US Army Corps of Engineers ®
Portland District

Lower Willamette River
Federal Navigation Channel, Oregon
Maintenance Dredging at Post Office Bar

Draft Environmental Assessment

The lower Willamette River passing through Portland, Oregon

Draft February 22, 2009

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ABBREVIATIONS AND ACRONYMS

BMP	best management practice(s)
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
DEQ	Department of Environmental Quality, State of Oregon
DDT	dichloro-diphenyl-trichloroethane
DMMP	Dredged Material Management Plan
DPS	distinct population segment
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FNC	federal navigation channel
FR	Federal Register
LCR	Lower Columbia River
LWR	Lower Willamette River
NEPA	National Environmental Policy Act
NGVD29	National Geodetic Vertical Datum 1929
NMFS	National Marine Fisheries Service
ODFW	Oregon Department of Fish and Wildlife
PAH	polycyclic aromatic hydrocarbon(s)
PCB	polychlorinated biphenyl(s)
ppm	parts per million
RI/FS	Remedial Investigation/Feasibility Study
SEF	Sediment Evaluation Framework
SL	screening level(s)
TBT	tributyltin
TMDL	Total Maximum Daily Load
TOC	total organic carbon
TVS	total volatile solids
μg/kg	microgram per kilogram(s)
μm	micrometer(s)
USFWS	U.S. Fish and Wildlife Service
UWR	Upper Willamette River
WRM	Willamette river mile(s)

English to Metric Conversion Factors

To Convert From	To	Multiply by
feet	meters	0.3048
miles	kilometers (km)	1.6093
acres	hectares (ha)	0.4047
acres	square meters (m^2)	4047
square miles (mi^2)	square kilometers (km^2)	2.590
cubic feet (ft^3)	cubic meters (m^3)	0.02832
feet/mile	meters/kilometer	0.1894
cubic feet/second (cfs or ft^3/s)	cubic meters/sec (m^3/s)	0.02832
degrees fahrenheit (°F)	degrees celsius (°C)	(Deg F - 32) x (5/9)

1. INTRODUCTION

1.1. Purpose and Need

In October of 2010, the U.S. Army Corps of Engineers (Corps) is proposing to dredge a significantly shoaled area called Post Office Bar, located at Willamette River mile (WRM) 2.1-2.4 in the lower Willamette River federal navigation channel (LWR FNC). The entire LWR FNC is almost 12 miles long and extends from the mouth of the Willamette River to the Broadway Bridge in Portland, Oregon (Figure 1). The purpose of the proposed dredging project at Post Office Bar is to restore the channel's capacity to maintain the 40-foot deep FNC for the transport of goods to and from Portland Harbor.

Channel maintenance at Post Office Bar is needed because a significant amount of shoaling has taken place since the channel in this location was last dredged in 1989. Post Office Bar poses a problem for outbound vessels because it occurs on an inside bend on the east bank of the river. The lack of maintenance dredging in this area presents a hazard to navigation and impacts access to LWR terminals and berths. Over 1,100 vessels transited past this shoal in 2008. Because of shallow depths, vessels are forced to transit at high tide only. With the high volume of traffic, and timing constraints due to the tidal influence, the potential for daily head on encounters at this location is greatly increased. The reduced channel width from shoaling in this area is especially dangerous because vessels moving around the bend in the river must orient the vessel at an angle. This maneuver requires more channel width than when the same vessels are transiting a straight stretch. The Columbia River Pilots have specifically requested that the Corps dredge this dangerous shoaled area.

Maintenance of the LWR FNC was suspended in 2000 because of the designation of Portland Harbor as a Superfund site by the U.S. Environmental Protection Agency (EPA). Also, the Corps has suspended work on the LWR Dredged Material Management Plan (DMMP) pending the outcome of the harbor-wide Superfund investigation (Figure 2). The DMMP is a long-term plan for continued maintenance of the existing LWR FNC. Over the past several years, the Corps has completed or worked on a number of studies related to the DMMP with dredging originally anticipated to commence in 2009. At the same time, the EPA has overseen studies of the Portland Harbor Superfund investigation; a cleanup remedy is not expected from EPA before 2012. With many decisions still to be made by EPA on harbor-wide cleanup, the Corps has decided to suspend development of the DMMP at this time. However, the immediate need for maintaining a safe navigation channel requires dredging at Post Office Bar.

1.2. Project Authority

Construction of the 40-foot deep by 600-foot wide navigation channels for the LWR and Columbia River was recommended in *Columbia and Willamette Rivers below Vancouver, Washington and Portland, Oregon*, dated June 25, 1962 and published as House Document 452, 87th Congress, 2nd Session. The LWR FNC was authorized in the River and Harbor Act of 1962 (Public Law 87-874 dated October 23, 1962). The local sponsor is the Port of Portland.

1.3. Project Area Description

The area to be affected by dredging at Post Office Bar includes a portion of the authorized LWR FNC, from about WRM 3 to its confluence with the Columbia River (at Columbia river mile 100).

All material dredged from Post Office Bar will be barged to the Port of Portland's West Hayden Island upland placement site located at Columbia River mile 105 (Figure 3). The LWR FNC has been maintained by the Corps to a depth of 40 feet plus 2 feet for advance maintenance (advance maintenance is allowed to ensure the authorized depth for a period of time after dredging). The channel width varies from 600 to 1,900 feet. From WRM 11.6 to 14 (Ross Island), the channel is 300-feet wide and 30-feet deep. The Port of Portland is responsible for maintaining this reach for navigation. The channel above Ross Island does not require maintenance for navigation.

Figure 1. Lower Willamette River Federal Navigation Channel

Note: Post Office Bar is shown as the shaded area between RM 2-3.

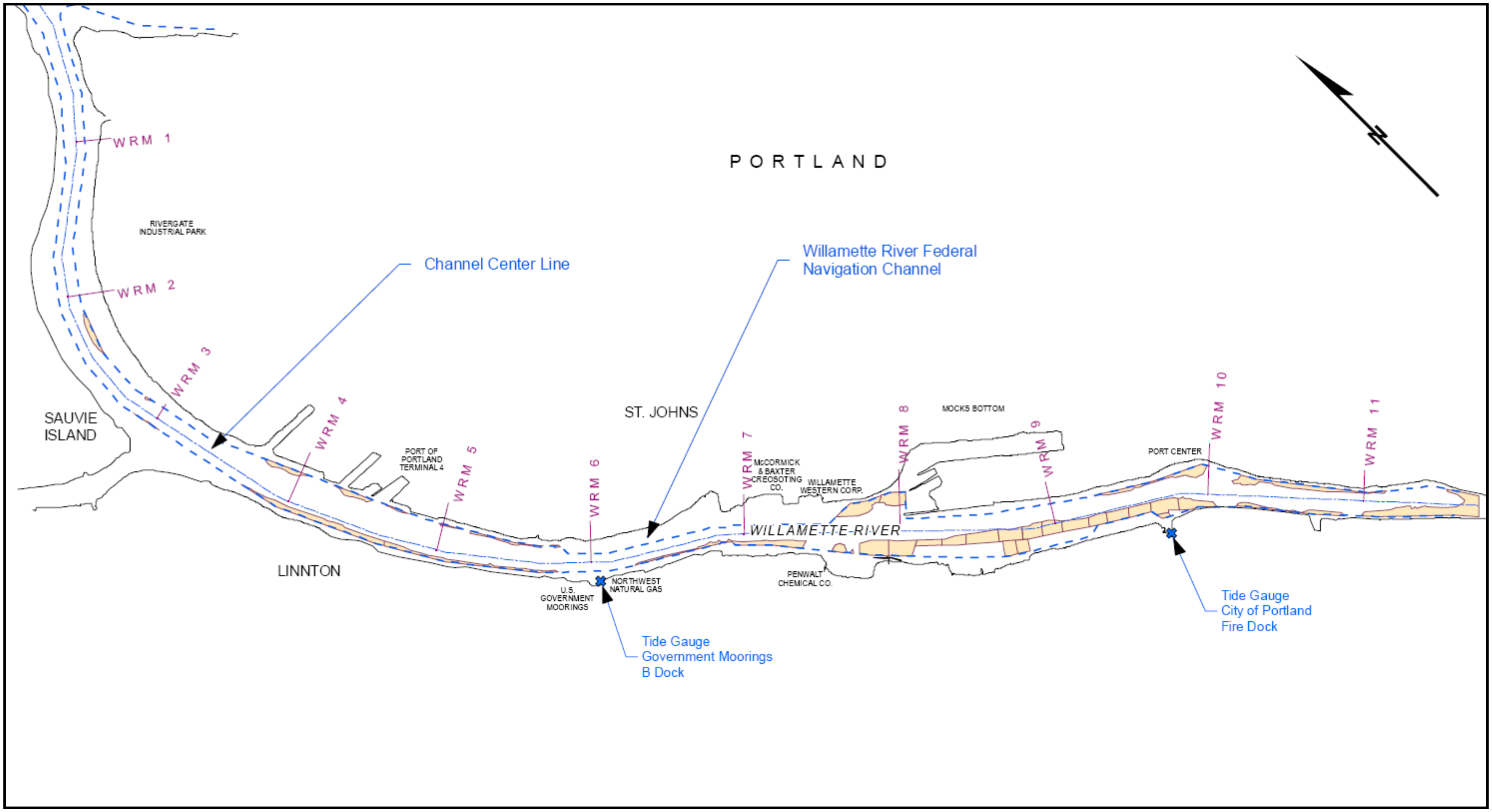
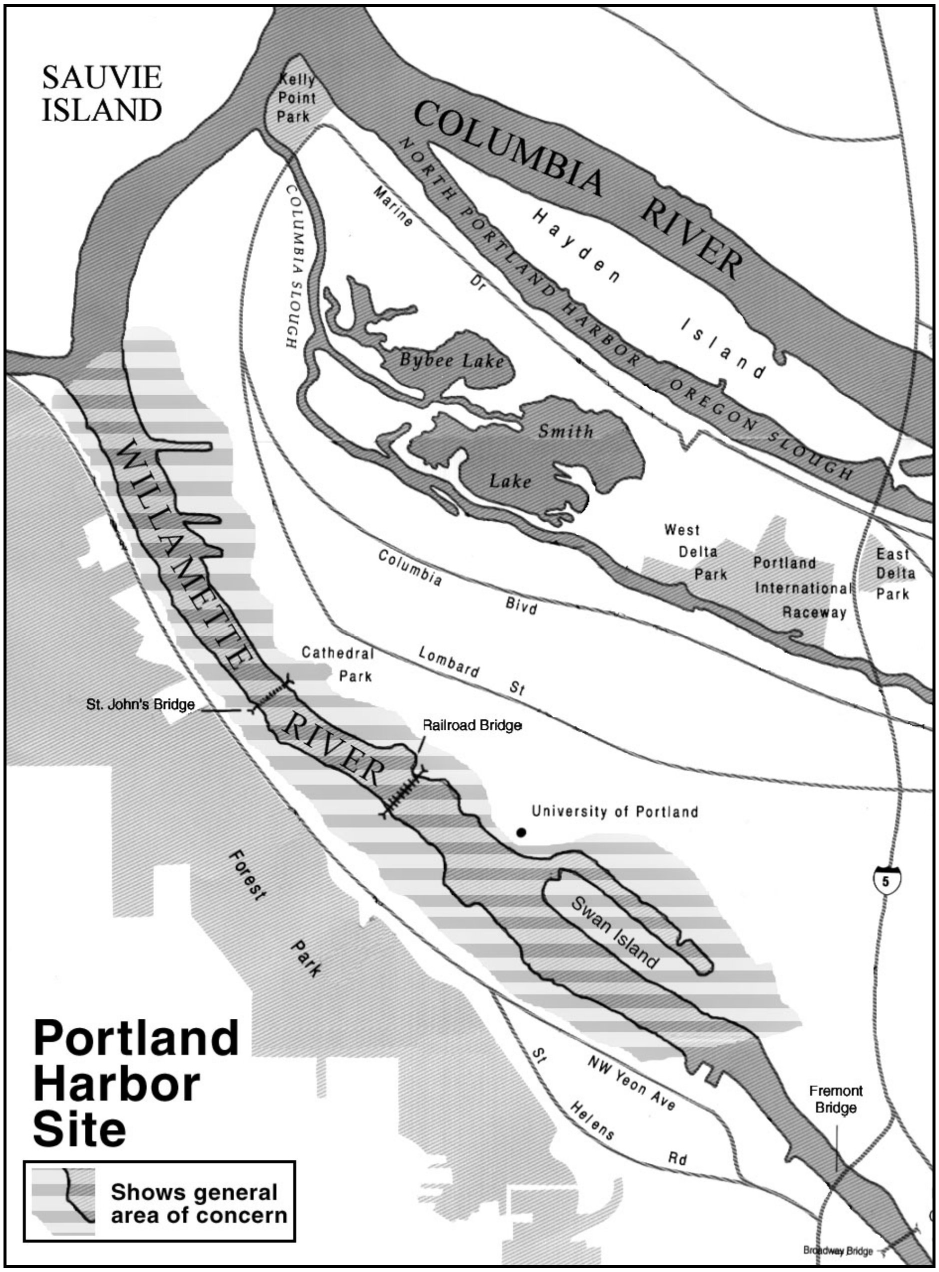
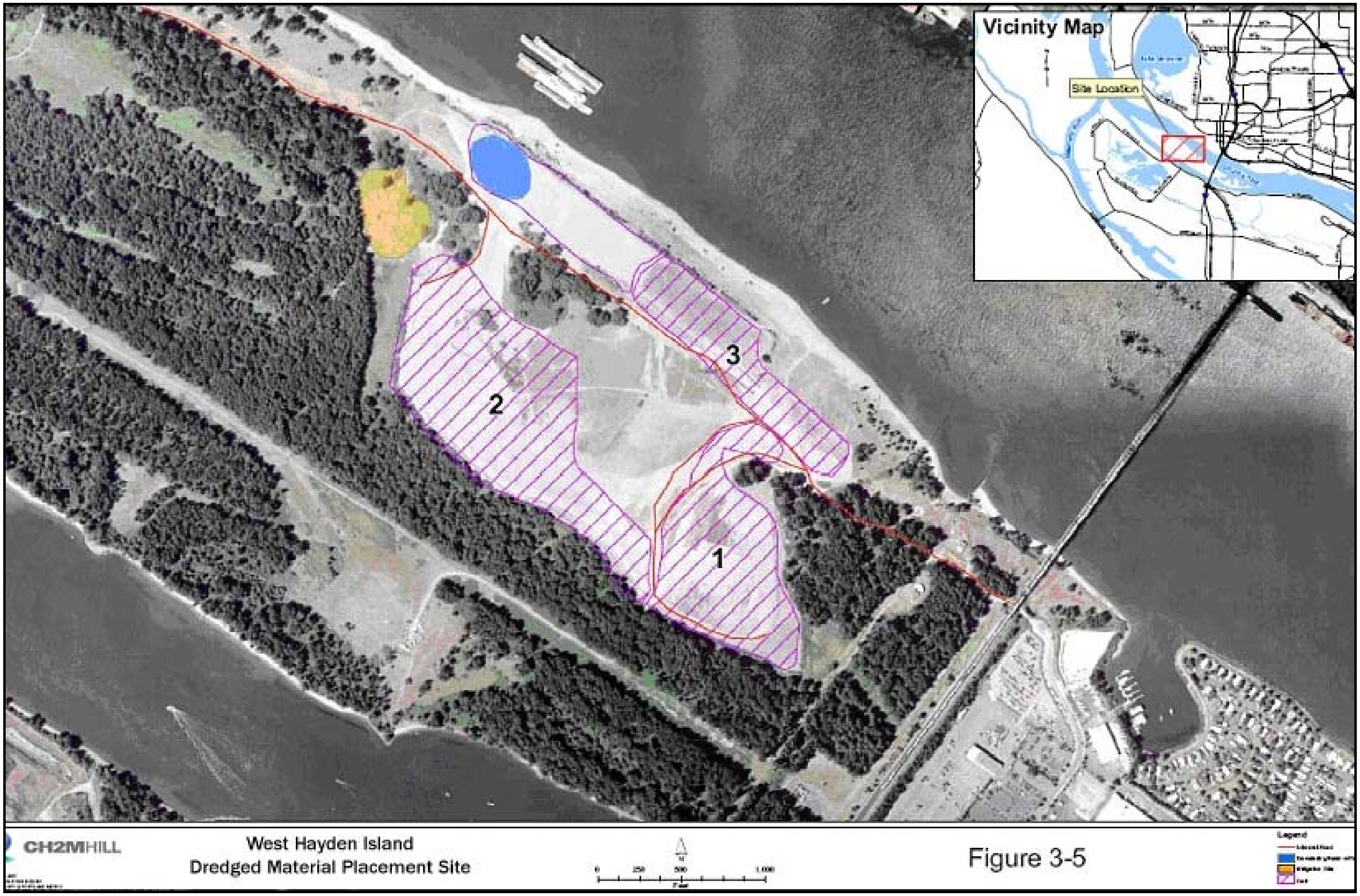


Figure 2. Portland Harbor Superfund Site Investigation



Source: http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

Figure 3. West Hayden Island Upland Placement Site



Note: Material placement areas are numbered 1, 2, and 3.

1.4. Related Actions and Previous Studies

1.4.1. Navigation and Channel Maintenance

Previous reports that addressed navigation on the LWR FNC are summarized below. These reports are available for review at the Corps' Portland District office located at 333 SW First Avenue in Portland, Oregon.

Columbia and Lower Willamette River Environmental Impact Statement (EIS), July 1975. The final EIS addressed the environmental effects of the 40-foot channel and ongoing/future maintenance of the Columbia and lower Willamette rivers in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended. Specific areas addressed include the effects of a deeper channel, the impacts of dredging and dredged material placement practices, impacts at specific upland and beach nourishment placement sites, and indirect and cumulative effects.

Columbia and Lower Willamette River Maintenance Environmental Assessments (EAs), 1983, 1989, and 1994. Since the 1975 final EIS, changes in maintenance practices and environmental conditions warranted additional NEPA documentation. Environmental Assessments were prepared to address minor changes in maintenance and subsequent environmental effects. All EAs resulted in a Finding of No Significant Impact.

Lower Columbia River Channel Improvement, January 1989. This report prepared by Ogden Beeman and Associates evaluated the potential for enlarging the existing navigation channel from the mouth of the Columbia River to Portland, Oregon.

Lower Columbia River Oregon and Washington, Columbia River Channel Deepening Reconnaissance Report, October 1991. This report was approved in August 1992 and formed the basis for the later feasibility study to deepen the Columbia and lower Willamette rivers navigation channel. Alternatives analyzed included a 42-foot-deep by 600-foot-wide channel for the lower 45 miles of the Columbia River with the existing depth of 40-feet upstream; a 45-foot-deep by 600-foot-wide channel for the entire length; and a channel 44-feet deep.

Final DMMP and Supplemental EIS, Columbia and Lower Willamette River Federal Navigation Channel, June 1998. This report presented the findings of studies conducted to determine how to maintain the authorized 40-foot navigation channels for the Columbia and lower Willamette rivers over the next 20 years using the criteria of least cost, environmental acceptability, and technical feasibility. The alternatives were evaluated in accordance with requirements of the Clean Water Act (CWA), Endangered Species Act (ESA), NEPA, and other environmental laws and regulations.

Integrated Feasibility Report for Channel Improvements and EIS, Columbia and Lower Willamette River Federal Navigation Channel, Final August 1999 (Columbia River Channel Improvement Project). The feasibility study evaluated various alternatives for improving navigation in the Columbia River. The lower Willamette River was deferred from the study because of contaminated sediment concerns. The alternatives studied for the Columbia River included dredging the river bottom to various depths, updating river level forecasting systems, upgrading existing port facilities or developing a regional port, and taking no action. The Corps concluded deepening the channel to a depth of 43 feet provided the most benefit to the nation.

Final Supplemental Integrated Feasibility Report and EIS, Columbia River Channel Improvement Project, January 2003. The need to supplement the 1999 feasibility report/EIS arose from changes to the proposed project after an 18 month reconsultation process with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) under the ESA. The Corps also revised its economic analysis of the project to reflect the new information obtained during the reconsultation process, as well as taking into account new cost estimates for completing the project. The authorized project includes deepening approximately 103 miles of the Columbia River navigation channel and related turning basins, wildlife mitigation features to offset wetland, agricultural, and riparian forest habitat losses resulting from dredged material placement, and construction of ecosystem restoration features.

1.4.2. Portland Harbor Superfund Site

In the late 1990s, the Oregon Department of Environmental Quality (DEQ) and the EPA conducted a study of river sediments in Portland Harbor. The study found that sediments throughout the harbor area were contaminated with heavy metals, arsenic, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), tributyltin (TBT), semi-volatile organic compounds, and pesticides such as dichloro-diphenyl-trichloroethane (DDT). The contamination was primarily attributed to a century of industrial and maritime activity and development along the LWR.

In December 2000, EPA determined that Portland Harbor qualified for placement on the National Priorities List (also known as Superfund) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; http://www.epa.gov/superfund/sites/npl/nar1606.htm). The EPA and DEQ are the lead agencies for the in-water and upland portions, respectively, of the Portland Harbor Superfund site clean-up. In September 2001, the EPA signed an Administrative Order on Consent with nine potentially responsible parties, including the City of Portland and the Port of Portland, to perform the necessary investigations to determine what clean-up options are possible. The group of potentially responsible parties, known as the Lower Willamette Group, is doing the investigation work under EPA oversight and with assistance from the DEQ, six tribal governments (Yakama, Grande Ronde, Siltez, Warm Springs, Umatilla, and Nez Perce Tribes), National Marine Fisheries Service, Oregon Department of Fish and Wildlife (ODFW), USFWS, and U.S. Department of the Interior.

The Lower Willamette Group is currently performing the Remedial Investigation/Feasibility Study (RI/FS) pursuant to the Administrative Order on Consent. The remedial investigation includes areas of the LWR extending from about WRM 0 to 12 (see Figure 2). This area does not define the Superfund site, the boundaries of which will be determined by EPA upon issuance of a Record of Decision at the end of the RI/FS process. The RI/FS report will present the results of the investigations of contamination, the risks to human health and the environment, and evaluate the clean-up options; it is expected to be completed in 2011.

The EPA is not expected to select a remedy and issue the Record of Decision until 2012. After issuance, the remedial design and remedial action will be implemented. The remedy will likely involve a combination of cleanup technologies and long-term operation and maintenance. The technologies likely will involve dredging, capping, or other engineered containment of contaminated sediment, natural recovery, and institutional controls to limit uses or disturbance of buried contaminated sediment.

In addition, the DEQ is working closely with the City of Portland and various upland property owners to identify and voluntarily clean up their upland sites along the banks of the LWR. The focus is on identifying and controlling upland sources of contamination that may be affecting river sediments through such pathways as overland runoff, bank erosion, stormwater discharge, or groundwater seepage.

A Letter of Agreement between the Corps, EPA, and DEQ defines agency roles, responsibilities, and interests for the LWR; establishes a formal mechanism of cooperation, coordination, and conflict resolution; and commits each agency to develop a long-term management strategy. In particular, the agreement requires that the EPA characterize the nature and extent of contamination within the Superfund site, document impacts to the Superfund site from maintenance dredging, and evaluate proposed dredging actions. The DEQ will consult with EPA and the Corps regarding CWA compliance and provide reviews of proposed dredging projects. The Corps is responsible for issuing permits for non-Corps dredging and filling, maintaining the LWR FNC, planning and design of environmental projects within the LWR, and technical assistance to the EPA.

The Corps has performed maintenance dredging of federally authorized channels and harbors that have been partially or wholly designated as Superfund clean-up sites across the nation, most notably the Hudson River in New York. Normally this action is coordinated with the EPA and the maintenance dredging is performed in accordance with CWA guidelines. In the Pacific Northwest, CWA compliance is accomplished through the Sediment Evaluation Framework (SEF 2009) and in coordination with the resource agencies. Policy also requires that Corps' actions defer to EPA enforcement in areas where sediment is being evaluated or remediated under CERCLA. The overall intent is that the Corps conduct dredging in a manner consistent with EPA's entire remedial action strategy, while avoiding taking on any new liabilities.

Prior to the issuance of the Record of Decision, the EPA will not have made a final decision on which sediments in the LWR require a CERCLA remedy. However in 2009, EPA identified Post Office Bar as an 'Area of Potential Concern' based on the findings of the Draft Remedial Investigation. In order to assure that navigation dredging will be protective of human health and the environment, and not exacerbate the contamination, the EPA and Corps will continue to coordinate, at a minimum, as described below.

1. Corps will notify EPA of the need for navigation dredging and seek appropriate data and information from EPA about the dredge locations.
2. EPA/Corps will examine existing data in Corps and EPA data sets. Corps may reevaluate the need for navigation dredging depending on the data evaluation.
3. Corps will determine additional data needs or analysis under CWA for the dredging project.
4. EPA will determine whether additional data for the RI/FS is needed.
   a. Is the area clearly outside EPA's areas of concern?
   b. Are there necessary data gaps to fill prior to EPA making a determination?
   c. If the area is within an area of concern, what data during and after dredging is required?
   d. If subsurface contamination exists, what data during and after dredging may be required?
5. Corps prepares plan for sampling for CWA/ESA/NEPA/CERCLA purposes.
6. If data needs for CERCLA purposes appear to extend far beyond CWA requirements, the Corps will confer with EPA regarding appropriate means to collect data. If necessary, the Corps will reevaluate the proposed action in light of data collection demands.
7. Data for dredging project will be collected in a coordinated manner. Corps will consult EPA about Quality Assurance Project Plan issues to assure data collected is compatible and useable by EPA.

8. Corps will report results and coordinate evaluation with EPA and others, as required.
9. If data is complete, potential impacts are within the range analyzed in the NEPA document (e.g., this EA; see Section 2.3), and EPA concerns are addressed, then the Corps will prepare plans and specifications for the navigation dredging action. If not, NEPA issues will be addressed through a supplemental NEPA document, or dredging activities will be suspended until any CERCLA issues are resolved to EPA's satisfaction.
10. If CERCLA-contaminated sediment will be dredged, the Corps would conduct appropriate chemical water quality monitoring and evaluate appropriate best management practices to monitor impacts from and minimize movement of suspended sediment.
11. If issues are addressed so that dredging can proceed, the Corps will obtain a Section 401 Water Quality Certificate from DEQ.
12. If supplemental NEPA documentation is required, Corps will review the need to update the ESA documents with the NMFS and USFWS.

The Corps will proceed with maintenance dredging only if EPA has no concern about the dredging action that could potentially affect the investigation or remedial action under CERCLA at Portland Harbor. Also, the Corps may revise dredging proposals to avoid areas or actions of concern, work with other involved parties to determine if coordinated action is feasible, or postpone dredging until EPA takes a remedial action under CERCLA for Portland Harbor.

2. AFFECTED ENVIRONMENT

2.1. Physical Characteristics

2.1.1. Hydrologic Conditions

The LWR (below Willamette Falls) drains an area of approximately 10,000 square miles. The lower 11 miles of the river are generally confined to a single channel that varies in width from 1,300 to 2,000 feet. The hydrology of the river in the Portland Harbor area is complex. Hydrologic conditions are influenced by three primary variables: (1) upstream reservoir regulation on the Columbia and Willamette rivers; (2) natural streamflows on the Columbia and Willamette rivers and local tributaries; and (3) tidal effects (Corps November 2004). Tidal effects are noticed at harbor stages less than 12 feet National Geodetic Vertical Datum 1929 (NGVD29; all stage elevations are in NGVD29), and are most pronounced at stages less than 5 feet, which are common in summer and fall.

Table 1 and Figure 4 show minimum, mean, and maximum monthly stage by month for the period of record (water years 1973 through 2003) at Portland (U.S. Geological Survey gauge #14211720). Maximum monthly stages in the Willamette River at Portland usually occur during the winter (December through February) and the spring (March through June). Notable maximum monthly stages of 27.2 feet in February 1996 and 18.5 feet in June of 1997 indicate the effects that large runoff years on the Columbia River have on stage at Portland. Minimum monthly stages usually occur between July and October. A minimum monthly stage of 1.1 feet occurred in July of 2001. Normally, August or September is the months when minimum monthly stages are most likely to occur in the Portland Harbor. Tidal effects strongly influence monthly river stages in the Portland Harbor during the summer and fall (Corps November 2004).

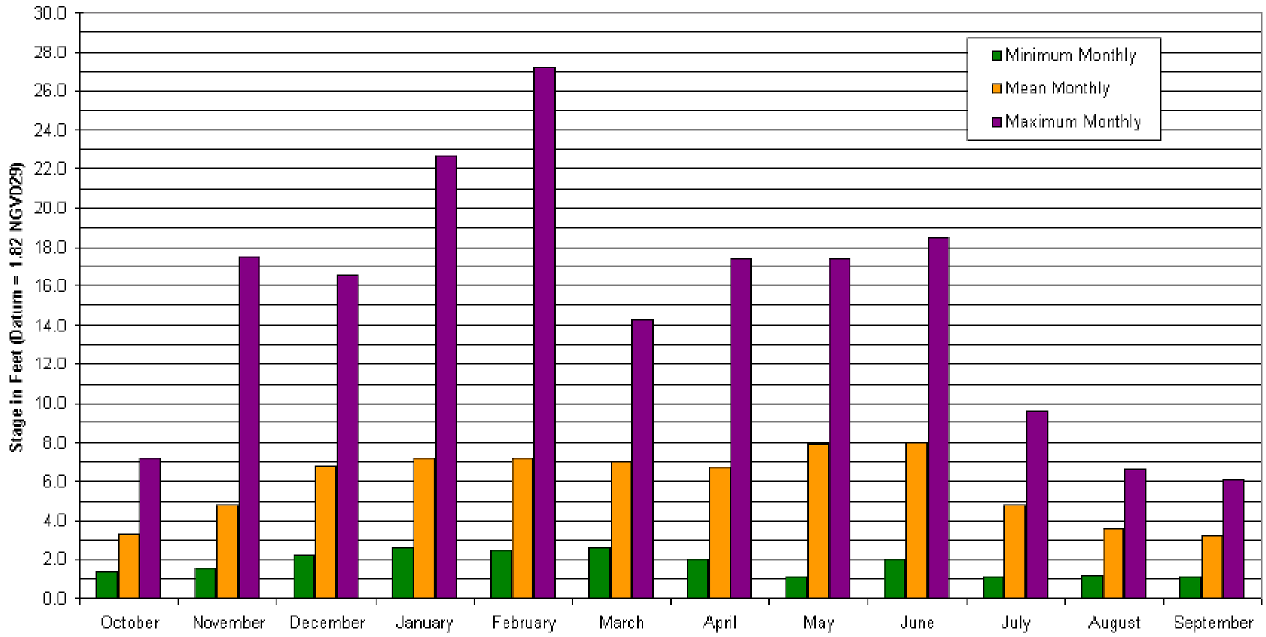
Table 1. Minimum, Mean, and Maximum Monthly Stage at Portland, Oregon

Month	Minimum Monthly Stage (feet)	Mean Monthly Stage (feet)	Maximum Monthly Stage (feet)
October	1.4	3.0	7.2
November	1.6	4.8	17.5
December	2.2	6.8	16.6
January	2.6	7.2	22.7
February	2.5	7.2	27.2
March	2.6	7.0	14.3
April	2.0	6.7	17.4
May	1.1	7.9	17.4
June	2.0	8.0	18.5
July	1.1	4.8	9.6
August	1.2	3.6	6.6
September	1.1	3.1	6.1

Note: Water years 1973-2003; gauge stage 0 = 1.55 feet NGVD29. Source: Corps November 2004.

Table 2 shows the minimum and maximum extreme stage by month at Portland. Notable values include the November 1979 minimum extreme stage of -0.5 feet and the February 1996 maximum extreme stage of 28.5 feet. The minimum extreme stage coincided with extremely low flows on the Columbia and Willamette Rivers and a low tide. The maximum extreme stage occurred as a result of extremely high flows on the Willamette River (Corps November 2004).

Figure 4. Minimum, Mean, and Maximum Monthly Stage at Portland, Oregon



Note: Water years 1973-2003 at U.S. Geological Survey gauge #14211720. Source: Corps November 2004.

Table 2. Minimum and Maximum Extreme Stage at Portland, Oregon

Month	Minimum Extreme Stage (feet)	Maximum Extreme Stage (feet)
October	-0.4	7.4
November	-0.5	13.3
December	1.1	18.9
January	0.6	24.1
February	0.8	28.5
March	0.1	17.6
April	0.5	17.6
May	1.3	17.9
June	0.6	20.0
July	-0.5	17.4
August	0.0	8.8
September	-0.6	9.8

Note: Water years 1973-2003; gauge stage 0 = 1.55 feet NGVD29. Source: Corps November 2004.

2.1.2. Sediment Transport

In 2007, the Corps Portland District evaluated the long-term sediment trends for the LWR at Portland. It was found that because of a favorable combination of physiographic and climatic conditions, the sediment yield for the Willamette River and its tributary subbasins is low. The west flank of Cascade Range is underlain by erosion resistant basalt, andesite, and pyroclastic rock. Transitional regions of the basins have thin soil layers and while valley floors have thicker alluvial deposits, dense tree, brush, grasses, and trees protect soil surfaces from rapid erosion. Also, soils on valley floors have been consolidated by flood water over the centuries. Thunderstorms are uncommon in the Willamette Valley; this lack of high intensity rainfall events also results in lower sediment yields. Since flow regulation began in the Willamette Basin in October 1966, the mean annual suspended sediment discharge for the LWR at Portland has decreased from about 2 million tons to 1 million tons—a 50% reduction in suspended sediment discharge. Table 3 shows the original and updated delivery ratios from the three general sediment sources in the basin, and the annual sediment amounts calculated for pre- and post-flow regulation periods at Portland.

Table 3. Pre- and Post-regulation Sediment Quantities at Portland, Oregon

Sediment Source	Annual Sediment Amount at Portland (tons)		Percent Change
	Pre-flow Regulation	Post-flow Regulation	
Eroding channels	1,100,000	650,000	- 41
Agricultural lands	430,000	220,000	- 49
Forested lands	470,000	130,000	- 72
Totals	2,000,000	1,000,000	- 50

Note that climate change, notably long-term changes in rainfall amounts and intensity, and major sediment discharge events, such as the December 1964 flood, were not considered in the analysis. Source: Corps Portland District.

Flow regulation may explain the approximate 41% reduction in sediment discharge from bank erosion. Prior to flow regulation in the Willamette Basin, 336 flow events exceeded 100,000 cubic feet per second (cfs); after regulation, this number was reduced to 179. Before regulation, 21 flows exceeded 200,000 cfs; after 1967 there were only three floods exceeding this value.

A stream's response to changes in both water discharge and sediment discharge is complex; however, the reduction by about 50% in the annual suspended sediment discharge for the LWR at Portland cannot be explained solely by dams trapping suspended sediment behind them. Water released from Willamette Basin dams has caused scour and degradation downstream. However, the extent of channel degradation is limited by geologic controls – usually a few miles downstream of the projects; and tributaries of the Willamette River were naturally under-loaded or the sediment supplied to the stream rarely exceeded its transport capacity. For under-loaded streams, channel degradation resulting from the trapping of suspended sediments in a reservoir is limited downstream, both laterally and longitudinally. Regardless, only 24% of the reduction in suspended sediment discharge at Portland is attributable to dam construction on tributary basins.

In contrast, the impacts of changed flow conditions extend downstream to the confluence of the tributaries and beyond to the mouth of the Willamette River. Two causes of bank failure are directly related to flow magnitude and the hydraulic parameters that are functions of flow (e.g., top width, depth, hydraulic radius, and energy grade line slope). The two failure mechanisms are direct scour of banks and loss of bank support (undercutting). A reduction in the dominant discharge and a reduction in the number and magnitude of flood flows result in both long- and short-term (flood flows) decreases in bank and bed shear forces and a reduction in total bank surface area subjected to hydraulic forces. Currently, long reaches of the river have achieved a stable meandering pattern, which results in lower amounts of sediment delivered to the stream through bank erosion.

Bedload for the reach of the LWR through Portland is partially controlled by a natural rock barrier at Oregon City (Willamette Falls at WRM 26.6). Because of the impounding effect of the falls, the gradient of the river in an approximately 25 mile reach upstream of the falls is less than 0.4 feet/mile. This flat reach of the Willamette River is referred to as the Newberg Pool, and the pool and falls function as a natural sediment trap. Because of the size of the pool, its capacity to store bedload material can be regarded as inexhaustible; thus, the sources of much of the bed material found in the Willamette River at Portland is from downstream of the falls.

Average suspended sediment concentrations for the Willamette and tributaries can vary from 21 to 90 parts per million (ppm), which is a very narrow range for such a large area. The sediment concentration range for periods of low water is 20 to 30 ppm and 200 to 300 ppm during high flow periods. During periods of high flow, the suspended sediment concentrations in the Willamette River are low in comparison to other rivers. For example, concentrations in the Missouri River can range from 15,000 to 20,000 ppm during peak flows; and a maximum concentration of 10,000 ppm was reported for the Colorado River at the Grand Canyon, Arizona (before Glen Canyon Dam). Suspended-sediment is one of two components of the total sediment load carried by a stream; the other component is bedload – or sediment that moves by saltation (a bouncing-like motion), sliding, or rolling along the river bed.

Although suspended sediment discharges are low, the large volume of water (referred to as water yield) of the Willamette River at Portland results in an average of 2.3 million tons of material (total-load) carried past the Morrison Bridge (WRM 12.8) annually. Thus, transport of sediment in the Portland reach is influenced primarily by hydrologic conditions, both natural and anthropogenic in origin. Runoff from 27% of the total area of the Willamette upstream of Portland is regulated by dams, including large private dams such as the Leaburg Dam on the McKenzie River. Significant movement of sediment begins at 50,000 cfs, a discharge which has occurred on the Willamette River at Portland 20% of the time during a 32-year period of regulated flow. However, more sediment is sometimes transported during one large flood than is transported during several average years. For example, 6.4 million tons of sediment was transported past the Morrison Bridge over a 10-day period during the December 1964 flood. A period with a large number of higher than average winter discharges can also result in more sediment being carried through the Portland reach.

In their navigation analysis for the Port of Portland, Parsons Brinckerhoff (2007) determined that an average of 0.32 feet (3.84 inches) of annual sediment accumulation has resulted in approximately five feet of sedimentation at Post Office Bar since 1990. Their analysis also showed that this area of the river has low flow velocities and that even during high energy flood events and freshets, the lower reach of the Willamette River is depositional. This is due to a significant portion of downstream flow discharging through Multnomah Channel (at WRM 3) to the Columbia River, the widening of the river as it bends to the northeast around WRM 2, and the narrowing of the river around WRM 1.5. This determination was verified in the 2009 Round 3 sampling for the Portland Harbor RI/FS by the Lower Willamette Group (2009) that included placement and retrieval of sediment traps and review of bathymetry data (2002-2009). Two sediment traps were located just downstream of Post Office Bar and were sampled quarterly in 2007. Average sediment deposition for both sediment traps was 6 centimeters (2.36 inches) per quarter. Chemical analysis of the sediment found that PCB congener and aroclor concentrations in the sediment traps were significantly less than concentrations found in surface and subsurface sediment samples from the same reach, indicating that infill from upstream sources is cleaner.

2.2. Water Quality

The DEQ maintains water quality monitoring sites throughout Oregon. The most recent trends in water quality were measured by the Oregon Water Quality Index for 1997-2006 (DEQ 2007). The Index analyzes a defined set of water quality variables and produces a score describing general water quality. The water quality variables used include temperature, dissolved oxygen, biochemical oxygen demand, pH, total solids, ammonia and nitrate nitrogen, total phosphorous, and bacteria. The score produced to describe general water quality ranges from 10 (worst case) to 100 (ideal water quality). Two monitoring sites closest to Post Office Bar are located in the LWR channel (DEQ 2007) at WRM 7.0 (Southern Pacific Railroad Bridge), which was classified as having fair water quality (minimum seasonal average index score of 82); and at WRM 13.2 (Hawthorne Bridge), which was classified as having good water quality (minimum seasonal average index score of 85). At WRM 7.0 no significant trend was noted from 1997-2006, whereas at WRM 13.2 a decreasing trend was noted (DEQ 2007). Factors leading to a decreasing trend may include increased levels of point or non-point source activity and/or decreased flows (DEQ 2007).

2.3. Sediment Quality

The most recent sediment testing at the Post Office Bar shoal was conducted for the Corps in 2009 and by Tetra Tech (2006) and Hart Crowser (2004). The reports are available at https://www.nwp.usace.army.mil/ec/sqer.asp. The characterization of the sediment was performed in accordance with the 1998 Dredge Material Evaluation Framework for the Lower Columbia River Management Area [now the Sediment Evaluation Framework (SEF); see SEF 2009]. The results were compared to the screening levels (SLs) developed to characterize dredged material for suitability for unconfined, open-water placement. A summary of the results is provided below.

Corps 2009. In February 2009 the Corps collected a total of six vibra-core sediment samples from Post Office Bar. Three cores were collected from the proposed the dredging prism (DP) and retained as discrete samples, which were then divided to represent the dredging prism and the new surface material (NSM). Three additional core samples were collected just shoreward of the DP to represent the potential sloughing materials.

The physical analyses classified material as elastic silt with 89.4% fines and 10.6% sand, with mean grain-size of 0.024 mm and 2.47% total organic carbon; ranging from 1.97% to 2.94 %. Some chemical data results exceeded the 2009 SEF freshwater screening levels (SLs) in one or more samples for cadmium, zinc, DDT, PCBs, and PAHs. In general, contaminant concentrations were higher in the sediment samples characterizing the NSM. In addition, PCB concentrations at the new surface exceed EPA's preliminary remediation goal for protection of human health through small mouth bass consumption (EPA letter to LWG dated June 23, 2009).

Tetra Tech 2006. In this study, the LWR FNC was divided into reaches including a reach encompassing Post Office Bar (WRM 0 to 3). On the eastside of the FNC at the Post Office Bar shoal, currently proposed for dredging, two surface samples were collected in 2005. These surface samples were collected just outside the FNC, adjacent to core locations sampled in 2004, to characterize potential "sloughing material" during dredging.

Sediment was described in terms of percent fine-grained material [less than 62.5 micrometers (μm; 230 sieve)] consisting of silts and clays, or percent coarse-grained material (greater than 62.5 μm) consisting of sands and gravels. Samples on the east side of the FNC were predominantly fine-grained material (clayey silts or clayey sandy silt), including those from Post Office Bar (silt/clay > 97% and sand/gravel < 5%). Total organic carbon (TOC) averaged 2.9% and total volatile solids (TVS) averaged 9.1%.

The analytical chemistry results for the above samples showed that metals, butyltins (pore water TBT), semivolatile organic compounds, PCBs, PAHs, DDT, phthalates, miscellaneous extractables and phenols, for both surface samples, were below SLs.

Hart Crowser 2004. Subsurface sediment vibra-coring was completed at three locations from the proposed dredging site at Post Office Bar. The sediment cores were taken to a removal depth of 42 feet (dredging depth of 40 feet plus 2 feet advance maintenance) and one composite sediment sample was submitted to the lab for analyses. The analytical chemistry results for the samples showed that metals, tributyltin (pore water TBT), semivolatile organics (including PAHs, phenols, phthalates, and miscellaneous compounds), and PCBs were below SLs. For pesticides, total DDT was detected in the composite sample at 14.3 µg/kg, which exceeded the SL of 6.9 µg/kg. Because chemical testing results exceeded the SL for DDT, Tier III bioassay testing was conducted for the composite sample, which passed the Tier III biological effects criteria.

Conclusion. Based on the testing results discussed above, this material is proposed for upland placement (subject to DEQ solid waste rules).

2.4. Air and Noise Quality

The DEQ and EPA have jurisdiction over air quality and noise in the Portland area. Ambient air quality standards for air pollutants have been established by federal and state agencies to protect public health (primary standards) and welfare (secondary standards). Areas in which pollutant concentrations exceed allowable ambient air quality standards are designated as nonattainment areas for that pollutant. Portland is classified as a nonattainment area for carbon monoxide and ozone. Ozone is controlled by regulating nitrogen oxide and nonmethane hydrocarbon or volatile organic compound emissions in the area. Air quality in the Portland area has improved in recent years. The number of days classified as “good” has steadily increased while the number of days classified as “moderate” or “unhealthful” has decreased. The state implementation plan developed by DEQ and approved by EPA includes enforceable emission limitations, related control measures, and schedules or timetables for compliance with ambient air quality standards.

The project area is very industrial with many sources of noise and artificial light, including industrial and port facilities, train and boat operation, cars and trucks on highways, and aircraft. Noise and light receptors are mostly people who live in residential neighborhoods and work within or adjacent to the commercial and industrial areas. Wildlife, where present, also could be sensitive to noise and light, particularly during nesting and breeding.

2.5. Terrestrial Habitat and Species

The primary data sources used for this section include the *Willamette River Inventory* (Portland Bureau of Planning 2002) and the *Willamette Watershed Characterization Report* (Portland Bureau of Environmental Services 2006). In the *Willamette River Inventory*, the lower Willamette River was divided into segments and reaches. The North Segment, Confluence Reach–Columbia River to Multnomah Channel (WRM 0-3) encompasses the dredging area and is described below.

2.5.1. North Segment, Confluence Reach (WRM 0-3)

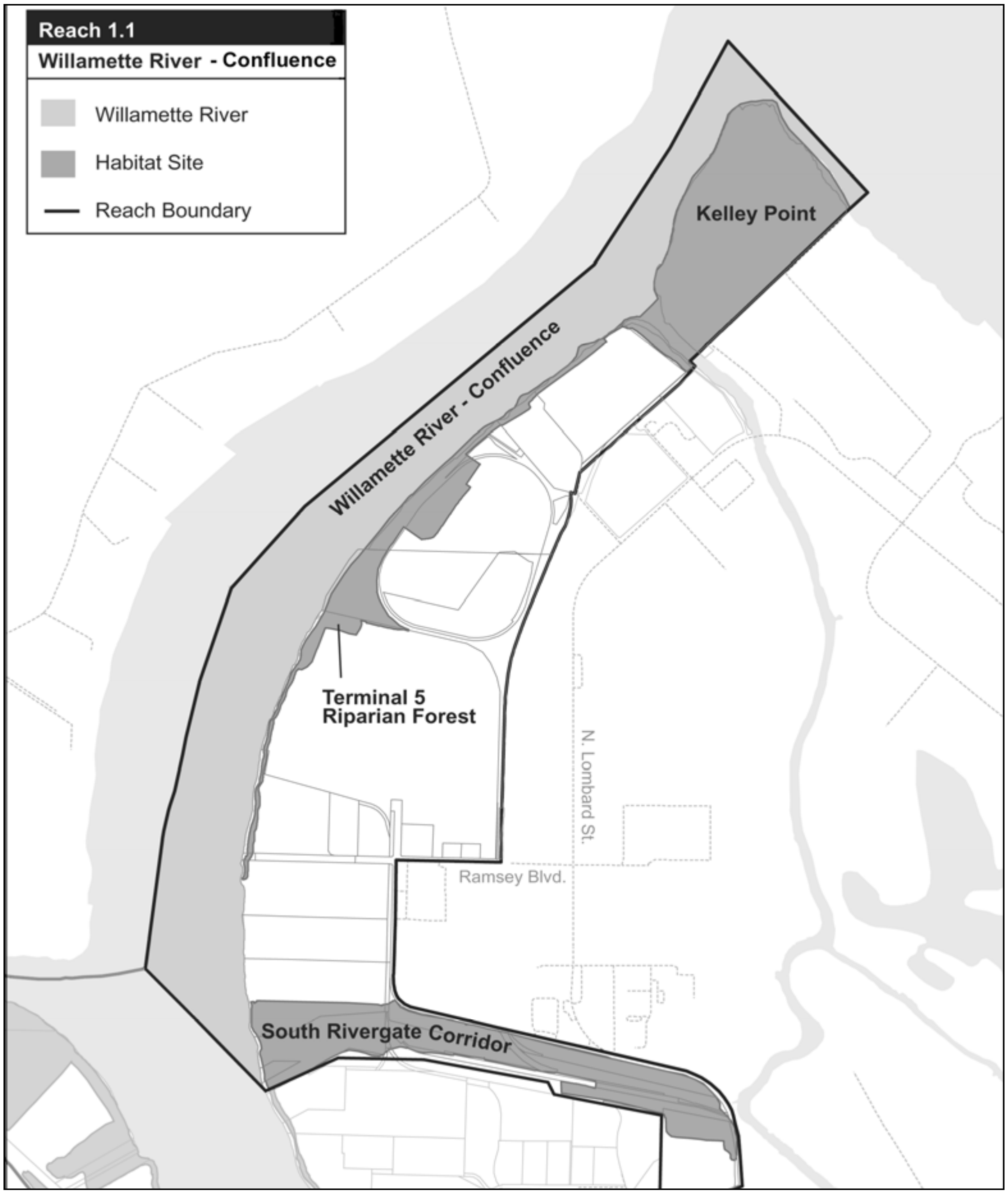
The Confluence Reach (Figure 5) was once an active floodplain region for both the Willamette and Columbia rivers, with a migrating channel and multiple islands and mid-channel bars. This reach links Willamette Valley wildlife habitats with the forests and emergent wetlands of Ridgefield Wildlife Refuge and Vancouver Lake lowlands to the north, and the lower Columbia River and its estuary to the west. Remnant bottomland hardwood forests offer wintering and breeding habitat for waterfowl, shorebirds, and neotropical migrants along the Pacific flyway.

This reach includes the LWR channel from its confluence with the Columbia River to WRM 3 near the Multnomah Channel. Minimal vegetation and wood exists along the margins of the river; that which occurs is primarily in the northern portion associated with the City of Portland’s Kelley Point

Park. The adjacent upland area is characterized by deciduous forest and scrub-shrub vegetation interspersed by open areas adjacent to industrial facilities. Several structures related to the marine cargo facilities are located on the east bank. Marine cargo activities are common in this reach, with large vessels docking or passing through to upstream berths. Maintenance dredging of the channel has decreased the structural diversity of the channel bed. From the confluence to Oregon Steel Mills (WRM 2), development is generally limited to diking and piers that extend out into the channel leaving the nearshore environment less disturbed and the bank relatively undeveloped.

Most of the shoreline is gently sloping beach with banks composed of sand fill, clay, and revetments. Although the nearshore environment is only slightly altered, most connections to the historic floodplain have been eliminated. The open water habitat provides feeding areas for birds such as ducks, cormorants, gulls, herons, and mammals such as river otter and mink. Kelley Point Park and the Harborton wetland area (at WRM 3, owned by Portland General Electric) increases the importance of this reach as a migration corridor for terrestrial species migrating from wildlife refuges in southern Washington and Sauvie Island. Insectivores such as swallows and bats also forage over the water.

Figure 5. Confluence Reach (WRM 0-3)



Source: *Willamette River Inventory* (Portland Bureau of Planning 2002)

The West Hayden Island upland placement site is located upriver from the confluence of the Willamette and Columbia rivers (at Columbia River mile 105). A portion of the site (approximately 102 acres) has been developed to be used as a dredged material placement site for Columbia River channel material. The dredge material placement area is currently a diked basin composed of sand with little or no vegetation. In the future, the site will continue to be sandy with little to no vegetation. The site has little habitat value.

2.6. Aquatic Habitat and Species

Aquatic habitat in the dredging area is highly degraded. The river has been channelized, off-channel areas filled, tributaries put into pipes, and the river disconnected from its floodplain as the lower Willamette Valley was urbanized. Much of the historical off-channel habitat has been lost due to diking and filling of connected channels and wetlands. Most of the LWR has a soft bottom with little or no aquatic vegetation.

A number of native and non-native fish species are present in the LWR. Farr and Ward (1993) found a total of 39 fish species from 17 families, with 19 introduced species from 7 families. Four species of salmonids found in the lower river are listed as threatened under the ESA. They include steelhead (*Oncorhynchus mykiss*), Chinook salmon (*O. tshawytscha*), coho salmon (*O. kisutch*), and chum salmon (*O. keta*). The LWR channel is primarily used as a migratory corridor by adult and juvenile salmonids, while tributaries are utilized for spawning and rearing. The ESA-listed salmonid species and their use of the project area are discussed in Section 2.7. Other species of social or economic importance in the LWR include white sturgeon (*Acipenser transmontanus*), American shad (*Alosa sapidissima*), and Pacific lamprey (*Lampetra tridentate*).

The ODFW conducted a 4-year study (2000-2004) to assess the biology, behavior, and resources of anadromous and resident fish in the LWR (ODFW 2005). The fish species captured represent a fish community very similar to that identified by Farr and Ward (1993), with 37 fish species from 15 families and 17 introduced species from 7 families. Unidentified salmon and trout composed the greatest proportion of the catch (22.4%), followed by American shad (15.6%), Chinook salmon (14.6%), unidentified suckers (13.1%), three-spine stickleback (*Gasterosteus aculeatus*, 8.2%), and peamouth chub (*Mylocheilus caurinus*, 7.2%). Species rarely encountered included cutthroat trout (*Oncorhynchus clarkii*) and sockeye salmon (*Oncorhynchus nerka*).

Multnomah Channel and Columbia Slough provide important rearing habitat for native and non-native fish species. These areas provide both rearing and refugia habitats for salmonids, particularly for over-wintering juveniles. Multnomah Channel has been identified as an important migratory corridor and off-channel habitat for anadromous species, particularly spring Chinook salmon. Fish assemblages in industrial segments of the LWR are expected to be oriented more toward non-native warmwater fish and opportunistic indigenous fish that do not appear to be adversely affected by development. These species include peamouth chub, sucker, and carp, which were found in abundance adjacent to shorelines by Farr and Ward (1993). Developed shoreline areas provide more habitat opportunities to warmwater species, particularly bass and sunfish. While migratory species such as salmon, shad, and sturgeon migrate through this segment, there is little available habitat to concentrate these fish or provide any specific habitat benefit.

In May and June 2003, the ODFW collected baseline data relating to distribution, density, diversity, and biotic integrity of benthic invertebrates in the LWR (Friesen et al., 2005b). Macroinvertebrates and zooplankton were sampled using a variety of gear types (drift nets, multiple-plate samplers, and ponar dredges). Approximately 38,000 organisms from 44 taxa were identified. Cladocerans (bosminids and daphnia), copepods, and aquatic insects dominated the drift net samples. The multiple-plate samplers were colonized primarily by daphnia and chironomids (95% of all organisms), and oligochaetes and chironomids composed the majority of the taxa (83%) in ponar dredge samples. Beaches tended to have relatively high species diversity and taxa richness, whereas seawalls had comparatively low densities and taxa richness. Rock outcrops and floating structures appeared to be preferred habitats for aquatic insects. The depth of substrate in the LWR FNC in well below the photic zone and consequently is expected to have minimal benthic population.

2.7. Threatened and Endangered Species

2.7.1. U.S. Fish and Wildlife Service Species

The USFWS is responsible for administration of the ESA with respect to Columbian white-tailed deer (*Odocoileus virginianus leucurus*, endangered); northern spotted owl (*Strix occidentalis caurina*, threatened); water howellia (*Howellia aquatilis*, threatened); and Bradshaw's desert parsley (*Lomatium bradshawii*, endangered). On August 9, 2007, the bald eagle (*Haliaeetus leucocephalus*) was removed from protection under the ESA. Even though they are delisted, bald eagles are still protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Columbian White-tailed Deer. The Columbia River DPS for Columbian white-tailed deer was listed as an endangered species on March 11, 1967. No critical habitat rules have been published for the species. Columbian white-tailed deer originally occupied the valleys of the Umpqua, Willamette, and lower Columbia Rivers northward in Oregon and into the Cowlitz River bottoms of Washington. There are now two remnant, isolated populations – one in the Roseburg/Umpqua drainage area, and one along the lower Columbia River (Marshall 1996). The Columbia River population is about 600 individuals and occupies land in and near the lower Columbia River from river miles 32-50. Columbian white-tailed deer populations occupy the following areas in Oregon: Tenasillahe Island (part of Julia Butler Hansen National Wildlife Refuge); Karlson Island (part of the Lewis and Clark National Wildlife Refuge) in Clatsop County; the vicinity of Westport, Clatsop, and Columbia counties; Wallace Island (part of Julia Butler Hansen National Wildlife Refuge); and adjoining small islands in Columbia County. On the Columbia River, Columbian white-tailed deer have been transplanted to Crims Island at river mile 57, Hump and Fisher islands at river mile 60, and Lord and Walker islands at river mile 63 to re-establish historic populations. The habitats used include riparian and floodplain areas on both sides of the river and islands within the river. The closest Columbian white-tailed deer population to the project area (confluence of the Columbia and Willamette rivers) is about 37 miles downstream on Lord and Walker islands. Therefore, the project area is considered to be outside the current range of this species.

Northern Spotted Owl. The northern spotted owl was listed as a threatened species throughout its entire range in June 1990 [55 *Federal Register* (FR) 26114]. Critical habitat was first designated in 1992; however, the USFWS revised the designation and issued a final revised designation of critical habitat in August 2008 (73 FR 47326). The northern spotted owl ranges from southern British Columbia south to Marin County, California and east to the shrub steppe of the Great Basin in Oregon and California. Most spotted owl observations have been made in forests with a component of old-growth and mature trees consisting of western hemlock (*Tsuga heterophylla*), Douglas fir (*Pseudotsuga menziesii*), and western redcedar (*Thuja plicata*). However, the spotted owl has been observed to use a wide variety of habitat types and forest stands, including managed stands for nesting, feeding or roosting. The most important habitat characteristic is an uneven-aged, multilayered canopy that offers moderate to high (65% to 80%) cover. Numerous large trees with broken tops, deformed limbs, and cavities are typically used as nest sites. Suitable habitat for spotted owls is not found in the project area.

Water Howellia. Water howellia was federally listed as threatened without critical habitat in 1994. This aquatic plant is found in still water and shaded areas in the floodplains of the Columbia River, ash woods and vernal pools where there is a high degree of water clarity. There are no known extant occurrences of howellia in Oregon. A population of this plant occurs about 15 miles north of Portland at the Ridgefield National Wildlife Refuge in Washington.

Bradshaw's Desert Parsley. Bradshaw's desert parsley was federally listed as endangered without critical habitat in 1988. This plant is found on seasonally saturated or flooded prairies, adjacent to creeks and small rivers in the southern Willamette Valley, primarily in and adjacent to the Eugene, Oregon area. There are no known occurrences in the Portland area.

Bald Eagle (Delisted). Bald eagles occur in the LWR FNC project area. Both juvenile and adult bald eagles are present along the LWR throughout the year. During winter, bald eagles on Sauvie Island can be seen foraging for fish and waterfowl or perched in cottonwood trees along the shore. There are two other known bald eagle communal winter night roosts in the Portland area: one is located in the vicinity of Vancouver Lake, Clark County, Washington and the other is located approximately 0.25 miles south of Salmon Creek in North Vancouver. Bald eagles build nests near the tops of tall trees in January and February. Bald eagles lay one to four eggs in late March or early April and both adults incubate the eggs for about 35 days until hatching. During the nest-building, egg laying, and the incubating periods, bald eagles are sensitive to disturbance and will abandon nesting if there is excessive disturbance during this time. The closest bald eagle nest site to the project area is found at Smith Lake (about 2 miles away; Isaacs and Anthony 2008).

The Columbia and Willamette Rivers both provide a potential source of food for eagles and likely travel corridors for both wintering and migrating birds. Habitat along the rivers includes scattered large trees that could serve as perching, roosting, or nesting habitat for bald eagles. In addition to Ross Island, it is likely that the birds make use of the riparian forest in the Confluence Reach and near Sauvie Island nest sites (Portland Bureau of Planning 2002).

2.7.2. National Marine Fisheries Service Species

The NMFS is responsible for ESA administration with respect to anadromous salmonids, southern distinct population segment (DPS) of green sturgeon (*Acipenser medirostris*, threatened), and Steller sea lion (*Eumetopias jubatus*, threatened). Steller sea lions and southern DPS green sturgeon may be found at the confluence of the LWR with the Columbia River. Thirteen salmon and steelhead Evolutionarily Significant Units (ESUs) may be found at the confluence (Table 4). Six of these ESUs may be found in the LWR: Lower Columbia River (LCR) and Upper Willamette River (UWR) Chinook salmon, LCR and UWR steelhead trout, Columbia River chum salmon, and LCR coho salmon. These six ESUs use the lower Willamette for adult migration and for juvenile rearing and migration. The Columbia River is used by the other ESUs primarily as a rearing/migration corridor between upstream spawning areas and the Pacific Ocean.

The salmonid ESUs shown in Table 4 have the potential to be present in the action area as juveniles, adults or both. The listed ESUs fall into two juvenile life-history strategies: "ocean-type" that rear in freshwater for only a few weeks to a few months before migrating to the estuary/ocean during their first year of life, and "stream-type" that spend at least a year rearing in freshwater prior to their downstream migration to the ocean. Designated critical habitat is shown in Table 5.

Table 4. Federally Listed Anadromous Salmonid Species

Species/ESU	Status	Life History Type	Federal Register (FR) Citation
Chinook Salmon (*Oncorhynchus tshawytscha*)			
Snake River (spring/summer-run)	Threatened	Stream	70 FR 37160; June 28, 2005
Snake River (fall-run)	Threatened	Ocean	70 FR 37160; June 28, 2005
Lower Columbia River	Threatened	Ocean/Stream	70 FR 37160; June 28, 2005
Upper Columbia River spring-run	Endangered	Stream	70 FR 37160; June 28, 2005
Upper Willamette River (spring-run)	Threatened	Ocean	70 FR 37160; June 28, 2005
Chum Salmon (*Oncorhynchus keta*)			
Columbia River	Threatened	Ocean	70 FR 37160; June 28, 2005
Sockeye Salmon (*Oncorhynchus nerka*)			
Snake River	Endangered	Stream	70 FR 37160; June 28, 2005
Steelhead Trout (*Oncorhynchus mykiss*)			
Snake River Basin	Threatened	Stream	71 FR 834; January 1, 2006
Lower Columbia River	Threatened	Stream	71 FR 834; January 1, 2006
Middle Columbia River	Threatened	Stream	71 FR 834; January 1, 2006
Upper Columbia River	Endangered	Stream	Reinstated to endangered per U.S. District Court decision, June 2007
Upper Willamette River	Threatened	Stream	71 FR 834; January 1, 2006
Coho Salmon *(Oncorhynchus kisutch)*			
Lower Columbia River	Threatened	Stream	70 FR 37160; June 28, 2005

Table 5. Critical Habitat Designations and Descriptions for Salmonid Species

Species	Date of Critical Habitat Designation	General Description of Critical Habitat
Chinook Snake River spring/summer	10/25/99 (64 FR 57399)	Columbia River to confluence with Snake River, Snake River and tributaries.
Chinook Snake River fall	12/28/93 (58 FR 68543)	Columbia River to confluence with Snake River, Snake River and tributaries.
Chinook Lower Columbia River	9/2/05 (70 FR 52630)	Columbia River to confluence with Hood River and tributaries.
Chinook Upper Columbia River	9/2/05 (70 FR 52630)	Columbia River to Rock Island Dam and tributaries.
Chinook Upper Willamette River	9/2/05 (70 FR 52630)	Columbia River to confluence of Clackamas and Willamette Rivers.
Chum Columbia River	9/2/05 (70 FR 52630)	Columbia River to confluence with Hood River and tributaries.
Sockeye Snake River	12/28/93 (58 FR 68543)	Columbia River to confluence with Snake River, Snake River and tributaries
Steelhead Snake River Basin	9/2/05 (70 FR 52630) effective 2/2/06	Columbia River to confluence with Snake River, Snake River and tributaries.
Steelhead Lower Columbia River	9/2/05 (70 FR 52630)	Columbia River to confluence with Hood River and tributaries.
Steelhead Middle Columbia River	9/2/05 (70 FR 52630)	Columbia River to confluence with Yakima River and tributaries.
Steelhead Upper Columbia River	9/2/05 (70 FR 52630)	Columbia River to Chief Joseph Dam and tributaries.
Steelhead Upper Willamette River	9/2/05 (70 FR 52630)	Columbia River to confluence of Clackamas and Willamette Rivers.

Note: Critical habitat for lower Columbia River coho salmon has not yet been designated.

Salmonid ESUs in the Lower Willamette River

Lower Columbia River Chinook Salmon. The range of this species includes all naturally-spawned populations of Chinook salmon from the Columbia River and its tributaries from its mouth at the Pacific Ocean upstream to a transitional point between Washington and Oregon, east of the Hood River and the White Salmon River, and includes the Willamette River to Willamette Falls exclusive of spring-run Chinook salmon in the Clackamas River. Historical records of Chinook salmon abundance are sparse but cannery records suggest a peak run of 4.6 million fish in 1883 (NMFS 2007). Although fall-run Chinook salmon are still present throughout much of their historical range, they are still subject to large-scale hatchery production, relatively high harvest, and extensive habitat degradation. Abundances largely declined during 1998-2000 and trend indicators for most populations are negative. However, 2001 and 2002 abundance estimates increased for most LCR Chinook salmon populations over the previous few years (NMFS 2007). In 2003, 2,873 fall-run Chinook salmon spawned in the Columbia River channel from river miles 113-143 (NMFS 2007).

The dominant life history type for this species is the fall-run, which consists of an early component that returns to the Columbia River in mid-August and spawns within a few weeks (Kostow 1995). Spring-run Chinook salmon enter freshwater in March and April and spawn in late summer. Adults from this species pass through the action area from February through November, with peak passage occurring from mid-March through May, and from October through early November (ODFW 2005). The majority of juveniles in this species leave as subyearlings, with downstream movement observed as early as December, with most moving during summer and fall months.

Upper Willamette River Chinook Salmon. The UWR spring-run Chinook salmon includes native spring-run populations above Willamette Falls and in the Clackamas River, although there are no direct estimates of the abundance of natural-origin spawners. In the past, it included sizable numbers of spawning salmon in the Santiam River, the Middle Fork of the Willamette River, and the McKenzie River, as well as smaller numbers in the Molalla River, Calapooia River, and Albiqua Creek. The total abundance of adult spring-run Chinook salmon (hatchery origin + natural-origin fish) passing Willamette Falls has remained relatively steady over the past 50 years (ranging from approximately 20,000 to 70,000 fish), but it is an order of magnitude below the peak abundance levels observed in the 1920s (approximately 300,000 adults; NMFS 2007).

Chinook salmon generally spawn and rear in mainstem reaches of large river systems such as the Willamette River and the Clackamas River. Juvenile Chinook that have emerged from spawning sites in the upper Willamette River watershed use the lower mainstem Willamette River and Columbia Slough through Portland for temporary rearing as they migrate to the ocean. Adults from this ESU migrate through the project area beginning in March and complete their migration by the end of July, with the peak between late April and early June. Chinook smolts would typically pass through the project area from January through June, and from August through December. Juveniles would be expected in the lower Willamette River anytime from March through mid-December.

Columbia River Chum Salmon. Chum salmon in the Columbia River once numbered in the hundreds of thousands of adults and were reported in almost every river in the Lower Columbia River basin, but by the 1950s most runs disappeared (NMFS 2007). The total number of chum salmon returning to the Columbia River in the last 50 years has averaged a few thousand per year, returning to a very restricted subset of the historical range. Significant spawning occurs in only 2 of the 16 historical populations, meaning that 88% of the historical populations are extirpated, or nearly so. The two remaining populations are the Grays River and the Lower Gorge (NMFS 2007).

Chum salmon spawn in the main channel of the Columbia River from river miles 113-114, near river mile 123, from river miles 136-139, and near Ives Island at river mile 143. Adults from this ESU may be found near the mouth of the Willamette River during their upstream migration from late September through December. Chum salmon do not spawn in the Willamette River or its tributaries and would not be expected to migrate up the Willamette River. Juvenile chum salmon emigrate to the ocean environment as fry in March and April and do not rear for extended periods of time in freshwater. Juvenile chum salmon fry should pass the mouth of the Willamette River during their downstream migration between March and late April. Chum salmon fry may potentially move into the LWR during incoming tides and could potentially feed on organisms within the project area for short periods during their downstream migration.

<u>Lower Columbia River Coho Salmon</u>. There are only two extant populations with appreciable levels of natural production: the Clackamas River and Sandy River. Although adult returns in 2000 and 2001 for the Clackamas and Sandy River populations increased moderately, the recent 5-year average of natural-origin spawners for both populations represent less than 1,500 adults per year (NMFS 2007). Recruitment in the Sandy River population failed in 5 of the last 10 years and has responded poorly to reductions in harvest. The extreme loss of naturally spawning populations, the low abundance of current populations, diminished diversity, and fragmentation and isolation of the remaining naturally-produced fish combine to create considerable risks for this species. The lack of naturally-produced spawners is contrasted by the very large number of hatchery-produced adults. The abundance of hatchery coho returning to the lower Columbia River in 2001 and 2002 exceeded one million and 600,000, respectively (NMFS 2007). Adult LCR coho salmon generally migrate through the LWR channel from September to March. Juveniles spend about 1 year in fresh water, with migration to the ocean beginning in April and declining through June.

<u>Lower Columbia River Steelhead</u>. This species includes all naturally spawning populations of steelhead in streams and tributaries of the Columbia River between and including the Cowlitz and Wind rivers in Washington, along with and including the Willamette and Hood rivers in Oregon. Excluded are steelhead in the Willamette Basin above Willamette Falls and steelhead from the Little and Big White Salmon rivers in Washington (NMFS 2007). All runs declined from 1980 to 2000, with sharp declines beginning in 1995. Historical counts in some of the larger tributaries (Cowlitz, Kalama, and Sandy rivers) probably exceeded 20,000 fish, while in the 1990s fish abundance dropped to 1,000 to 2,000 (NMFS 2007). From 1997 to 2002 the average has not been greater than 750 spawners per population. In the LWR, out-migration of juveniles starts in April, peaks in May, and is complete by mid-July. Most smolts move downriver through the LWR in less than 1 day and are predominantly 2+ years of age (Corps April 2004). Migration rates for yearlings from this ESU are expected to be similar to migration rates for UWR steelhead (see below).

<u>Upper Willamette River Steelhead</u>. This ESU includes all naturally spawning populations of winter-run steelhead in the Willamette River and its tributaries upstream from Willamette Falls to and including the Calapooia River (NMFS 2007). Over the past several decades, total abundance of natural, late-migrating winter steelhead ascending the Willamette Falls fish ladder has fluctuated several times with a range of about 5,000 to 20,000 spawners. The last peak occurred in 1988 and was followed by a steep and continuing decline. Abundance in each year from 1993 to 1998 was below 4,300 fish, and the run in 1995 was the lowest in 30 years. In 2001 and 2002, adult returns have significantly increased (exceeding 10,000 total fish). However, the recent 5-year average abundance remains low for the entire species (5,819 adults) and individual populations remain at low abundance. Adults from this ESU could be expected in the LWR from January through mid-May. Steelhead smolts from this ESU would be expected to be present in the lower Willamette River from March through mid-July, with peak migration occurring in May (Corps April 2004).

The NMFS (2007) summarized salmonid use of the LWR as follows.

> Steelhead, Chinook salmon, and coho salmon adults migrate through the lower Willamette River on their way to and from spawning grounds in tributaries of the Willamette River. Steelhead are not known to spawn in the mainstem of the Willamette River in the vicinity of the City of Portland (City). Chinook salmon may spawn not far upstream from the City boundary, perhaps in the lower end of the Clackamas River or in the Willamette River just below Willamette Falls where suitable gravel-type substrate for spawning may occur. Coho salmon go up the Clackamas River to spawn. Recent observations of coho salmon juveniles in Miller Creek (tributary at river mile 3 on the Willamette River) by City biologists suggest that coho spawning may occur in that small tributary.
>
> Adult Chinook and steelhead have been documented holding up in the lower mainstem Willamette River for a period of time before moving upriver. Adults migrate upstream to spawn during early spring (spring Chinook), early fall (coho), late fall through winter (steelhead), and spawn in early to mid-fall (Chinook and coho) and spring (steelhead). Adult steelhead have been documented entering the mouth of the Clackamas River with a darkened coloration, indicating that they have been in freshwater for some time.
>
> Fry emerge from the gravel in late spring/early summer, rear in the stream for one to three years, and outmigrate during spring and fall freshets. These juvenile steelhead, Chinook salmon and coho salmon migrate to the Pacific Ocean via the Willamette River.
>
> Of the more than 5,000 juvenile salmonids collected by Friesen and others (2005a) in the lower Willamette River during 2000 to 2003, over 87% were Chinook salmon, 9% were coho salmon, and 3% were steelhead. The authors concluded that the Chinook salmon juveniles were largely spring-run stocks that rear in fresh water for a year or more before migrating to the ocean. Chinook salmon juveniles caught exhibited a bimodal distribution in length indicating the presence of both subyearlings and yearlings. Although at lower abundance, coho salmon juveniles also exhibited this bimodal distribution of yearlings and subyearlings.
>
> As in the Columbia River, yearling and older juvenile salmonids in the Willamette River tend to be found in mid-channel areas whereas subyearling fish tend to be most abundant at nearshore sites (Dawley et al., 1986; Dauble et al., 1989; Friesen et al., 2005a). Off-channel habitats such as alcoves, lagoons, backwater areas, and secondary channels are more important areas for juvenile refuge and rearing (Friesen et al., 2005a; Vile et al., 2005). Vile and others (2005) found significantly higher stomach fullness indices for juvenile Chinook salmon captured in off-channel sites in the lower Willamette River than at sites in the main river channels. Friesen and others (2005a) also reported a slowing in out-migration rates as juvenile salmonids move through the lower Willamette River, suggesting this area may play a role in rearing as fish prepare for the transition to salt water. The growth that these researchers observed in the area lead them to conclude that the lower Willamette River is valuable as rearing habitat, and is more than a simple migration corridor.

Southern DPS Green Sturgeon. Green sturgeon are anadromous and range from Alaska to Mexico primarily in marine waters. They feed in estuaries and bays from San Francisco to British Columbia and spawn in freshwater in the mainstem of large rivers. Spawning currently only occurs in a few rivers in spring – the Sacramento and Klamath rivers in California and the Rogue River in Oregon. The southern DPS green sturgeon was listed as threatened on April 7, 2006. This DPS consists of coastal and Central Valley populations south of the Eel River with the only known spawning population in the Sacramento River. Critical habitat was proposed on September 8, 2008 (73 FR

52084). Proposed critical habitat in the action area includes, "All tidally influenced areas of the Columbia and Willamette Rivers downstream of Bonneville Dam and Willamette Falls and up to the elevation of mean higher high water, including tributaries upstream to the head of tide."

Adults are the only life stage known to occupy the lower Columbia River and are most likely feeding. Green sturgeon are benthic feeders and are not known to rely on salmonids as prey. They are demersal and occur from inshore water to deeper holes but commonly move to intertidal areas to feed at high tide. Green sturgeon enter the Columbia River at the end of spring with their numbers increasing through June (B. James, WDFW, personal communication, 2007). The greatest numbers are caught in the Columbia River estuary in July through September. The majority of green sturgeon are caught in the lower reaches of the Columbia River (29,132 from river mile 1-20 and 8,086 from river mile 20-52) based upon harvest data from 1981-2004 (B. James, WDFW, e-mail communication 2007). A few green sturgeon may be found as far upriver as Bonneville Dam, but there are no known spawning populations in the Columbia River and its tributaries. Altman and others (1997) do not list green sturgeon as occurring in the Willamette River. During fish sampling in 2000-2002 in the LWR, no green sturgeon were collected (ODFW 2003).

Steller Sea Lion. There are two stocks of Steller sea lions in the North Pacific. The stock found off California, Oregon, Washington, British Columbia, and Southeast Alaska – referred to as the Eastern stock – was listed as threatened on December 4, 1990. Critical habitat was designated on August 27, 1993. Steller sea lions are present year-round in the Columbia River, but seldom move upriver past the mouth of the Cowlitz River at Longview (Columbia river mile 70; ODFW website at http://www.dfw.state.or.us/fish/SeaLion/faqs.asp). During the spring migration of smelt, lamprey, salmon, and steelhead, it is common for California sea lions to follow these prey species into freshwater upstream to Bonneville Dam (Columbia River mile 145). The majority of Pinnipeds observed at the Bonneville tailrace have been identified as California sea lions; Steller sea lions have been observed in small numbers at the tailrace in recent years. The majority of sea lion observations occur from February through May, although occasional sightings occur as early as January and as late as June. Peak season for sea lion presence at Bonneville tailrace is about mid-March to mid-May. No Steller sea lions are expected to occur in the LWR but could occur at the confluence of the LWR and Columbia River at these times. No designated critical habitat is located in the project area.

2.8. Cultural and Historic Resources

The cultural resources of the LWR area are poorly identified. Very few surveys have been conducted in the lower reaches of the Willamette River and development in the project area since the 1850s has significantly altered the landscape. According to Ellis and others (2005), only about 200 acres of upland areas along the 26-mile reach of the LWR have been surveyed. In addition, only about 20 archaeological sites have been identified. Many of these sites were reported by amateur collectors, although professional archaeologist have also documented and reported some of these sites. It is difficult to determine other site locations (predict their locations) from this information because it was not collected systematically and much of the LWR has been altered by industrial and municipal development.

Supportive information from historic accounts such as from Lewis and Clark in 1805-1806, the records of fur trade companies in 1812 through 1850, and from other historic documents have recorded tribal presence as people engaged in subsistence activities, used campsites, and occupied a few village sites along the shorelines. These early documents also record the initial EuroAmerican settlement along the river. Later records discuss the more substantial developments of the recent period, including the expansion of Portland as a major port on the northwest coast and industrial development, resulted in the modified landscape currently seen along the LWR and its channel.

The LWR FNC was started in the late 1890s following construction of the north and south jetties at the mouth of the Columbia River (Willingham 1992). Prior to the construction of the jetties, navigation improvements on the Columbia River included comparatively minor channel work in the natural channel of the river removing accreted sediments in small areas of the channel, eliminating snags and other natural obstructions, and regulating constructions (docks, salmon fish traps) in the river, which had the potential to interfere with navigation (Willingham 1992:54-55). Following construction of the jetties, the Corps initiated deepening of the Columbia River ship channel to 25 feet (River and Harbor Act of 1902) from the mouth of the Columbia River to Portland (Willingham 1992:71). Ship channel depths have increased over time in response to the size of vessels entering the Columbia River. The current authorized depth of the Willamette River channel (River and Harbors Act of 1962) is 40-feet deep and 600 to 1,000-feet wide depending on location from the mouth of the Willamette River to the Broadway Bridge in Portland (Willingham 1992:137-138). The 1962 Act also authorized turning basins to facilitate moving of ships into terminals.

The expansion of the channel followed other efforts to improve and sustain navigation on the Willamette River. One of the most significant changes was the shifting of the main Willamette River channel to the west of Swan Island by blocking off the natural deep channel which followed the east bank of the Willamette River leaving the shallow river channel on the west open for navigation. The Port of Portland closed the natural channel at Swan Island in 1899 (Willingham 1992:129-130). The shallower west channel required frequent maintenance, which the Corps has dredged since 1871.

Certain areas on the LWR have been dredged and surveyed for river depths since the establishment of the Port of Portland. In support of the Port, the Corps dredged accumulated sediments at Post Office Bar between 1873 and 1876. Since the first dredging cycle, Post Office Bar has been routinely dredged to maintain the ship channel. Between December 1951 and June 1989, Post Office Bar was dredged 15 times, with over 8,525,703 cubic yards of sediments removed from this location (Parsons Brinckerhoff 2007: Table 1).

2.9. Socio-economic Resources

2.9.1. Population

The Portland-Vancouver-Beaverton OR-WA Metropolitan Statistical Area (Portland MSA) includes Clackamas, Columbia, Multnomah, Washington, Yamhill counties in Oregon, and Clark and Skamania counties in Washington. The population of the Portland MSA increased by 231,839 people (12%) from 2000 (1,927,881 people) to 2007 (estimate 2,159,720 people; Portland State University 2008). Tables 6 and 7 show the population trends for the counties and major cities in and near the project area.

Table 6. Population Trends by County near the Project Area

County	2000 Census	2007 Estimate	% Change 2000-2007
Multnomah County OR	660,486	710,025	7.5
Washington County OR	445,342	511,075	14.8
Clackamas County OR	338,391	372,270	10.0
Columbia County OR	43,560	47,565	9.2

Source: Portland State University 2008; U.S. Census Bureau

Table 7. Population Trends for Major Cities near the Project Area

City	2000 Census	2007 Estimate	% Change 2000-2007
Portland OR	529,121	568,380	7.4
Gresham OR	90,205	99,225	9.9
Beaverton OR	76,129	85,560	12.4
Hillsboro OR	70,186	88,300	25.8

Source: Portland State University 2008; U.S. Census Bureau

Portland Bureau of Planning's report, *Portland Oregon Present* (2004) documented trends and the state of the city as related to economic, environmental, cultural, and urban issues. The report documents demographic trends including the increase of Hispanic populations, the shift from family to non-family households within the city, the decline in the number of households with children, the overall decline in median household size, and the shift in the median age of residents. Since the 1970s, married family households have declined in both absolute numbers and as a percentage of population. During the 1990s, Portland also experienced a significant change in population composition. Whites have declined slightly as a percentage of the population, and there was a large rate of increase in Hispanic and Asian households. According to the Multnomah County Health Department, from 1990 to 2000 the number of births by Multnomah County resident Hispanics increased 242% (from 404 to 1,380), while the percentage of non-Hispanic Whites decreased 16% (from 7,595 to 6,375).

Many of Portland's inner city neighborhoods are declining in population. However, this decline is not a result of a decline in the number of housing units but is due to a long-standing decline in average household size. Thus, while household size is decreasing, the number of households is increasing (Portland Bureau of Planning 2004). Some inner city neighborhoods experienced a decline in the percentage of families with school-aged children, but also experienced a decline in the overall median age of residents during the last 10 years. This supports several findings that these neighborhoods have become attractive to young adults, single or married, who have delayed child rearing or have chosen not to have children (Portland Bureau of Planning 2004).

2.9.2. Employment and Income

In 2004, the Portland metropolitan region had the 23rd largest economy in the United States–$88.6 billion (Portland Bureau of Planning 2004). In the 1990s, economic growth in the region exceeded the national average in most employment sectors. Since 1970, the region experienced strong growth in employment within all sectors of the economy. In the 1990s, manufacturing declined in the nation, but the Portland region experienced more than a 25% gain in employment in the manufacturing sector. While manufacturing accounted for a significant portion of the region's growth and has provided high-wage jobs, it has also resulted in a more volatile regional economy.

Tables 8 and 9 provide recent statistics on total income reported and per capita income by county in the region, respectively (Portland Development Commission 2006). Total reported personal income in Multnomah County increased by 13.4% over the period from 2000 to 2004. The largest increase in total reported personal income over the period from 2000 to 2004 was in Clark County (18.4%) and the lowest increase was in Clackamas County (8.4%). The largest gain in per capita income for the period from 2001-2004 was in Multnomah County (11.7%), while the lowest gains were in Washington and Clackamas counties, which only witnessed growth of about 1% over the period.

Table 8. Total Personal Income by County

County	2000 (thousands)	2004 (thousands)	Change 2000-2004
Multnomah County OR	$21,384,426	$24,247,657	13.4%
Washington County OR	$14,880,607	$16,258,262	9.3%
Clackamas County OR	$12,416,346	$13,453,156	8.4%
Columbia County OR	$1,168,108	$1,303,937	11.6%
Clark County WA	$10,040,451	$11,884,195	18.4%

Source: Portland Development Commission 2006.

Table 9. Per Capita Income by County

County	2001	2002	2003	2004	Change 2001-2004
Multnomah County OR	$32,329	$33,792	$34,203	$36,117	11.7%
Washington County OR	$33,178	$32,096	$31,828	$33,347	0.5%
Clackamas County OR	$36,556	$35,618	$35,553	$37,094	1.5%
Columbia County OR	$26,750	$27,191	$26,787	$27,745	3.7%
Clark County WA	$28,890	$29,541	$29,050	$30,289	4.8%

Source: Portland Development Commission 2006.

As a result of the region's economic expansion in the 1990s, the average personal income in Portland (Multnomah County) exceeded the national average. Despite this strong growth, the total number of people living in poverty increased in many Portland neighborhoods, particularly in east Multnomah County as well as in inner ring suburbs west and east of the city. Overall, however, the percentage of total city population living in households below the poverty line declined slightly from 14% in 1990 to 13% in 2000. Of more concern are the findings that a larger share of persons in poverty is made up of children under the age of 18. Portland city staff and members of the community identified a perceived shift in poverty from the north and northeast areas to farther east and southeast. The data do not support a physical shift in poverty; rather poverty is becoming more dispersed throughout the city and the metropolitan area (Portland Bureau of Planning 2004).

2.9.3. Marine Economic Activity

The LWR FNC is critical to the success of the Portland Harbor and regional economy. Portland Harbor is Oregon's primary seaport and the region's largest heavy industrial area. Marine economic activity on Portland's lower Willamette River takes place at a mixture of public marine terminals owned by the Port of Portland and private marine terminals. The Port of Portland's public marine terminals include Terminal 2 that handles breakbulk cargo and steel; Terminal 4 that handles bulk products, breakbulk cargo, and automobiles; and Terminal 5 that handles grain and mineral bulks. Private marine terminals handle grain, petroleum products, and dry bulk cargo such as cement, alumina, sand and gravel, and limestone. In 2006, these public and private marine terminals handled nearly 26 million tons of cargo for shippers located within the metropolitan region and Oregon, as well as throughout the Pacific Northwest and United States. Summarized below are the combined regional economic benefits generated by cargo and vessel activity at marine terminals on the LWR (all data provided by the Port of Portland, 2007).

In 2006, 14,414 jobs in the Portland metropolitan region and the states of Oregon and Washington were supported by marine cargo activity on the lower Willamette River. Of these jobs:

- 4,899 were direct jobs, or those that were directly generated by activities at the Port and private marine terminals. If such activities should cease, these jobs would be discontinued over the short term. These jobs are directly dependent upon the vessel and cargo activity on the lower Willamette River. They include jobs with the International Longshore and Warehouse Union, terminal operators, stevedores, trucking firms, railroads, steamship agents, freight forwarders and customhouse brokers, warehousemen, federal agencies, towing companies, pilot organizations, and marine construction companies.
- 6,383 were induced jobs, or those jobs supporting the local purchases made by the 4,899 individuals holding the direct jobs due to marine terminal activity. Should the direct jobs be lost from the economy, the induced jobs would be reduced. These jobs are with local grocery stores, retail outlets, restaurants, transportation services, local government services, schools, hospitals, and many other similar services.
- The firms dependent upon the marine activity on the LWR made $295.2 million of local purchases for office supplies, equipment, utilities, communications, maintenance and repair services, transportation services, professional services, and goods and services. These purchases supported 3,132 indirect jobs in the Portland metropolitan economy.

Businesses providing maritime services on the LWR received $857.4 million of direct business revenue. This figure does not include the value of the cargo moving over the marine terminals since the value of the cargo is determined by the demand for the cargo, not the use of the marine terminals.

According to the Port of Portland, marine activity on the LWR in 2006 created $1.0 billion of direct, induced, and indirect personal wage and salary income and local consumption expenditures for Portland metropolitan residents. The consumption expenditures are a part of the direct multiplier effect, and measure the local consumption expenditures by those directly employed. The consumption expenditures support the induced jobs. The 4,899 direct job holders received $236.3 million of direct wage and salary income for an average salary of $48,249. Also, a total of $111.2 million of state and local tax revenue was generated in 2006 by maritime activity.

2.9.4. Recreation

The LWR provides opportunity for outdoor recreation and is used for boating, swimming, fishing, and other water-based recreation. The waterfront parks and boat ramps that provide public access to the LWR near the project area are shown in Table 10.

Table 10. Recreational Parks and Boat Ramps along the Lower Willamette River

Park Facility and River Mile	Owner	Public dock	Restrooms	Boat ramp	Picnicking	Hiking	Bicycling	Water
Kelley Point Park - WRM 0-1	City of Portland		●	●	●	●	●	●
Cathedral Park - WRM 5.5	City of Portland	●	●	●	●		●	●
Swan Island Boat Ramp - WRM 9.5	Port of Portland		●	●				
McCarthy Park - WRM 9.6	Port of Portland						●	

Source: Portland Parks and Recreation website (http://www.portlandonline.com/parks/).

Kelley Point Park is the largest waterfront park (104 acres) and is located at the confluence of the Columbia and Willamette rivers. Kelley Point Park was originally created by the Port of Portland using material dredged from the Columbia River. It is the only recreational facility located in the project area. Cathedral Park is 23 acres in size and is located under the St. Johns Bridge. McCarthy Park is a small, relatively unknown park on Swan Island that is mostly used by local workers during lunch hours and after work. The park is the only place where people can access the river between the Steel Bridge and the St. Johns Bridge.

3. ALTERNATIVES

3.1. No Action Alternative

For the No Action Alternative, no dredging of the LWR FNC at Post Office Bar would occur in 2010 to maintain the authorized channel depth for ships transiting the channel for the deep-draft transport of goods to and from Portland Harbor. Any maintenance dredging needed in the FNC would be postponed until the EPA finishes the Portland Harbor Superfund investigation RI/FS, selects a remedy, and issues the Record of Decision, which is not expected before 2012.

Not providing channel maintenance at Post Office Bar would continue to impact the navigation industry, and impacts are expected to worsen over time. The Columbia River Pilots have requested that the Corps dredge the shoal at Post Office Bar. A significant amount of shoaling has taken place since the channel was last dredged in 1989. The lack of maintenance dredging at Post Office Bar would present a hazard to navigation and would impact access to Willamette River terminals and berths. This impact could eventually cause an adverse effect on the local economy by slowing or eventually halting shipping activity on the LWR, which in 2006 created $1.0 billion of direct, induced, and indirect personal wage and salary income and local consumption expenditures for Portland metropolitan residents.

3.2. Maintenance Dredging Alternative (Proposed Action)

Dredging of the LWR FNC will occur at Post Office Bar, a large depositional area on the east side of the channel from WRM 2.1-2.4. This shoal poses a problem for outbound vessels because it occurs on an inside bend in the river. Corps' hydrosurveys conducted in September 2008 were used to determine the quantity of material to be dredged to a total depth of 42 feet (channel depth of 40 feet plus 2 feet advance maintenance) at Post Office Bar. Based on this survey, an estimated 75,000 cubic yards of material will need to be dredged from Post Office Bar.

3.2.1. Dredging Operations

Dredging operations will be conducted to minimize turbidity and reduce sediment drift through the use of a clamshell dredge with a close-lipped (environmental) bucket. All material dredged from the LWR FNC will be placed in watertight transport barges and moved upriver for final placement at the West Hayden Island upland placement site (see Figure 3). No water discharge will occur from the transport barge.

The proposed action will occur during the July 1 to October 31 in-water work period for the lower Willamette River to minimize impacts to ESA-listed fish species. Most likely, the current proposed dredging will take place in October 2010. It is estimated that the duration of the dredging would be 15-30 days, once it commences. The dredge will work up to 7 days per week/24 hours per day.

Sediment quality evaluations have been performed on the material to be removed from Post Office Bar. Based on previous sediment testing (see *Environmental Baseline* section), the material to be removed from Post Office Bar is predominantly fine material (clayey silts or clayey sandy silt) that would meet criteria for upland placement at West Hayden Island.

3.2.2. Dredged Material Placement at West Hayden Island

Dredged material has been placed on West Hayden Island since dredging of the Columbia River, North Portland Harbor, and Oregon Slough began in the 1920s. The Port of Portland's upland dredged material placement site on West Hayden Island is located on the north side of Hayden Island and upriver from the confluence of the Willamette and Columbia rivers (at Columbia River mile 105). Hayden Island is a channel island covering approximately 1,400 acres. The western portion of the island, West Hayden Island, covers approximately 800 acres and is undeveloped. A portion of West Hayden Island (approximately 102 acres) has been developed to be used as a dredged material placement site for Columbia River channel material. The dredge material placement site is currently a diked basin composed of sand with little or no vegetation. In the future, the site will continue to be sandy with little to no vegetation. The site has little habitat value.

Site improvements in place include a 1,000-foot-long by 20- to 50-foot-wide dredged material retention pond, settling basin, dikes, drainage canals, improved gravel road with culverts, a locked gate, and wire fencing. The site currently has a working system of berms feeding into a single return-water collection and settling area and outfall weir. A single concrete weir was constructed to handle return water to the Columbia River. The weir has three outfalls each sized for 30-inch pipes, and has connected pipes that extend through the berm. The outfalls' inverts at the concrete weir are at elevation +15.0 feet NGVD29.

The dredge material placement site was engineered to minimize the need for re-working or re-grading the placed dredge material, and to optimize the potential for percolation to reduce outfall volumes. Placement areas 1, 2, and 3 can be filled independently of one another and can be used in any order (see Figure 3). The general flow direction is designed to be east to west through the site. The Port of Portland and the Corps have used the site for dredged material placement in the past. Current available capacity at the West Hayden Island placement site is 1.6 million cy. Placement of material from the proposed action (estimated at 75,000 cy) will not appreciably reduce the capacity of the site to handle material from the Columbia River.

All material dredged will be placed in the upland site in such a manner as to prevent material and/or slurry water from returning to the Columbia River. The placement of material into the upland site may be accomplished through the use of hydraulic or mechanical equipment. This equipment may include but is not limited to hydraulic pumping, trucking, or conveyor systems with spill containment. The material will be contained within the site boundary by dikes. Once material is placed, it will be managed to prevent material from moving outside the overall site boundary. The existing site capacity is sufficient to retain all dredged material and elutriate at the placement site. The material will be managed to optimize percolation and to eliminate outfall water from being returned to the Columbia River. This strategy has been successfully implemented for previous Port of Portland projects.

3.2.3. Conservation Measures

The Corps will implement the following impact minimization techniques and best management practices (BMPs) for the proposed action:

Timing of Dredging Activities

- All in-water work associated with maintenance dredging at Post Office Bar will be conducted during the approved in-water work period for the LWR (July 1 to October 31) to minimize potential impacts to juvenile salmonids through the avoidance of vulnerable salmonid life stages and peak migration periods.

- The offloading of dredge material at the West Hayden Island upland placement site does not constitute "in-water work" and would not be subject to ODFW in-water work timing requirements. This stipulation applies because effluent water will be completely retained within the placement site and would not enter into the Columbia River. Dredge placement would be conducted at the West Hayden Island placement site, an approved upland facility, concurrently or immediately following dredging activities.

Maintenance Dredging and Placement

Dredging

- Dredging operations will be conducted to minimize turbidity and reduce sediment drift through the use of a clamshell dredge with an environmental bucket. The BMPs that could be used to control turbidity may include regulating the bucket speed, ensuring that the bucket lips are sealed before lifting the bucket out of the water, maintaining the bucket flaps, filling the bucket to capacity to minimize water in the bucket, not overfilling the bucket, and modifying the bucket size and/or type.

- Dredging and GPS software will be used to model the dredge prism and track previously dredged areas to ensure that dredging efficiency is maximized. As an incentive to the dredging contractor to dredge only the amount identified to be dredged and to the authorized depth, the Corps will not compensate the contractor for the dredging or placement of any material removed from below the dredge prism.

- The Corps will conduct post-dredge bathymetry surveys to ensure that only the material identified to be dredged was removed to the authorized depth.

- If at any time during dredging activities, listed salmonids are observed in distress or a listed salmonid is killed, operations will cease and the NMFS will be notified.

- The dredging will be conducted in the areas with the highest concentrations of contamination first, then proceed to the cleaner areas to prevent contamination of cleaner areas and minimize downstream impacts.

- Accretion of new sediments (approximately 4 inches per year as per Parsons Brinckerhoff 2007) is expected to limit long-term exposure to the NSM. To verify the infill rate, the Corps will do a post-dredging hydrosurvey after completion of dredging, then hydrosurvey again at 6, 12, and 18 months post-dredging.

- The Corps also proposes to collect sediment grab samples from with the navigation channel at Post Office Bar and from a reference location just shoreward of that. Sediment samples would be analyzed for physical and chemical parameters and compared to SEF SLs. If PCBs are detected above SEF SLs, the Corps will consult with the appropriate regulatory agencies regarding the actions to take, if any. Additional samples would be collected from the same two stations (5 replicates) and submitted for benthic analysis to document species density, diversity, richness, and equitability at 6, 12 and 18 months post-dredging.

Barging of Dredged Material

- A bin-barge or flat-deck barge with watertight sideboards will be used to enclose dredged material, including dredged sediment and residual water. No material shall be allowed to leak from the bins or overtop the walls.

- The barge will be loaded so that enough of the freeboard remains to allow for safe movement of the barge and its material on its route to the West Hayden Island placement site.

Dredged Material Placement

- The dredging contractor will handle all dredge material in a manner consistent with its characterization. Dredge material will be transported to the West Hayden Island placement site (see Figure 3). No material would be allowed to enter the Columbia River at the off-loading site.

- All dredge material and residual water deposited at the West Hayden Island upland placement site would be held in the containment areas (see Figure 3). These areas are sufficiently large to contain all the dredge material. No surface water releases of dredge elutriate to the Columbia River will occur.

- If necessary, "make up" water (used to create a liquid, pumpable slurry) would be obtained from residual water on the barge, the placement site containment areas, or the Columbia River. If water is pumped from the river, intake screens will be installed per NMFS (1997) and ODFW screening criteria.

Water Quality Monitoring

- Water quality monitoring would be conducted during active dredging activities, as specified by the appropriate federal and state permit requirements. The Corps is continuing to coordinate with state and federal agencies concerning any water quality monitoring necessary. Turbidity monitoring would only be performed during daylight hours and would be contingent on safe boating and weather conditions.

Spill Prevention and Control

- All equipment used will be clean and inspected daily prior to use to ensure that the equipment has no fluid leaks. Should a leak develop during use, the leaking equipment shall be removed from the project site immediately and not used again until it has been adequately repaired and inspected. At no time will any fuels or oils be allowed to enter any waterbody.

- Floating spill containment booms and absorbent booms will be maintained on-site during all phases of dredging and offloading of material to facilitate the cleanup of potential hazardous material spills.

4. ENVIRONMENTAL EFFECTS

4.1. Physical Characteristics

The proposed dredging action at Post Office Bar and upland placement of the dredged material at West Hayden Island would not alter the hydrologic conditions or sediment transport in the LWR.

4.2. Water and Sediment Quality

Dredging operations will be conducted to minimize turbidity and reduce sediment movement through the use of a clamshell dredge with a close-lipped (environmental) bucket. All material dredged will be placed in watertight transport barges and moved upriver for final placement at the upland placement site at West Hayden Island. No water discharge will occur from the transport barge during transport. Dredged material will be placed into the upland site in such a manner as to prevent material and/or slurry water from entering the Columbia River. The existing site capacity would be sufficient to retain all dredged material and elutriate at the placement site. The material will be managed to optimize percolation and to eliminate outfall water from being returned to the Columbia River.

The proposed action will reduce water quality during and immediately following dredging. The suspension and transport of sediments is a direct result of dredging activities. During dredging, the concentration of contaminants in the water column will increase along with turbidity, thus increasing the exposure of salmonids and prey species. Also, the concentration of dissolved contaminants will increase due to disturbance of the substrate. The increases in turbidity and particulate and dissolved contaminants are expected to be localized, short-term, and would dissipate within several hours.

Displacement of adult and juvenile salmon may result from the increased turbidity because they will likely move to avoid areas of higher concentrations of suspended sediment and the dredging activity. The extent of this potential impact cannot be quantified but should be limited to the size and duration of the plume. Also, dredging will be performed during the summer/fall in-water work period, which would provide the best opportunity to reduce exposure to ESA-listed fish and potential dispersal of contaminants based on river flows.

As discussed in Section 3.2.3, the Corps will implement impact minimization techniques and BMPs for the proposed action to reduce potential water quality impacts.

4.3. Air and Noise Quality

The proposed dredging action would not increase airborne particulate matter in the project area above acceptable threshold levels. Operation of dredging machinery and other equipment would cause a minor, temporary increase in air emissions because of exhaust, which would cease once dredging is completed. There also would be localized increases in noise levels from dredge and barging operations, but these would not likely be noticeable over ambient conditions.

4.4. Terrestrial Habitat and Species

Only aquatic habitat will be affected in the immediate area of the proposed dredging at Post Office Bar. A transport barge will be used to transport the dredged material upriver to a discharge facility at the established upland placement site at West Hayden Island. This site is a diked basin composed of sand with little or no vegetation. In the future, the site will continue to be sandy with little to no vegetation. The site has little habitat value. Few wildlife species would occur and those that do are generally at low population levels. Dredged material will not be placed in wooded or wetland areas.

Bald eagles are present along the LWR throughout the year. The proposed action is not expected to disturb nesting bald eagles. The closest nesting location is located about 2 miles from the proposed action. Furthermore, the proposed dredging will occur within the July 1 to October 31 in-water work window, which would also serve to reduce potential disturbance to nesting eagles. Foraging eagles may be disturbed by the proposed action. However, suitable perching and foraging areas are available on the LWR and Columbia River shorelines away from the dredging and disposal activities.

4.5. Aquatic Habitat and Species

Aquatic habitat will be affected in the immediate area of proposed dredging action. Aquatic habitat conditions within the LWR are highly degraded. The river in the proposed dredging areas has a soft bottom with little to no aquatic vegetation. Previous maintenance dredging of the FNC has decreased the structural diversity of the channel bed.

A clamshell dredge will be used to dredge the LWR FNC. Clamshell dredging operations are not expected to entrain adult or juvenile salmonids. Pressure waves created as the bucket descends through the water column warns fish and gives them time to avoid the bucket. Capture rates of salmonids by dredge buckets tend to be low based on studies in the Columbia River (Larson and Moehl 1990) and Grays Harbor (McGraw and Armstrong 1990). Adult fish have sufficient swimming capacity to avoid entrainment if they are present in the vicinity of clamshell dredging. Also, scheduling the dredging work during the Willamette River in-water work period (July 1 through October 31) will reduce potential effects to ESA-listed salmonids through the avoidance of peak migration periods for adult and juvenile fish.

Impacts to the prey base are likely to affect juvenile salmonids rearing or migrating through the LWR for a period of days to weeks during and following dredging. The importance of the LWR as a rearing area for juvenile salmonids is limited, and the disturbance to the benthic community at the site likely will not alter feeding opportunities for salmonids in the lower river as a whole. Further, sediment movement in the river is a very dynamic process, and the organic content and particle size will return to background within several days to weeks in the project area. Recolonization by macroinvertebrates will quickly follow. Therefore, even if the benthic invertebrate population is being eaten by juvenile salmonids, the disruption to this food source will cover only a small area, and will be limited to no more than a few weeks.

Fish will be exposed to increased turbidity downstream from the dredging activity. As discussed previously, the proposed dredging will increase turbidity in the LWR. The increases in turbidity and suspended solids are expected to be localized, short-term, and would dissipate within several hours. It is unlikely that changes in the pelagic community will be measurable or permanent.

Adult fish will likely avoid the dredging area. Juvenile salmon are less able to swim away from in-water disturbances; however, they are more commonly found along the edge of the rivers and not in the main navigation channel where the dredging will be done. Some juvenile salmonids may be injured by increased turbidity within the action area, which may cause increased physiological stress, reduced feeding, and change in behavior. Because the duration of the dredging will be short-term, and the spatial extent is small, the effect of increased turbidity and contaminants at the population level or at the species scale is not likely to be measurable.

Vibration, noise, and turbidity from dredging operations may displace or otherwise harass (e.g., stress) both adult and juvenile fish. Noise and vibration are expected in and proximal to the dredging operation, and may displace or harass individual fish even if they do not occupy the area being dredged. That is, fish would likely avoid the area if the noise of the dredging activity was disturbing to them. However, the area of disturbance around the dredge is very small relative to the project area, and the impact is expected to be minimal since most fish are able to avoid the impact area and can find ample area for migrating around the dredge.

As discussed in Section 3.2.3, the Corps is planning on implementing impact minimization techniques and BMPs for the proposed action to reduce potential aquatic resource impacts.

4.6. Threatened and Endangered Species

A Biological Assessment was prepared for the proposed project to address federally listed species under the jurisdiction of the USFWS and NMFS. The BA was provided to the agencies for review and consultation. For USFWS-listed species, the determination made for the proposed project was "no effect" because of a lack of suitable habitat and presence for Columbian white-tailed deer, northern spotted owl, water howellia, and Bradshaw's desert parsley.

For NMFS-listed species, the determination made for the proposed project was "no effect" for southern DPS green sturgeon and Steller sea lion. As discussed in Section 2.7.2, southern DPS green sturgeon are not expected to occur in the dredging area. Also, no Steller sea lions would be expected in the area because the proposed action will occur during the July 1 to October 31 in-water work period for the lower Willamette River. For the 13 listed Columbia River salmonid ESUs, it was determined that the proposed action "may affect, and is likely to adversely affect" these species.

This determination is based primarily on an unquantifiable risk of temporary and localized effects including increases in turbidity, transport of sediment downcurrent, noise disturbance and benthic forage disturbance. These temporary and localized effects, however, are not likely to result in significant, adverse effects to the migration of any listed anadromous salmonid ESUs or their critical habitat. Very few salmonids, if any, would be exposed to the areas disturbed by dredging due to their habitat preferences and by timing the activity during a period of low abundance. As discussed in Section 3.2.3, the Corps is planning on implementing impact minimization techniques and BMPs for the proposed action to reduce potential impacts to the ESA-listed salmonid species.

4.7. Cultural and Historic Resources

No impacts to cultural resources are anticipated from dredging accumulated sediments from Post Office Bar. The site has been dredged since the mid-1850s and was dredged to its current depth (40 feet) starting in 1960. The only material to be removed has accumulated since the last dredging cycle in 1997. Placement of dredged material at the Port of Portland's upland placement site at West Hayden Island will not impact native ground surface. The West Hayden Island site is developed with retaining dikes and has many feet of accumulated dredged material over its whole enclosed extent. The material to be dredged from Post Office Bar will be placed over existing dredged material at the West Hayden Island placement site.

4.8. Socio-economic Resources

The proposed action would remove the shoaled area at Post Office Bar, which would alleviate the impact to navigation. Waterborne commerce would remain an important component of the local and regional economy. The proposed action will not change the type or quantity of goods shipped or the type or size of vessels on the river. Some short-term interference to recreational and commercial traffic could occur during dredging and transportation of dredged material to the upland placement site. However, these conflicts are expected to be an inconvenience rather than an impact to commercial and recreational activity. Also, no impacts would occur to recreation facilities in the area. In addition, the proposed action will not cause changes to population or other indicators of social well being, and will not result in disproportionately high or adverse effects on minority populations or low-income populations.

4.9. Cumulative Effects

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 Code of Federal Regulations, Section 1508.7). Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. The past and present actions that have occurred within and adjacent to the LWR project area are identified below. Together, these actions have resulted in the existing conditions of the project area (see Section 2).

- 1830-1970: Human/industrial use and modification of the LWR watershed up until the passing of the Clean Water Act.
- First LWR dredging in 1868 and dredging of a new main channel along the west side of Swan Island in the 1920s to improve navigation.
- The authorization of the 40-foot deep LWR FNC in the River and Harbor Act of 1962.
- Corps' maintenance dredging and disposal activities to 1997.
- Federal and state actions aimed toward remediation of the LWR. Actions include the Portland Harbor Superfund action; early action sites such as GASCO, Terminal 4, Arkema, Triangle Park, and U.S. Moorings; upland site remediation; and the LWR ecosystem restoration study.
- Recreational facilities established by local agencies.
- Commercial, industrial, and residential development that has occurred throughout the project area and adjacent upland areas.
- Natural area acquisition, protection and restoration within and adjacent to the project area. These land uses have been established and are owned and operated by a variety of public and private entities including federal, state, and local governments, private companies, and organizations and individuals.

The reasonably foreseeable future actions under consideration in this analysis are identified below. The listing includes relevant foreseeable actions within and adjacent to the LWR project area including those by the Corps, other federal agencies, state and local agencies, and private and commercial entities.

- Continued operation and maintenance of the entire 11.6-mile-long LWR FNC (maintenance dredging to 40 feet plus 2 feet advanced maintenance dredging).
- Continued protection and restoration of existing natural areas and potential acquisition, restoration and protection of natural areas or abandoned commercial/industrial properties by federal, state, local and county government agencies, and not-for-profit agencies.

- Continued operation of existing recreational facilities along the LWR.
- Continued use and development of the project area, including areas adjacent to the river, floodplain, and upland areas, for commercial, industrial, or residential uses in proportion to future increases in population throughout the area.
- Initiation of Superfund cleanup activities at Portland Harbor and upland sites after 2012.
- Water quality improvements with implementation of more stringent non-point source pollution standards such as TMDLs and elimination of combined sewer overflows.
- Continued operation and maintenance of private off-channel births and teminals.
- Deepening the LWR FNC to the authorized depth of 43 feet plus 2 feet advanced maintenance dredging.

Water and Sediment Quality. Water and sediment quality impacts are closely interrelated. The water quality in the LWR currently does not meet designated uses because of a variety of impairments. Past adverse impacts to water and sediment quality in the project area remain from the 1830-1970 period in the form of legacy contamination within the sediments of the LWR, particularly in Portland Harbor.

In addition to past and present actions that have shaped the existing conditions within and adjacent to LWR project area, increased sediment suspension (turbidity) and associated contaminants are expected to occur during dredging at Post Office Bar. However, this impact would be localized and short-term and is not expected to be cumulatively significant. There are a number of actions that are ongoing or planned within and adjacent to the project area with a focus of improving water and sediment quality, including the implementation of more stringent non-point source pollution standards, such as TMDLs and the elimination of combined sewer overflows, and the Superfund cleanup at Portland Harbor. Strict controls placed on foreseeable future projects would reduce the short-term adverse impacts to water and sediment quality in the LWR. These activities are anticipated to provide a long-term, cumulative benefit to the water and sediment quality in the LWR.

Future development, construction activities, and other foreseeable future projects, in combination with population growth within and adjacent to the project area, would produce changes in the amount of impervious surfaces and associated runoff in the LWR watershed. However, all projects are required to adhere to local, state, and federal stormwater control regulations and best management practices, which are designed to limit surface water inputs.

Air and Noise Quality. The proposed action and the past, present and reasonably foreseeable actions identified above are not anticipated to result in cumulatively significant air quality deterioration as defined by the state of Oregon. Noise associated with the proposed action also would occur. These noise impacts would be localized, short-term, and of an intermittent nature and are not expected to be cumulatively significant.

Biological Resources. Biological resources include fish and wildlife, vegetation, wetlands, federal threatened and endangered species, other protected species, and natural resources management. The legacy contamination in the LWR prevents aquatic systems from returning to natural species richness, community structure, and ecological function. While historic development within and adjacent to the LWR project area has caused extensive losses of aquatic and riparian habitats, with resulting adverse impacts to fish and wildlife resources, these actions occurred in a regulatory landscape that is very different from that which exists today. While future development will likely have localized impacts on these resources, under the current regulatory regime these resources are unlikely to suffer significant losses. Moreover, initiatives by federal, state, and local agencies and groups will operate to mitigate the unavoidable environmental impacts of any future development.

In addition, there are a number of actions that are ongoing or are planned within and adjacent to the LWR project area that will provide a cumulative, long-term improvement to fish and wildlife habitat and resources, including the implementation of more stringent non-point source pollution standards, such as TMDLs and the elimination of combined sewer overflows, and the Superfund cleanup at Portland Harbor. Any future federal actions would require additional evaluation under the National Environmental Policy Act at the time of their development.

Cultural and Historic Resources. Post Office Bar has been dredged many times in the past. No cultural and historic resources are expected to be impacted by the proposed action. Reasonably foreseeable future actions within and adjacent to the highly developed LWR project area will be subject to review and approval by State Historic Preservation Officer, and would be anticipated to have minor impacts, if any, on cultural resources.

Socio-economic Resources. The proposed action and future Corps' maintenance dredging activities would alleviate shoaling impacts to navigation and will not change the type or quantity of goods shipped or the type or size of commercial vessels transiting the river. Waterborne commerce would remain an important component of the local and regional economy.

Some short-term interference to recreational and commercial traffic could occur during proposed and future dredging activities, including Corps' maintenance dredging of the LWR FNC and any dredging that may be recommended to cleanup Portland Harbor. However, these conflicts are expected to be an inconvenience rather than a direct impact to commercial and recreational activity. The proposed action and future dredging activities are not expected to cause a cumulative adverse change to population or other indicators of social well being, and should not result in a disproportionately high or adverse effect on minority populations or low-income populations.

Cumulative Effects Summary. The cumulative impact analysis evaluated the effects of implementing the proposed action in association with past, present, and reasonably foreseeable future Corps' and other parties' actions within and adjacent to the LWR project area. Past and present actions have resulted in the current highly degraded condition of the LWR and other features of the project area. Reasonably foreseeable future actions that have been considered included relevant foreseeable actions within and adjacent to the project area and including those of the Corps, other federal agencies, state and local agencies, and private and commercial entities. The cumulative impacts associated with implementation of the proposed action were evaluated with respect to each of the resource evaluation categories, and no cumulatively significant adverse impacts were identified. However, there are a number of actions ongoing or planned within and adjacent to the LWR project area that will provide a long-term, cumulative improvement to water and sediment quality and fish and wildlife habitat and resources, including the implementation of more stringent non-point source pollution standards, such as TMDLs and the elimination of combined sewer overflows, and the Superfund cleanup at Portland Harbor after 2012.

5. COORDINATION

The draft Environmental Assessment will be issued for a 30-day public review period. Review comments will be requested from federal and state agencies, as well as various interested parties. The Corps will issue a public notice on the availability of the draft Environmental Assessment and the public review period. The Public Notice was sent to the agencies and groups shown below, and the Draft Environmental Assessment is available on Portland District's website (www.nwp.usace.army.mil/pm/e/en_plan_assess.asp).

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

Confederated Tribes and Bands of the Yakama Nation
Confederated Tribes of the Grand Ronde Community of Oregon
Confederated Tribes of the Siletz Indians of Oregon
Confederated Tribes of the Umatilla Indian Reservation
Confederated Tribes of the Warm Springs Reservation of Oregon
Nez Perce Tribe
Columbia River Inter-Tribal Fish Commission

Governor of Oregon
Oregon Department of Fish and Wildlife
Oregon Department of State Lands
Oregon Department of Environmental Quality
Oregon Department of Land Conservation and Development
Oregon State Historic Preservation Office
Oregon State Marine Board

Port of Portland
Lower Willamette Group
Mayor, City of Portland
City of Portland Bureau of Environmental Services
CLD Pacific Grain LLC
Columbia River Pilots
Geo Design Inc.
Kinder Morgan Liquids Terminals LLC
Northwest Environmental Advocates
Oregon Center for Environmental Health
Schnitzer Steel Industries Inc.
Shaver Transportation Company
Willamette Riverkeeper
Working Waterfront Coalition
Lower Willamette Group

6. COMPLIANCE WITH LAWS AND REGULATIONS

6.1. National Environmental Policy Act (NEPA)

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

6.2. Endangered Species Act (ESA)

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed or proposed threatened or endangered species. A Biological Assessment was prepared for the proposed action to address impacts to federally listed species under the jurisdiction of the USFWS and NMFS. The BAs were provided to the agencies for review and consultation.

For USFWS-listed species, the determination made for the proposed action was "no effect" because of a lack of suitable habitat and presence for Columbian white-tailed deer, northern spotted owl, water howellia, and Bradshaw's desert parsley.

For NMFS-listed species, the determination made for the proposed project was "no effect" for southern DPS green sturgeon and Steller sea lion. Southern DPS green sturgeon and Steller sea lions are not expected to occur in the action area during the July 1 to October 31 in-water work period for the LWR. For the listed salmonid ESUs, it was determined that the proposed action "may affect, and is likely to adversely affect" these ESUs in the project area.

This determination is based primarily on an unquantifiable risk of temporary and localized effects including increases in turbidity, exposure and resuspension of contaminated sediments/transport of sediment downcurrent, benthic forage disturbance from dredging in the LWR, and noise disturbance. These temporary and localized effects, however, are not likely to result in significant, adverse affects to the migration of any listed anadromous salmonid ESUs or their critical habitat. Very few salmonids, if any, would be exposed to the areas disturbed by dredging due to their habitat preferences and by timing the activity during a period of low abundance. As discussed in Section 3.2.3, the Corps is planning to implement impact minimization techniques and BMPs for the proposed action to reduce potential impacts to the ESA-listed salmonid species.

The Corps is currently in consultation with the NMFS. A Biological Opinion has not yet been received.

6.3. Clean Water Act (CWA)

Section 401 of the Clean Water Act of 1977, as amended, requires certification from the state or interstate water control agencies that a proposed water resources project is in compliance with established effluent limitations and water quality standards. A Joint Permit Application will be prepared for the proposed action and provided to the Oregon DEQ. The proposed action will be in compliance with the Clean Water Act via public review of the project under Sections 401, and with the issuance of a Section 401 Water Quality Certification from Oregon DEQ.

6.4. Magnuson-Stevens Fishery Conservation and Management Act

The LWR is designated as EFH for Chinook and coho salmon. An assessment for EFH was prepared and provided to NMFS for review and consultation. The assessment determined that temporary impacts to migratory habitat will occur primarily as a result of the disturbance created by the dredging operations. Dredging will occur during the summer/fall in-water work period for the Willamette River to minimize impacts to Chinook and coho salmon. Also, it is anticipated that the conservation measures described in the EA are also applicable to EFH and would satisfy the requirements pursuant to the Magnuson-Stevens Fishery Conservation and Management Act.

6.5. Clean Air Act

The Clean Air Act of 1970, as amended, established a comprehensive program for improving and maintaining air quality in the United States. Its goals are achieved through permitting of stationary sources, restricting the emission of toxic substances from stationary and mobile sources, and establishing national ambient air quality standards. Title IV of the Act includes provisions for complying with noise pollution standards. There would be a small, localized reduction in air quality during dredging due to emissions from dredging equipment. There also would be localized increases in noise levels from dredging equipment. These impacts would be minor and temporary in nature, and would cease once dredging is completed.

6.6. National Historic Preservation Act

Section 106 of the National Historic Preservation Act requires that all federally assisted or federally permitted projects account for the potential effects on sites, districts, buildings, structures, or objects that are included in or eligible for inclusion in the National Register of Historic Places. No impacts to cultural resources are anticipated from the proposed action. The LWR FNC has been dredged many times in the past. Also, the dredged material will be placed in an established upland placement site at West Hayden Island.

6.7. Native American Graves Protection and Repatriation Act

This Act provides for the protection of Native American and Native Hawaiian cultural items, established ownership and control of Native American cultural items, human remains, and associated funerary objects to Native Americans. It also establishes requirements for the treatment of Native American human remains and sacred or cultural objects found on federal land. No cultural items, human remains, and associated objects are expected to be affected by the proposed action.

6.8. Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act of 1934 states that federal agencies involved in water resource development are to consult with the USFWS and state agency administering wildlife resources concerning proposed actions or plans. The proposed action is being coordinated with the USFWS and ODFW in accordance with the Act.

6.9. Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

As discussed in Section 1.4.2, in 2000 the EPA determined that Portland Harbor qualified for placement on the National Priorities List (also known as Superfund) under CERCLA. A Portland

Harbor Remedial Investigation/Feasibility Study (RI/FS) is underway. The remedial investigation includes areas of the LWR extending from approximately WRM 0 to 12. This area does not define the Superfund site, the boundaries of which will be determined by EPA upon issuance of a Record of Decision at the end of the RI/FS process. The RI/FS report will present the results of the investigations of contamination, the risks to human health and the environment, and evaluate clean-up options; it is expected to be completed in before 2012.

The EPA is not expected to issue the Record of Decision before 2012. After issuance, the remedial design and remedial action will be implemented. The remedy will likely involve a combination of cleanup technologies and long-term operation and maintenance. The technologies likely will involve dredging, capping, or other engineered containment of contaminated sediment, natural recovery, and institutional controls to limit uses or disturbance of buried contaminated sediment.

The Corps will proceed with the proposed action only if EPA has no concern about the dredging action that could potentially affect the investigation or remedial action under CERCLA at Portland Harbor. Because the area is designated as an 'Area of Potential Concern' in the 2009 EPA Draft Remedial Investigation, the Corps continues to coordinate with EPA to ensure that the dredging is consistent with any potential remedy. The Corps may revise dredging proposals to address EPA concerns or postpone dredging until EPA takes appropriate action under CERCLA for Portland Harbor.

6.10. Executive Order 11988, Floodplain Management

This executive order 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.

6.11. Executive Order 11990, Protection of Wetlands

This executive order requires federal agencies to protect wetland habitats. The proposed action would not affect any wetland habitats.

6.12. Executive Order 12898, Environmental Justice

This executive order requires federal agencies to consider and minimize potential impacts to subsistence, low-income or minority communities. The goal is to ensure that no person or group of people should shoulder a disproportionate share of the negative environmental impacts resulting from the execution of this country's domestic and foreign policy programs. The proposed action will not cause changes in population, economics, or other indicators of social well being. The proposed action will not result in a disproportionately high or adverse effect on minority populations or low-income populations. There are no environmental justice implications from the proposed action.

6.13. Analysis of Impacts on Prime and Unique Farmlands

Because no prime and unique farmlands are located in the project area, no impacts would occur.

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