduct additional consultation.

6.2.2. Native American Graves Protection and Repatriation Act

This Act provides for the protection of Native American and Native Hawaiian human remains and cultural items. It also establishes requirements for the disposition of Native American human remains and sacred or cultural objects found on federal lands. The Act also provides for the protection, inventory, and repatriation of Native American human remains and cultural items (funerary objects, sacred objects, and objects of cultural patrimony).

Tribal coordination regarding the current project has been conducted, and in the unlikely event that any human remains are encountered during construction of the project the tribal groups and the Oregon SHPO will be notified immediately and the NAGPRA process followed.

6.2.3. The Archaeological Resources Protection Act

This Act establishes criminal penalties for individuals who excavate or remove archaeological resources from public lands without a permit. In the event that there is discovery of any archaeological resources, activity will cease in the immediate area of discovery, and Portland District staff archaeologists will be informed. District archaeologists will then initiate consultation with the State Historic Preservation Office and associated tribes in accordance with NHPA and/or the provisions of the ARPA and/or the NAGPRA.

7. COORDINATION AND DISTRIBUTION

Early and continuing coordination with the general public and appropriate public agencies is an essential part of the environmental process to determine the scope of environmental documentation, the level of analysis, potential impacts and avoidance, minimization, and/or related environmental requirements. Agency consultation for this project has been accomplished through a variety of formal and informal methods

This draft EA is being issued for a 30-day public review period. Review comments are requested from federal and state agencies, as well as various interested parties. Responses to public comments would be prepared. Public concerns identified in comments would aid in determination of whether or not an EIS is necessary for the Proposed Action. If it is determined that an EIS is not required, a FONSI would be signed, concluding the NEPA process.

In addition to the posting of the EA on the Corps website, a notice requesting comments regarding this EA was sent to the following agencies and groups:

U.S. Fish and Wildlife Service
National Marine Fisheries Service
U.S. Environmental Protection Agency
U.S. Coast Guard

Confederated Tribes of Siletz
Confederated Tribes of the Grand Ronde
Confederated Tribes of the Warm Springs
Cowlitz Indian Tribe
Confederated Tribes of the Umatilla Indian Reservation
Nez Perce Tribe
Confederated Tribes of the Yakama Nation

Clatsop County, Oregon
Columbia County, Oregon
Multnomah County, Oregon

Cowlitz County, Washington
Clark County, Washington
Pacific County, Washington
Wahkiakum County, Washington

Oregon State Historic Preservation Office
Oregon Department of Land Conservation and Development
Oregon Department of State Lands
Oregon Department of Fish and Wildlife
Oregon Department of Parks and Recreation
Oregon Department of Environmental Quality
Oregon Department of Geology and Mineral Industries

Oregon Department of Fish and Wildlife
State of Oregon Governor's Office

Washington State Historic Preservation Office (Washington Department of Archaeology and
Historic Preservation)
Washington Department of Ecology
Washington Department of Fish and Wildlife
Washington Department of Natural Resources
State of Washington Governor's Office

Port of Astoria
Port of Chinook
Port of Ilwaco
Port of Longview
Port of Portland
Port of Vancouver

American Rivers
Columbia River Bar Pilots Columbia River Business Alliance
Columbia River Channel Coalition
Columbia River Estuary Study Taskforce
Columbia River Crab Fishermen's Association
Columbia River Fishermen's Protective Union
Columbia River Inter-Tribal Fish Commission
Lower Columbia River Estuary Partnership
Lower Columbia Ports Coalition
Northwest Environmental Advocates
Oregon State University
Oregon Natural Resources Council
Oregon Charter Boat Association
Oregon Sea Grant
Oregon Coastal Management Program
Pacific States Marine Fish Commission
Pacific Northwest Waterways
Portland Audubon Society
Salmon for All
Save Our Wild Salmon
Washington Public Ports Association
Wahkiakum Port District #1 and #2

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APPENDIX ONE

Terms and Conditions of NMFS 2012 BiOp

The terms and conditions described below are non-discretionary, and the Corps or any applicant must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14). The Corps or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14). If the following terms and conditions are not complied with, the protective coverage of section 7(o)(2) will likely lapse.

1. To implement Reasonable and Prudent Measure #1 (dredging and dredge material disposal), the Corps shall:
 - a. Apply these terms and conditions to its own actions when carrying out FNC O&M work, to the actions of any contractor hired by the Corps for that purpose, and to the actions of any party licensed by the Corps to dredge sand from the FNC for commercial purposes.
 - b. Complete all dredging and in-water placement during the following times (the “routine” or “preferred” O&M season):
 - i. The mouth of the Columbia River at RM -3.0 to the Interstate 5 Bridge at RM 106.5 from June 1 through December 15.
 - ii. I-5 Bridge at 106.5 to the Bonneville Dam at RM 145 from August 1 through September 30.
 - iii. All side channels except the Old Mouth Cowlitz River from August 1 through December 15 (i.e., Baker Bay/West Channel, Chinook Channel, Hammond Boat Basin, Skipanon Channel, Skamokawa Creek, Wahkiakum Ferry Channel, Westport Slough, and Upstream Entrance to Oregon Slough and Portland-Vancouver Anchorage.
 - iv. Old Mouth Cowlitz River from September 1 through December 1
 - c. Dredging and in-water placement may be completed outside the preferred O&M season as necessary to resolve shoaling conditions that cause, or are likely to cause, significant draft restrictions for commercial vessels if left unmanaged until the next preferred O&M season.
 - i. Whenever possible, limit dredging outside the preferred O&M season to April 1 through May 31.
 - ii. No in-water disposal is allowed between December 1 and May 31 Cowlitz River at RM 63 to 70,
 - iii. When alternative sites are available, there will be no in-water placement near the mouths of the Kalama River at RM 71 to 75, or the Lewis River at RM 85-89 December 1 and May 31.
 - iv. Testing and calibration of dredge equipment outside the preferred O&M season must occur upstream the Lewis River at RM 89.
 - d. Prior to any dredging taking place, the Corps must develop and implement a Water Quality Sampling and Monitoring Plan for dredging and disposal that has been reviewed and approved by NMFS. The plan must include the following minimum

requirements for turbidity monitoring during periods of active dredging, disposal, and dewatering of upland facilities.

- i. A properly and regularly calibrated turbidimeter is recommended, however visual gauging is acceptable
- ii. Locations of turbidity samples or observations must be identified and described in the plan. At a minimum, monitoring must take place at the following distance, and within any visible plumes:
 1. Dredging and in-water disposal activities (flowlane and beach placement) – Upcurrent (background) and 900 feet down current from the point of discharge (bucket, cutterhead, draghead, or pipeline) and no more than 150 feet laterally from the vessel or shoreline.
 2. Other disposal activities (upland) – Upcurrent (background) and 300 feet downcurrent from the discharge point.
 3. If a meter is used the Corps must identify a depth between 10 and 20 feet, or at mid-depth if in shallow areas (less than 20 feet in depth), to collect all samples.
- iii. Monitoring must occur when dredging and disposal is being conducted and must meet the following requirements;
 1. Active Dredging – once a day during a flood tide and once a day during an ebb tide.
 2. In-Water Disposal (Flowlane and Beach Placement) – once a day during a flood tide and once a day during an ebb tide during a disposal activity.
 3. Background turbidity NTU or observation, location, tidal stage, and time must be recorded prior to monitoring downcurrent
- iv. Compliance:
 1. Turbidity must be measured or observed and recorded as described above during periods of active dredging, disposal, and dewatering of upland facilities. Results must be compared to the background sample or observation taken during that monitoring event.
 2. If an exceedance over the background level (as defined below Table 1) occurs at the second monitoring interval the activity must stop until the turbidity levels return to background. At that time, activity may resume with the minimum frequency of monitoring while maintaining compliance

Table 1 Turbidity Exceedance and Actions Required

TURBIDITY CAUSING ACTION	ALLOWABLE EXCEEDANCE TURBIDITY LEVEL			ACTION REQUIRED AT 1ST MONITORING INTERVAL	ACTION REQUIRED AT 2ND MONITORING INTERVAL
	TURBIDIMETER		VISUAL		
	Background < 50 NTU	Background ≥ 50 NTU			
DREDGING & IN-WATER DISPOSAL	0 to 5 NTU above background	10% over background	Visible plume	Modify activity and continue to monitor at ebb or flood tide	Stop activity until levels return to background and continue to monitor at ebb or flood tide
UPLAND DISPOSAL				Modify activity and continue to monitor every 4 hours	Stop activity until levels return to background and continue to monitor every 4 hours

- a. Water quality limits on side channel and Portland-Vancouver Anchorage dredging:
 - i. DO will be sampled at the mid-point of the water column 300 feet down current from the dredge and in the turbidity plume if visible.
 - ii. Samples will be collected during daylight hours during active dredging at the following frequency; once a day during a flood tide and once a day during an ebb tide.
 - iii. DO concentrations must be sampled with a dissolved oxygen meter properly and regularly calibrated according to the owner’s manual.
 - iv. Dredging may not begin if DO concentrations at the dredge site are less than 6.5 mg/l
 - v. If the level of DO measured is below 8 mg/l, the monitoring frequency must increase to every four hours until the level returns above 8 mg/l.
 - vi. If the level of DO is measured below 6.5 mg/l, or if distressed or dead fish are observed in or beside the dredge, the activity must be stopped until the level returns to above 6.5 mg/l.
 - vii. Restricted visibility: During periods of restricted visibility that could cause an unsafe condition, the Corps may postpone required compliance monitoring until conditions improve if confirmation is made by a third party, such as the Coast Guard Watch Stander or the National Weather Service, that the visibility in the area to be monitored is considered to be restricted and is unsafe to conduct the required monitoring. If monitoring is postponed due to restricted visibility and unsafe conditions, the weather condition, time of determination, and verification route must be recorded. Regular monitoring must resume once the visibility returns to safe levels.
- b. Keep dragheads and cutterheads at or buried in the substrate when suction dredges are working, and no more than 3.0 feet above the substrate for the minimum time necessary to clean or purge the dragheads.

- c. Discharge material from a pipeline dredge at depths of 20.0 feet or more below the water surface.
- d. Require use of an enclosed-bucket whenever a clamshell dredge or back-hoe will be used to dredge materials that are not approved for in-water disposal due to contaminant concerns.
- e. Use the SEF (2009; or the most recent version) to determine the suitability of sediment for in-water disposal or beneficial use.
- f. Grade all shoreline disposal or beach nourishment sites to between 10 to 15% with no swales to reduce the potential to strand juvenile salmonids.
- g. Monitor upland disposal sites during the nesting season. Discourage any avian predators that are found nesting at an upland disposal site, consistent with the Migratory Bird Act.
- h. Construct any new upland disposal site at least 300 feet from the shoreline, and include a berm designed to minimize sediment in return flow.
- i. Provide this notice to all Corps project managers or contractors engaged in FNC maintenance, and to all private vendors licensed to remove sand from the FNC for commercial purposes:

NOTICE. If a sick, injured or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NMFS Law Enforcement at 360.418.4246. The finder must take care in handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by law enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

- 2. To Implement Reasonable and Prudent Measure #2 (monitoring), the Corps shall:
 - a. Prepare a monitoring report for NMFS by February 15 each year that describes the Corps' efforts in carrying out these terms and conditions. The report must include
 - i. An assessment of overall channel maintenance activity.
 - ii. An assessment of dredging and disposal activities by river segment, including the dredged area in acres, dredging time in minutes, date, dredge type, disposal site.
 - iii. DO and turbidity observations before and during side channel dredging.
 - iv. A summary of all observations of upland disposal sites that may be used for nesting use by avian predators, especially Caspian terns and double-crested cormorants.
 - v. The finished beach gradient at any beach nourishment site used during the year.
 - vi. The location, time and amount of any reported spills, the cleanup response time and actions as well as effectiveness.
 - vii. A copy of any warning, notice of noncompliance, penalty notice, violation, or other enforcement action taken by a Federal, state or local agency.
 - b. Submit the annual monitoring report to:

State Director
Oregon State Habitat Office
Attn: 2011/02095
1202 NE Lloyd Boulevard, Suite 1100
Portland, Oregon 97232-2778

- c. The Corps must attend an annual coordination meeting with NMFS by Mar 1 each year to discuss the annual report and any actions that can improve conservation under this opinion, or make the maintenance program more efficient or accountable. The Corps is also encouraged to invite representatives from the Oregon Department of Environmental Quality, the Washington Department of Ecology, the Oregon Department of Fish and Wildlife, the Washington Department of Fish and Wildlife and the U.S. Environmental Protection Agency to attend.