US Army Corps
of Engineers ®
Walla Walla District
BUILDING STRONG®

LOWER SNAKE RIVER CHANNEL MAINTENANCE IMMEDIATE NEED DREDGING FOR COMMERCIAL NAVIGATION ENVIRONMENTAL ASSESSMENT

TIERED FROM THE LOWER SNAKE RIVER PROGRAMMATIC SEDIMENT MANGEMENT PLAN FINAL ENVIRONMENTAL IMPACT STATEMENT DATED AUGUST 2014

Lower Granite Lock and Dam
Ice Harbor Lock and Dam

Asotin, Columbia, Franklin, Garfield, Walla Walla, and Whitman Counties, Washington
and
Nez Perce County, Idaho

In compliance with the
National Environmental Policy Act of 1970

ADMINISTRATIVE RECORD – DO NOT DESTROY

PROJECT FILE NUMBER: PPL-C-2022-0057

September 2022

Table of Contents

Figures

Tables

Appendices

Appendix A: Current Immediate Need Navigation Channel Maintenance Dredging Monitoring Plan
Appendix B: Clean Water Act Section 404(b)(1) Evaluation
Appendix C: Hydraulic Evaluation of the Bishop Bar Disposal Site
Appendix D: Endangered Species Act Biological Assessment
Appendix E: National Marine Fisheries Service Biological Opinion
Appendix F: U.S. Fish and Wildlife Service Biological Opinion
Appendix G: Idaho SHPO NHPA Section 106 Concurrence Letter dated June 8, 2022
Appendix H: Washington SHPO NHPA Section 106 Concurrence Letter dated June 16, 2022

Acronyms

°C	degrees Celsius
°F	degrees Fahrenheit
BA	Biological Assessment
BMP	Best Management Practice
CFR	Code of Federal Regulations
Corps	U.S. Army, Corps of Engineers, Walla Walla District
CWA	Clean Water Act
cy	cubic yards
DPS	Distinct Population Segment
EA	Environmental Assessment
EM	Engineer Manual
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FONSI	Finding of No Significant Impact
FWCA	Fish and Wildlife Coordination Act
LSR	Lower Snake River
LSRP	Lower Snake River Projects
MBTA	Migratory Bird Treaty Act
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
NWP	Nationwide Permit
PSMP	Programmatic Sediment Management Plan
RM	River Mile
SHPO	State Historic Preservation Officer
SPCC	Spill Prevention, Control, and Countermeasures
TCP	Traditional Cultural Property
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
Ecology	Washington State Department of Ecology

WOTUS	Waters of the United States

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1 Introduction

1.1 Proposed Action, Authority, and Purpose of and Need for Action

1.1.1 Proposed Action

The U.S. Army Corps of Engineers, (Corps) Walla Walla District, proposes to dredge accumulated sediment from the federal navigation channel below the Ice Harbor Lock and Dam navigation lock near Pasco, Washington, and near the confluence of the Snake and Clearwater Rivers near Clarkston, Washington, and Lewiston, Idaho. The Corps is proposing to accomplish the dredging and disposal action during the next winter in-water work window of December 15, 2022 to March 1, 2023, or during the next available in-water work window, subject to any delays and available funding/resources.

Berthing areas at the Port of Clarkston and the Port of Lewiston have also been impacted by accumulated sediment and would be dredged as well, but funded by the Ports. The Corps proposes that all dredged sediment would be disposed of at an in-water location near Bishop Bar (north shore) located at River Mile (RM) 118 on the lower Snake River in Washington State. The dredging and disposal together constitute the proposed action and are referred to as such or as the "immediate need dredging action" through-out this document.

In compliance with the National Environmental Policy Act (NEPA), this Environmental Assessment (EA) identifies, considers, and analyzes the potential environmental effects associated with the proposed dredging and disposal action and at least the No Action alternative. This EA was prepared in accordance with the Council on Environmental Quality *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA)* (Title 40 of the CFR Parts 1500-1508) and 33 CFR 230, *Procedures for Implementing NEPA*. The Corps' objective in preparing this EA is to determine the potential environmental effects of the proposed dredging and disposal action and any reasonable alternatives. If such environmental effects are determined to be relatively minor, a Finding of No Significant Impact (FONSI) would be issued, and the Corps would proceed with the dredging and disposal action, subject to availability of funding. If any environmental effects are determined to be significant according to the Corps' analysis, either mitigation would be employed to ensure effects are reduced below significant levels, or an Environmental Impact Statement (EIS) would be prepared before a decision is reached regarding implementation of the proposed action.

This EA is tiered from the Corps' August 2014 *Lower Snake River Programmatic Sediment Management Plan* (PSMP) *Final Environmental Impact Statement* (FEIS) which is incorporated herein in its entirety by reference. The immediate need dredging is an action considered in the PSMP, Appendix A to the PSMP FEIS. A copy of the PSMP FEIS can be viewed at: https://www.nww.usace.army.mil/Missions/Projects/Programmatic-Sediment-Management-Plan/. The accumulated sediment has triggered the immediate need for navigation dredging at the Snake/Clearwater confluence. Additionally, a "future forecast tiered NEPA analysis for a long-term sediment management solution at the confluence" has been initiated by the Corps and is progressing as funding becomes available.

1.1.2 Authority

The Corps' authority to construct, operate, and maintain the lower Snake River projects (LSRP), including the federal navigation channel was first established in Section 2 of the River and Harbor Act of 1945 (Public Law 79-14) and approved March 2, 1945, in accordance with House Document 704, 75th Congress, 3rd Session. The projects authorized under the statute include:

- Ice Harbor Lock and Dam - Lake Sacajawea, Snake River, Washington.
- Lower Monumental Lock and Dam - Lake Herbert G. West, Snake River, Washington.
- Little Goose Lock and Dam - Lake Bryan, Snake River, Washington.
- Lower Granite Lock and Dam - Lower Granite Lake, Snake River, Washington.

The projects are authorized for multiple purposes, including hydropower generation, inland navigation, recreation, fish and wildlife, and incidental irrigation. The four lower Snake River projects are part of the Federal Columbia River Power System (FCRPS). Subsequent to the original authorizing statutes or enabling legislation, other statutes further influence the project authorizations.

The Flood Control Act of 1944 (PL 78-534) authorized the Chief of Engineers to construct, maintain, and operate recreational facilities in reservoir areas under Corps management.

Compliance with the Fish and Wildlife Coordination Act of 1958 (PL 85-624) resulted in certain modifications to the LSRP during and after construction and added fish and wildlife conservation/mitigation as an authorized project purpose, which was ratified by Congress under the Water Resources Development Act of 1976 (PL 94-587).

The Flood Control Act of 1962 (PL 87-874) established the navigation channel within the LSRP at 14-feet-deep by 250-feet wide at the lowest operational water elevation of the reservoirs, or minimum operating pool (MOP) level, and provided the Corps with authority to maintain the federal channel at those dimensions, for slack water navigation to be possible on the lower Snake River on a year-round basis. The Corps lacks discretion to designate alternative channel dimensions except 33 U.S.C. 562 authorizes the Corps to maintain wider areas for bends, sidings, and turning places as may be necessary to allow for the free movement and maneuvering of boats and barge tows. Additionally, Section 109 of the Water Resources Development Act of 1992 (P.L 102-580) provides limited authority to maintain navigation access and berthing areas at port facilities using the federal navigation channel on the Columbia, Snake, and Clearwater rivers. In addition, Corps policy (Engineer Regulation [ER] 1130-2-520, Section 8-2) allows one foot of advance maintenance to reduce the reoccurrence of dredging and one foot of over-depth to account for general inaccuracies in dredging methods.

The original enabling legislation for the Lower Granite Project included construction and maintenance of levees as appurtenant facilities of the authorized Project. This provides for normal operating water surface elevations from 733 to 738 feet at National Geodetic Vertical Datum 1929 (NGVD29). All elevations in this EA are NGVD29 in the Lewiston, Idaho, and Clarkston, Washington, areas. The backwater levee system was constructed as part of the Lower Granite Project in lieu of relocating the business district of Lewiston, Idaho. It was designed as an upstream extension of the dam to allow the Lower Granite reservoir to pass a Standard Project Flood event while protecting Lewiston from inundation by such a flood.

1.1.3 Purpose of and Need for Action

The purpose of the proposed immediate need dredging action is to reestablish the federal navigation channel to the congressionally authorized dimensions of 250 feet wide by 14 feet deep, to allow for safe and effective commercial navigation, incorporating any recommended or necessary refinement allowed by federal law and implementing regulations/policy. In addition, there is shoaling below the Ice Harbor Dam navigation lock that is hindering navigation. In order to ensure a depth of 14 feet, the Corps would dredge to a depth up to 16 feet. The dredging depth consists of the main 14 feet, plus one foot for advanced maintenance, and up to an additional foot for over dredging, which accounts for any depth inaccuracy of the dredging method. Additionally, the federal navigation channel at the Port of Lewiston (Clearwater River) has been increased in width to provide for a vessel turning area, as it is the terminus of the lower Snake River federal navigation channel. The proposed action is needed to restore safe and effective navigation in the federal channel through the lower Snake River to Lewiston, Idaho because accumulated sediment (which results in shallower water) is impeding navigation (see Section 3.3.2.1 “Navigation Triggers” of the PSMP). Sediment (mostly sand) has been depositing in the Snake/Clearwater confluence primarily during spring runoff periods. Bathymetric survey results from 2021 show that the area shallower than 14 feet within the proposed confluence dredging footprint, as measured at Minimum Operating Pool (MOP) has increased since 2015. MOP is a term used to define the lowest water level allowed in the reservoir to still maintain needed operations and associated project purposes, such as the navigation locks, hydropower, adult and juvenile fish bypass systems and ladders, incidental irrigation, and recreational areas. It is likely that additional sediment would be deposited in 2022, further increasing the area which does not meet the authorized channel depth. Water depths in the current federal navigation channel alignment at the confluence are now as shallow as 9 feet while the berthing areas at the Port of Clarkston and Port of Lewiston are now as shallow as 4 feet and 11 feet, respectively, based on a MOP water surface elevation. Navigation channel depths less than 14 feet substantially impact access to port facilities.

This EA is tiered from the 2014 PSMP FEIS and incorporates the comprehensive framework provided by the PSMP. During preparation of the PSMP FEIS, the Corps evaluated a wide range of alternatives and identified only one (1) measure that can effectively manage sediment once it has deposited and is interfering with navigation – i.e., dredging. (See, Section 3.3.3.1 of PSMP). This EA will not re-evaluate other potential action measures or alternatives for removing the problem sediment. Alternatives considered in this EA, therefore, focus on dredged material *disposal* options. "The disposal method would be selected based on the Federal Standard (33 CFR 335.7) and would consider beneficial use of dredged material, either in-water or upland subject to authority and funding." See also, 33 C.F.R. 336.1(c)(1). When in-water disposal is proposed, the Corps is required to identify and utilize the lowest-cost, least environmentally damaging, practicable alternative as its disposal method. See Section 1.4 of the PSMP FEIS and Section 2.4 of Appendix L to the FEIS.

Sediment deposition is also currently interfering with the Corps' ability to operate the Lower Granite reservoir within one foot of its minimum operating pool from April through August for Endangered Species Act (ESA) listed threatened and endangered juvenile salmon passage, which is a conservation measure proposed by the Corps and carried forward into the National Marine Fisheries Service (NMFS) 2020 Columbia River System Biological Opinion, https://www.salmonrecovery.gov/BiologicalOpinions/FCRPSBiOp.aspx.

The proposed action includes ancillary/related sediment maintenance actions by the Ports of Lewiston and Clarkston to restore the dimensions of berthing areas adjacent to the federal navigation channel. The Ports are responsible for funding such maintenance at their respective berthing areas (i.e., 50 feet out from port docks), including costs associated with Clean Water Act (CWA) compliance (i.e., Section 404/10 permits). The Ports and Corps have signed an agreement under which the Corps would include the Ports ancillary/related berthing area maintenance dredging and disposal in the Corps' federal navigation channel maintenance dredging contract, pending completion of environmental reviews. The Ports, however, must pay for their portion of the costs. The Ports are also responsible for obtaining their own in-water work permits.

1.2 Project Location

The Corps operates and maintains the dams and associated navigation system on the lower Snake and Clearwater Rivers up to the Port of Lewiston (Figure 1-1). While there are periodic sedimentation problems at other locations, the main problem area is at the confluence of the Snake and Clearwater Rivers, including the ports in Lewiston and Clarkston. Downstream from the Lewiston/Clarkston area are the four lower Snake River dams:

Lower Granite Lock and Dam is located approximately 27 miles northeast of Pomeroy, Washington, and southwest of Pullman, Washington at river mile (RM) 107.5 on the lower Snake River. This dam is about 32 miles downstream from the Snake/Clearwater River confluence. The dam straddles both Garfield and Whitman Counties, while Lower Granite Lake extends up the Snake River into Asotin County, Washington, and up the Clearwater River into Nez Perce County, Idaho. Most of the necessary dredging occurs upstream of this dam and is proposed to be dredged during the upcoming dredging efforts.

Little Goose Lock and Dam is located on the lower Snake River, at RM 70.3 near Starbuck, Washington. No dredging at Little Goose Dam is proposed at this time.

Lower Monumental Lock and Dam is located on the lower Snake River, at RM 41.6 near Kahlotus, Washington. No dredging at Lower Monumental Dam is proposed at this time.

Ice Harbor Lock and Dam is located on the lower Snake River, at RM 9.7. The dam and reservoir lie in southeastern Washington, with the right abutment of the dam in Franklin County and the left abutment in Walla Walla County. The reservoir impoundment of the Snake River, called Lake Sacajawea, extends 32 miles east to the base of Lower Monumental Lock and Dam. Dredging below the navigation lock is proposed.

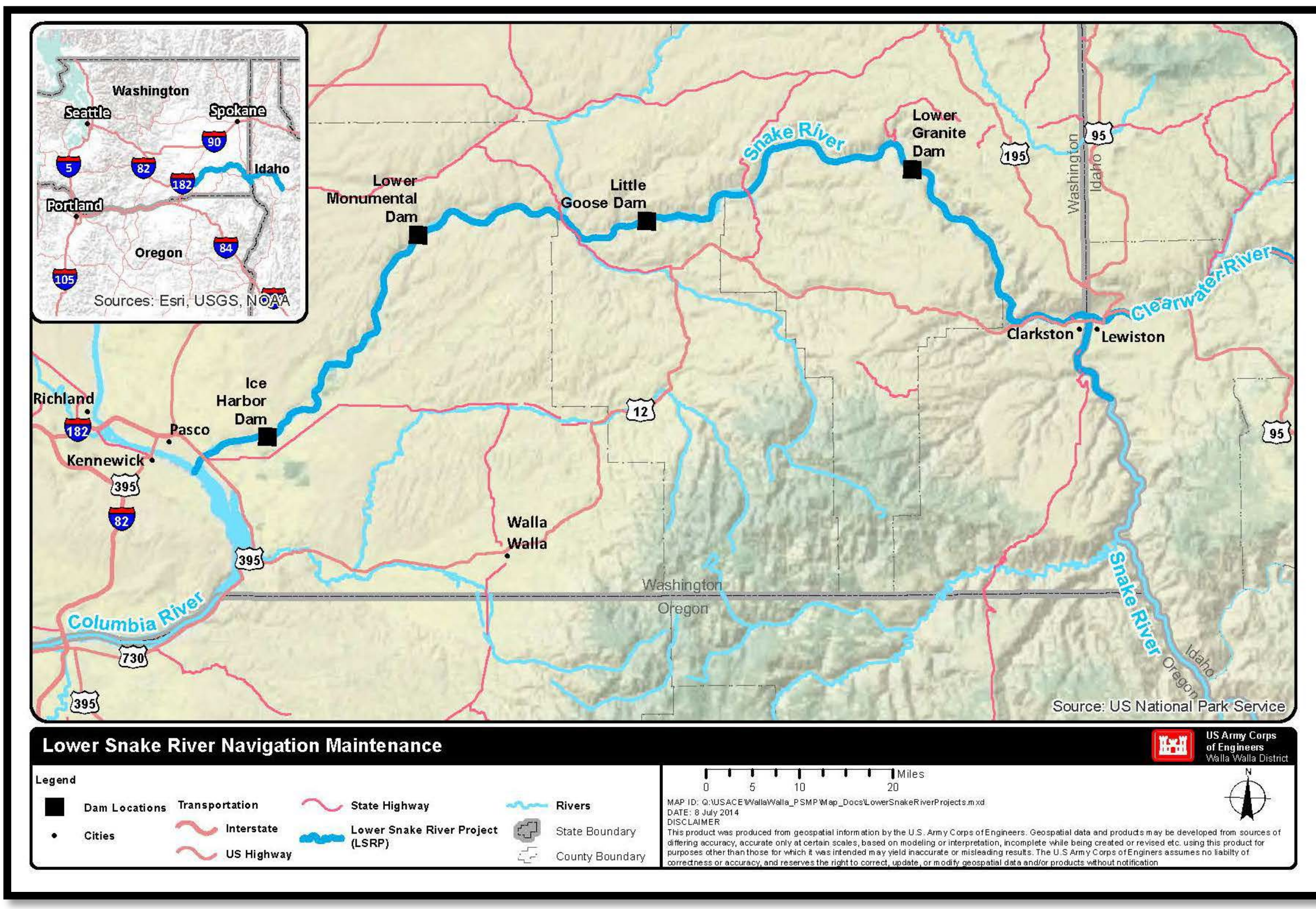

Figure 1-1: The Lower Snake River Dams

1.3 Commercial Navigation and Minimum Operating Pool (MOP)

Commercial navigation is negatively affected when the navigable depth in the river channel is less than 14 feet deep at MOP. The commercial navigation industry has designed its vessels/tugs and barges for that depth to maximize transportation capacity. The Corps controls a limited (e.g., 5 feet) maximum and minimum water level in the reservoirs behind each dam, which are influenced by various factors such as uncontrolled runoff, wave action, precipitation, powerhouse operations, and sediment deposition. Table 1-1 shows the MOP ranges for the lower Snake River dams. The federal navigation channel at the lower Snake River and Clearwater River confluence and below the Ice Harbor navigation lock was last dredged in 2015 and sediment has reaccumulated. Operating at MOP is also identified in the NMFS 2020 CRSO Biological Opinion as beneficial to migrating juvenile salmonids because river velocity increases and migration time decreases. The Corps is currently “operating” the reservoir at MOP plus three feet to provide the depth needed for the safe use of barges.

Table 1-1. Minimum Operating Pool Ranges on the Lower Snake River

Dam	Reservoir	Snake River Mile	MOP Elevation Range (feet)
Ice Harbor	Lake Sacajawea	9.7	437-438.5
Lower Monumental	Lake Herbert G. West	41.6	537-538.5
Little Goose	Lake Bryan	70.3	633-634.5
Lower Granite	Lower Granite Lake	107.3	733-737.5

1.4 Channel Maintenance History

Commercial navigation is one of the Corps primary civil works mission areas. Commercial barge navigation on the lower Snake River is of key importance because navigation is one of the existing authorized project purposes of the LSRP and a major element supporting the regional economy.

The Snake River navigation channel extends approximately 140 miles from the confluence of the Columbia and Snake Rivers at Pasco, Washington to the confluence of the Clearwater River with the Snake River at Lewiston, Idaho. The Snake River channel is the eastern end of the inland Columbia-Snake River federal navigation channel, which extends 330 miles from Portland, Oregon and Vancouver, Washington to Lewiston, Idaho, and allows for commercial navigation from the Pacific Ocean to Idaho. Deep-water ports on the lower Columbia River are major international terminals and are the destination of most of the barge traffic originating on the Snake River. The commercial navigation channel in the LSRP is maintained at the congressionally authorized depth of 14 feet deep and 250 feet wide at MOP. The navigation lock approach to Ice Harbor Dam is a critical feature for commercial navigation in the LSRP as all tows entering or leaving the Snake River portion of the Columbia/Snake River system must pass through the Ice Harbor navigation lock.

Approximately 10 million tons of commercial cargo is shipped on the inland portion of the Columbia-Snake River system each year with an annual value of between 1.5 and 2 billion dollars. Downbound movements (i.e., movements from upstream ports toward the Columbia River) of grain account for most of this cargo, of which the largest share is wheat. Approximately half of all the wheat exported from export terminals on the lower Columbia River arrives by barge.

The federal navigation channel at the Snake/Clearwater confluence provides commercial navigation access to both the Port of Clarkston and the Port of Lewiston, two of the three ports located in Lower Granite Reservoir. Sediment accumulation in the federal channel at the confluence interferes with the access to these two ports. The third port, the Port of Whitman at Wilma, is located on the right bank of the Snake River about three miles downstream of the Port of Clarkston. The navigation channel adjacent to the Wilma site is outside of the area of sediment accumulation at the confluence.

Congress has funded multiple navigation channel maintenance (dredging) actions for the LSRP since the 1980s, including the most recent in the winter of 2015, to restore the navigation channel to the congressionally authorized dimensions (14-feet deep and 250 feet wide). Channel maintenance by dredging has occurred periodically since 1961 (Table 1-2) and was an anticipated action necessary to keep the channel operating for its designated navigational uses. Navigation channel maintenance has not occurred since 2015.

Table 1-2. History of Channel Maintenance in the Lower Snake and Clearwater Rivers

Dredging Location	Year	Purpose	Amount Dredged [cubic yards (cy)]	Disposal
Excavation of Navigation Channel, Ice Harbor, Part I and II, Channel Construction	1961	Navigation	3,309,500	Upland and in-Water
Navigation Channel, Ice Harbor Part III, Channel Construction	1962	Navigation	120,000	Upland and in-Water
Downstream Navigation Channel, Ice Harbor Lock and Dam	1972	Navigation	80,000	Upland and in-Water
Downstream Approach Navigation Channel, Lower Monumental Lock and Dam	1972	Navigation	25,000	Upland
Navigation Channel Downstream of Ice Harbor Lock and Dam	1973	Navigation	185,000	Upland and in-Water
Downstream Approach Channel Construction, Lower Monumental Lock	1973	Navigation	10,000	Upland
Downstream Approach Channel Construction, Ice Harbor Lock	1978	Navigation	110,000	Upland and in-water
Downstream Approach Channel Construction, Ice Harbor Lock	1978 1981/82	Navigation	816,814	Upland and in-water

Dredging Location	Year	Purpose	Amount Dredged [cubic yards (cy)]	Disposal
Various Boat Basins, Swallows Swim Beach, Lower Granite Reservoir (Corps)	1975-1998	Recreation	20,000	Upland sites
Port of Lewiston – Lower Granite Reservoir (Corps)	1982	Navigation/Maintain Flow Conveyance Capacity	256,175	Upland sites
Port of Clarkston – Lower Granite Reservoir (Corps)	1982	Navigation	5,000	Upland sites
Downstream Approach Channel Construction, Ice Harbor Lock	1985	Navigation	98,826	In-water
Confluence of Clearwater and Snake Rivers (Corps)	1985	Maintain Flow Conveyance Capacity	771,002	Upland site
Port of Lewiston – Lower Granite Reservoir (Corps)	1986	Navigation/Maintain Flow Conveyance Capacity	378,000	Upland sites
Confluence of Clearwater and Snake Rivers (Corps)	1988	Maintain Flow Conveyance Capacity	915,970	In-water
Confluence of Clearwater and Snake Rivers (Corps)	1989	Maintain Flow Conveyance Capacity	993,445	In-water
Schultz Bar – Little Goose (Corps)	1991	Navigation	27,335	Upland site
Confluence of Clearwater and Snake Rivers (Corps)	1992	Maintain Flow Conveyance Capacity	520,695	In-water
Barge Approach Lane, Juvenile Fish Facilities, Lower Monumental	1992	Navigation	10,800	Upland site
Ports of Lewiston (Lower Granite Reservoir), Almota and Walla Walla	1991/92	Navigation	90,741	Upland and in-water
Schultz Bar – Little Goose (Corps)	1995	Navigation	14,100	In-water
Confluence of Clearwater and Snake Rivers (Corps)	1996/97	Navigation	68,701	In-water

Dredging Location	Year	Purpose	Amount Dredged [cubic yards (cy)]	Disposal
Confluence of Clearwater and Snake Rivers (Corps)	1997/98	Navigation	215,205	In-water
Greenbelt Boat Basin, Clarkston – Lower Granite Reservoir	1997/98	Recreation	5,601	In-water
Port of Lewiston – Lower Granite Reservoir (Port)	1997/98	Navigation	3,687	In-water
Port of Clarkston – Lower Granite Reservoir (Port)	1997/98	Navigation	12,154	In-water
Lower Granite Navigation Lock Approach	1997/98	Navigation	2,805	In-water
Lower Monumental Navigation Lock Approach	1998/99	Navigation	5,483	In-water
Lower Monumental Navigation Lock Approach	2005/06	Navigation	7,744	In-water
Lower Granite Navigation Lock Approach	2005/06	Navigation	342	In-water
Port of Lewiston	2005/06	Navigation	4,583	In-water
Port of Clarkston	2005/06	Navigation	10,594	In-water
Confluence of Clearwater and Snake Rivers (Corps)	2005/06	Navigation	311,396	In-water
Confluence of Clearwater and Snake Rivers (Corps)	2014/15	Navigation	352,625	In-water
Port of Lewiston	2014/15	Navigation	3,365	In-water
Port of Clarkston	2014/15	Navigation	14,510	In-water
Downstream Approach Channel, Ice Harbor Lock	2014/15	Navigation	1,805	Contractor retained

2 Formulation of Alternatives

The PSMP FEIS (Corps 2014) identified and evaluated a wide range of measures and alternatives to accomplish the purpose of maintaining the federal navigation channel on the lower Snake River from Ice Harbor Lock and Dam to Lewiston, Idaho, and the PSMP (Attachment A to the FEIS) provides a decision-making process to manage and, if possible, prevent sediment accumulation. Section 3.3.4 (Planning Process for Sediment Management Actions) of the PSMP states that the Corps would perform a tiered NEPA analysis of immediate need actions and that the NEPA document would most likely be an EA. Section 3.3.3.1 of the PSMP states, “During preparation of the EIS/PSMP, the Corps evaluated a wide range of alternatives and identified only one (1) measure that can effectively manage sediment once it has deposited and is interfering with navigation – i.e., dredging.” Section 3.3.4.2 states, “Given the immediate need measures identified in the PSMP, the NEPA review process for immediate need actions will generally include only the “No Action” and Proposed Action Alternative (i.e., dredging), with alternative dredged material disposal options...”

The alternatives analysis provided in Section 2 of this EA, therefore, focuses primarily on dredged material disposal options. Section 2.4.1 of the PSMP states, “The disposal method is ultimately identified through evaluation of disposal alternatives under the substantive provisions of CWA Section 404(b)(1) guidelines established by the EPA (40 C.F.R. 230), and Corps regulations.” Additionally, Section 3.3.3.1 of the PSMP states, “The disposal method would be selected based on the Federal Standard (33 CFR 335.7) and would consider beneficial use of dredged material, either in-water or upland subject to authority and funding.” "When in-water disposal is proposed, the Corps is required to identify and utilize the lowest-cost, least environmentally damaging, practicable alternative as its disposal method." See Section 1.4 of the PSMP FEIS and Section 2.4 of Appendix L to the FEIS.

The dredged material disposal alternatives evaluated are focused on the appropriate disposal location and method for the proposed immediate need dredging action only. Identification of a long-term (future forecast need) sediment management solution for the confluence will be evaluated under a tiered NEPA analysis, in accordance with the 2014 PSMP. The long-term sediment management solution analysis would determine the most cost-effective, technically acceptable, and environmentally acceptable action(s) to manage the sediment depositing in that area. It may take several years to complete the analysis and accompanying environmental compliance and implement the recommended action, subject to authority and funding. While that analysis is being conducted, the Corps may need to go through one or more instances of interim operations with possible immediate need dredging and disposal action(s).

The Corps is not proposing to create shallow water habitat for juvenile salmonids as part of the immediate need dredging-disposal action. However, if future immediate need dredging-disposal is required prior to completion of the long-term (future forecast) sediment management solution, the Bishop Bar site may provide an opportunity to create shallow water habitat at that time. The same is true if the tiered NEPA analysis for the long-term sediment management solution involves some level of dredging and in-water disposal.

Evaluation of Disposal Options

As the PSMP FEIS identifies dredging as the only feasible alternative to sediment removal for immediate need conditions, the Corps focused on sediment disposal options to combine with dredging to form complete alternatives. The updated evaluation of disposal options is detailed in Appendix B, Clean Water Act Section 404(b)(1) Evaluation, Section 2.4, Screening Alternatives. The Corps revisited all disposal options considered in the PSMP FEIS to ensure new information could be considered and explored new options.

In general, the 404(b)(1) guidelines mandate that “no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.” [40 C.F.R. 230.10(a)]. “Practicable” is defined as “available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.” [40 C.F.R. 230.10(a)(2)]. It is also the Corps' policy to designate the least costly alternative, if environmentally acceptable [i.e., selected through the 404(b)(1) guidelines] and engineering/technologically feasible, as the “Federal standard” for the proposed discharge action [33 CFR 336.1(c)(1)]. The Corps, therefore, identified the following disposal alternatives screening criteria:

1. Alternative satisfies the Corps and/or the Ports basic disposal purpose.
2. Alternative is practicable/available for Corps and/or Ports (cost, technology, logistics).
3. Alternative is environmentally acceptable [404(b)(1) guidelines].
4. Alternative is the least cost after consideration of 1-3 (Federal standard).

Multiple factors must be considered when determining if a location is a viable disposal site. Small sites could be utilized but using multiple sites requiring access development, retention pond construction and revegetation work could be cost-prohibitive. Sites must be free of existing developments, such as recreation, habitat management, or permanently installed infrastructure equipment, and sites must not be encumbered by a real estate license unless specific to this use. Disposal site proximity to the dredging area is also considered to facilitate completion of the dredging within the in-water work window time constraint. Closer locations promote efficiency of equipment resources while more distant disposal locations can increase cost by increasing the amount of equipment needed to perform the work within the in-water work window.

When selecting sites, emphasis is given to protection of environmentally sensitive areas such as existing juvenile salmon rearing habitat in shallow water areas, managed wildlife habitat mitigation sites, known or potential cultural resource locations, and public recreation areas. Disposal by the Corps on non-federal land requires specific project authorization (new authority) or a beneficial use cost share agreement with a local government. The process could require approval by Corps Headquarters (possibly Congress), requiring extensive (possibly years) lead time for execution. Engineering feasibility is also an important consideration in selection and development of sites for dredged material disposal. Barge access must be reasonably good or extensive in water work would be required. Existing road access to the site facilitates use of earth moving equipment at the site and reduces environmental effects of road construction.

The Corps applied the screening criteria above to determine which options(s) would be carried forward for further evaluation resulting in the selection of the preferred disposal alternative. Table 2-1 presents a summary of the screening results. Only disposal alternatives that met the first three screening criteria (purpose, practicable, environmental) were evaluated for costs. Only alternatives meeting all four criteria were carried forward for evaluation.

Table 2-1. Disposal Alternatives Screening

	Criteria			
Alternatives	Purpose	Practicable	Environmental	Least Cost
Corps Only Alternative				
Upland - Ice Harbor Storage Yard	Y*	Y	N	-
Upland - Un-Named (RM 11.5)	Y*	N	N	-
Joint Alternatives				
In Water – Bishop Bar (RM 118)	Y	Y	Y	Y
In Water - Open Water (RM 119)	Y	Y	N	-
Upland - Joso	Y	N	Y	-
Upland - Kelly Bar (RM 120)	Y	N	N	-
Upland - Silcott Island	Y	N	N	-
Upland - Chief Timothy HMU	Y*	N	N	-
Upland - Port of Wilma (RM 134)	Y*	N	N	-
Ports Only Alternatives				
Upland - Port Clarkston Property	Y	N	Y	-
Upland - Not Port of Clarkston Prop.	Y	N	Y	-
Upland - Confluence Riverfront	Y	N	N	-
Upland - Port of Lewiston Property	Y	N	Y	-
Upland - Asotin County Landfill	Y	N	Y	-

Y=Yes N= No *=In Part

Evaluation confirmed that in-water disposal at Bishop Bar was the only complete and feasible option for disposal of sediment for the immediate need. Alternatives considered under NEPA must include the No Action Alternative, which provides a baseline from which to compare other alternatives. Therefore, in tiering from the PSMP FEIS, two alternatives are evaluated in this EA: 1) the No Action Alternative, and 2) the proposed Immediate Need Dredging-Disposal with in-water disposal at Bishop Bar. Alternative 2 is very similar to the alternative that was identified as Alternative 7 in the PSMP FEIS which was selected as the preferred alternative in that document. These alternatives are described in more detail below.

2.1 Alternative 1: No Action

The No Action Alternative represents a continuation of the Corps current operational practices of managing the LSRP. The Corps would not conduct channel maintenance dredging. The Corps would continue its ongoing monitoring of accumulated sediment that affects the existing authorized project purposes of the LSRP as described in Section 2.2.1 (Problem Identification) of the PSMP FEIS.

The Corps would continue to adjust reservoir operations as an interim measure to increase water levels to maintain commercial navigation. The Corps would manage pool levels within the allowable operating range for the Lower Granite Reservoir to maintain 14 feet of water depth, if possible, over areas where sediment deposition has occurred in the channel. When possible, the Corps would operate the Lower Granite reservoir at MOP, or as close to MOP as possible, during the juvenile salmonid outmigration season (typically from April through August, but as late as October in Lower Granite Reservoir), and at varying levels within the reservoir's operating range through the rest of the year, or as necessary to support navigation. Modifying reservoir operations provides the Corps the option of operating above MOP to maintain adequate navigation channel (or berthing area) depth to support commercial navigation.

Reservoir operations would continue to be implemented in the lower Snake River, consistent with the terms and conditions of the 2020 National Marine Fisheries Service (NMFS) *Federal Columbia River Power System Biological Opinion*, and associated Endangered Species Act (ESA) consultation, and other applicable requirements, to address sediment accumulation that interferes with navigation.

2.2 Alternative 2: Immediate Need Dredging

The Corps proposes to perform maintenance dredging and associated sediment disposal in the winter 2022/2023 in-water work window to restore the federal navigation channel to the Congressionally authorized 14-foot depth as measured at MOP, and 250 feet wide, or as increased under other applicable law/regulation, at four locations in the lower Snake River and Clearwater River in Washington and Idaho (Figure 2-1).

The 14-foot minimum depth is the depth required to safely and efficiently pass large boats and barges and the Corps is authorized by the Flood Control Act of 1962 (Public Law 87-874) to maintain this depth. In order to ensure a depth of 14 feet, the Corps would dredge to a depth up to 16 feet. The dredging depth consists of the main 14 feet, plus one foot for advanced maintenance, and up to an additional foot for over dredging, which accounts for any depth inaccuracy of the dredging method.

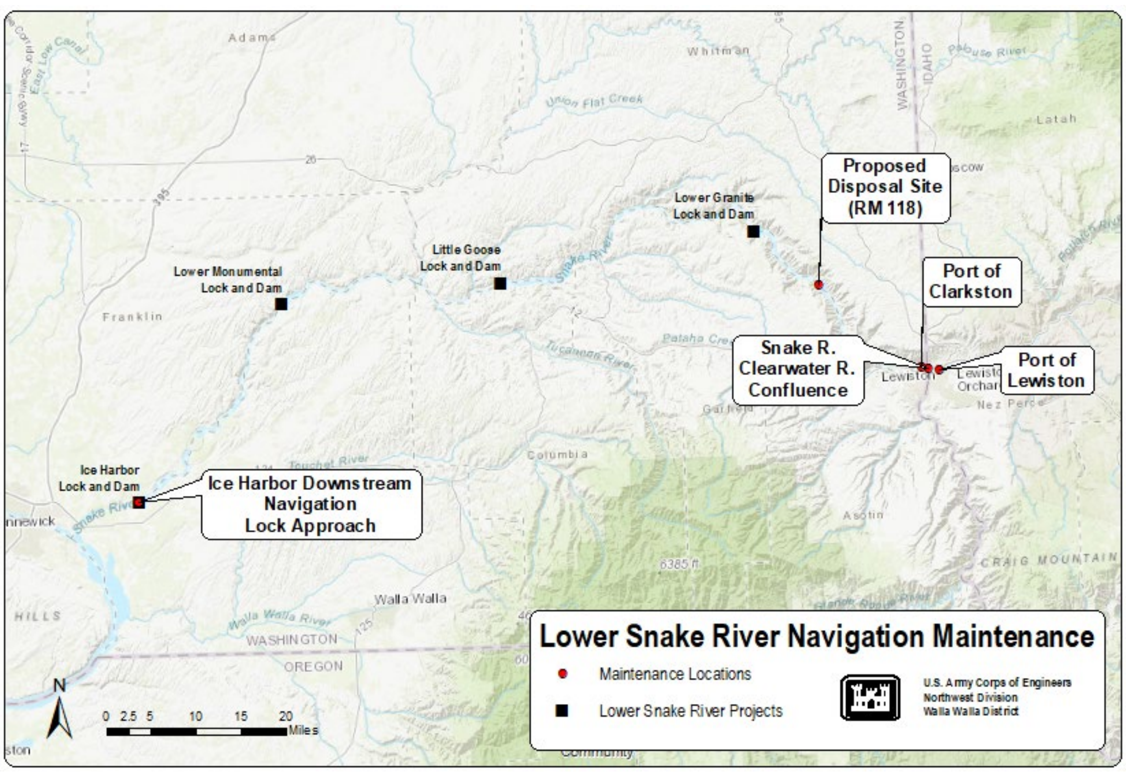

Figure 2-1. Project action area map of the lower Snake River hydro system and navigation system

The proposed dredging sites in Lower Granite Reservoir are: the federal navigation channel (Snake RM 138 to Clearwater RM 2) and the berthing areas for the Port of Lewiston (Clearwater RM 1-1.5) and Port of Clarkston (Snake RM 137.9 and 139), and two access channels between the Port of Clarkston docks and the federal navigation channel. The Ports are responsible for funding berthing area maintenance and some associated environmental compliance/permits (e.g., Clean Water Act Section 404 and Rivers and Harbors Act Section 10). The proposed footprint for dredging the federal navigation channel is smaller than it has been in the past. Due to the decreased federal navigation channel footprint, it is now necessary to dredge access channels to connect the navigation channel to the Port of Clarkston docks.

Another proposed dredging site is the downstream navigation lock approach for Ice Harbor Dam (Snake RM 9.5). Sedimentation in the Ice Harbor Dam navigation lock approach is interfering with the ability of barge traffic to safely maneuver when entering or exiting the navigation lock. Spill flows over the spillway have scoured rock from the base of the four rock-filled coffer cells bordering the lock approach and have pushed material from the edge of the lock approach into the channel, narrowing the room available for barges to maneuver between the coffer cells and the north shore. In addition, at least one of the coffer cells has been losing rockfill through the exposed base and this may be contributing to the material encroaching in the lock approach. This material has created a shoal that encroaches across the south half of the lock approach, reducing the depth to about 9 feet. Temporary repairs to the coffer cell were attempted in 2012, but these repairs were not totally successful.

Table 2-2 lists the sites proposed for dredging during the winter 2022/2023 in-water work window (December 15 to March 1) and the estimated quantities of material to be removed from each site. Sediment is expected to continue to accumulate at these locations while this action is being planned, therefore the amount of material to be removed at the time of the dredging would likely be greater than what is shown in this table.

Table 2-2. Sites Proposed for Immediate Maintenance Dredging

Site to be Dredged	Estimated Quantity to be Dredged (cy)[1]
Federal navigation channel at confluence of Snake and Clearwater Rivers (Snake RM 138 to Clearwater RM 2)	162,040
Port of Clarkston (Snake RM 137 and 139)	21,600
Port of Clarkston Access Channels	67,740
Port of Lewiston (Clearwater RM 1-1.5)	4,380
Ice Harbor Navigation Lock Approach (Snake RM 9.5)	2,150
Total	**257,910**

Note: [1] Based on removal to 16 feet below MOP using survey data from 2021.

2.2.1 Areas To Be Dredged

2.2.1.1 Snake/Clearwater Confluence in Lower Granite Reservoir

Confluence of Snake and Clearwater Rivers (federal navigation channel). About 162,040 cy of material would be removed from the federal navigation channel at the confluence of the Snake and Clearwater Rivers (Figure 2-2 and Figure 2-3).

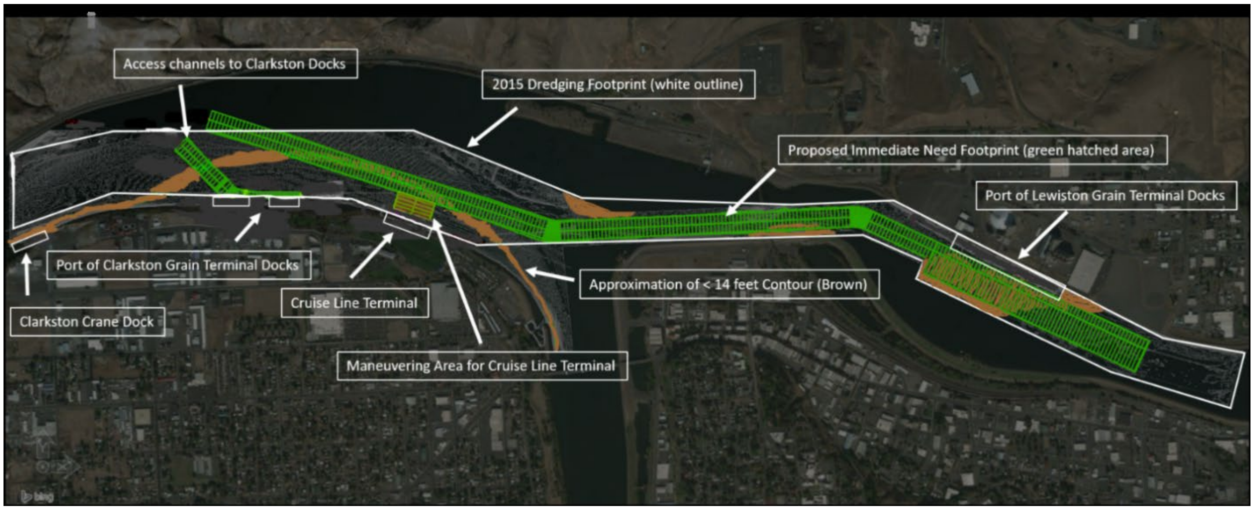

Figure 2-2. Dredging Footprint.

The federal navigation channel has a maximum total width of 450 feet in front of the Lewiston grain terminal dock. This wider area allows for maneuvering of barge tows at the terminus of the navigation system in accordance with 33 U.S.C. § 562, "Channel dimensions specified shall be understood to admit of such increase at the entrances, bends, sidings, and turning places as may be necessary to allow for the free movement of boats."

Sediment samples were collected in September and October 2019 from the main navigation channel in the confluence area. The average percent sand and fines (i.e., small particles of sediment, generally silts and clays) from the 2019 samples was 96 percent and 4 percent, respectively. Sediment samples were analyzed for contaminants. Sediment was determined to be suitable for in-water disposal.

Analytical Resources, Inc. (ARI) provided laboratory analytical services for the project (except particle-size analysis). ARI completed sample handling and analysis in accordance with SEF, DMMP User Manual, and Puget Sound Estuary Program procedures. EcoChem provided data validation services for the project. Stage 2B validation was completed on 100% of the data (not including bioassay testing). Independently from the Stage 2B validation, Stage 4 validation was completed on the dioxin/furan data. EcoAnalysts completed Level 2B bioassay testing for the project.

Figure 2-3. Edges of Shallow Areas in Green (less than 16 feet at MOP) within the Confluence Area.

Access Channels. Due to the modified federal navigation channel footprint described above, two access channels would need to be dredged to connect the navigation channel to the Port of Clarkston's docks. Approximately 67,740 cy of material would be removed from the access channels.

Port of Clarkston. Approximately 21,600 cy of material would be removed from four berthing areas at the Port of Clarkston: the crane dock at the downstream end of the port property, the grain terminal dock, the recreation dock, and the cruise line terminal dock at the upstream end (Figure 2-4). The berthing area is defined as a zone extending approximately 50 feet out into the river from the port facilities and running the length of the port facilities. Maintenance in this area is the port's responsibility, and the Port of Clarkston would provide funding to the Corps for this portion of the dredging. This area was last dredged in 2015. Sediment surveys in 2019 showed that sediment composition was primarily of 64- to 93-percent sand and 7- to 36-percent fines. Sediment samples were analyzed for contaminants. Sediment was determined to be suitable for in-water disposal.

Figure 2-4. Port of Clarkston Dredging Areas.

Port of Lewiston. Approximately 4,380 cy of material would be dredged from the berthing area at the Port of Lewiston (Figure 2-5). The berthing area is defined as a zone extending approximately 50 feet out into the river from the port facilities and running the length of the port facilities. Maintenance in this area is the port's responsibility, and the Port of Lewiston would provide funding to the Corps for this portion of the dredging. The area was last dredged in 2015. Sediment surveys in 2019 showed that sediment composition was 97 percent sand and 3 percent fines. Sediment samples were analyzed for contaminants. Sediment was determined to be suitable for in-water disposal.

Figure 2-5. Port of Lewiston Dredging Area.

2.2.1.2 Ice Harbor Lock Approach

About 2,150 cy of material would be dredged from the Ice Harbor Dam lock approach (Figure 2-6 and Figure 2-7). This is the estimated quantity associated with dredging to a depth of 16 feet below MOP. Dredging last occurred in this area in 2015. Sediment sampling in 2011 showed that sediment composition was large rock substrate and cobbles greater than or equal to 2 to 6 inches. Sediment samples were analyzed for contaminants. Sediment was determined to be suitable for in-water disposal.

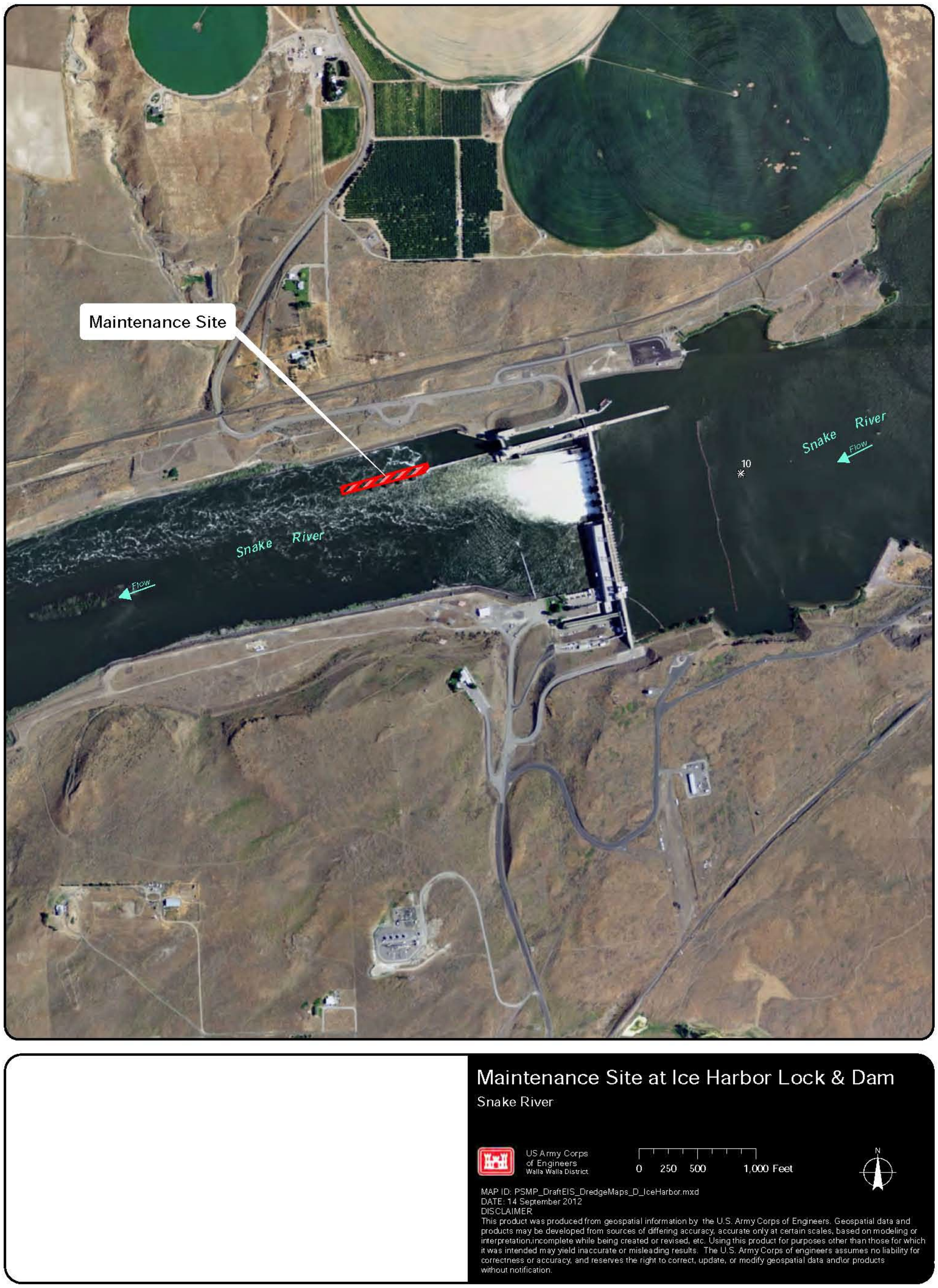

Figure 2-6. Dredging Location at Ice Harbor Navigation Lock Approach.

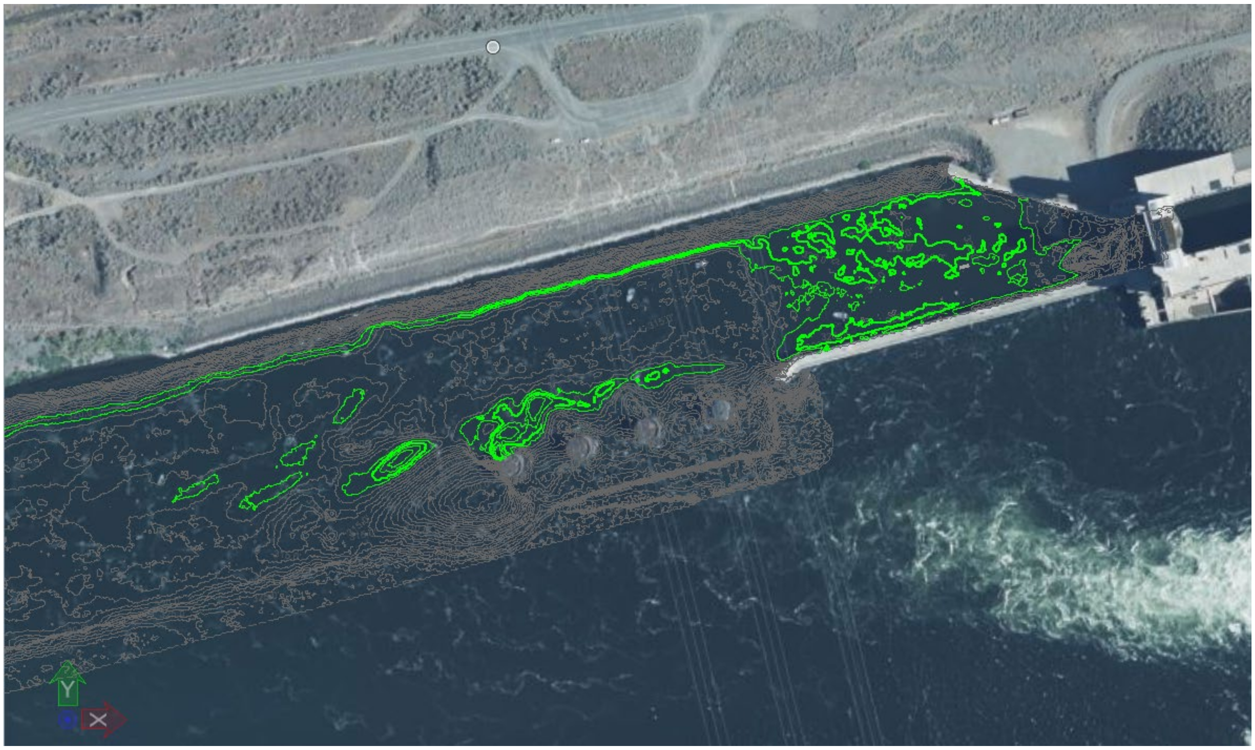

Figure 2-7. Shoaling at Ice Harbor Navigation Lock Approach. Areas less than 16 feet deep at MOP are in green.

2.2.2 Dredging Methods

Dredging would be accomplished by a contractor using mechanical methods, such as a clamshell, dragline, or shovel/scoop operating from a floating barge. Based on previous dredging activities, the method to be used would likely be a clamshell. Material would be dredged from the river bottom and loaded onto barges for transport to the disposal site. Clamshell dredges with a capacity of approximately 15 cy and barges with capacity of up to 3,000 cy and maximum drafts of 14 feet would likely be used. It would take about 6 to 8 hours to fill a barge. The expected rate of dredging is 3,000 to 5,000 cy per 8-hour shift. The contractor could be expected to work up to 24 hours per day and 7 days per week if needed. Material would be scooped from the river bottom and loaded onto a barge, most likely a bottom-dump barge. While the barge is being loaded, the contractor would be allowed to overspill excess water from the barge, to be discharged a minimum of 2 feet below the river surface. Turbidity monitoring would take place upstream (for background) and downstream of the dredge as described in the Current Immediate Need Navigation Channel Maintenance Dredging Monitoring Plan, May 2022 (Appendix A). The data would be collected near real-time so that timely measures can be taken to avoid exceeding Washington and Idaho state water quality standards. These are the same procedures used during the previous dredging action in 2015.

2.2.3 Sediment Disposal

Several potential disposal sites were evaluated in the Corps' July 2022 Clean Water Act *Lower Snake River Navigation Channel Maintenance Current Immediate Need Section*

404(b)(1) Evaluation (Appendix B) but eliminated from further consideration. An in-water disposal site near Bishop Bar (River Mile 118) was selected as the least environmentally damaging practicable alternative (LEDPA). The dredged material would be transported by barge to the disposal area, where the material would be placed within the designated footprint. The disposal area footprint is close to the shoreline and extends towards the center of the channel. The dredged material would be placed in steps. The first step would be to place the cobbles from the Ice Harbor navigation lock approach either on the bottom of the disposal site or along the outer edge of the planned disposal area footprint. This would be followed by placing a mixture of the silt, sand, and gravel/cobble, to fill the mid-depth portion of the site and form a base embankment, 20 feet below the MOP elevation.

In-water sediment disposal in Lower Granite Reservoir needs to take place downstream of RM 120 to avoid raising the water surface elevation at the confluence of the Snake and Clearwater Rivers (PSMP FEIS, Appendix L, Page L-16). Material placed in-water upstream of RM 120 can raise the water level upstream and impede the ability of high flows to move through the channel. The original (pre-dam) river bottom is owned and managed by Washington Department of Natural Resources, but the Corps is authorized to engage in dredging of sediment within the original channel under the superior right of "navigational servitude."

Bishop Bar Located at River Mile 118

Bishop Bar is an approximately 29-acre submerged bench located in the Lower Granite Reservoir between RM 118 and 119 and is comprised of a large bench on the right bank just downstream of Blyton Landing. The site is located outside of the federal navigation channel, and experiences lower velocities than the main thalweg, which is the line of lowest elevation within the river (Figure 2-8) (see Appendix C - *Hydraulic Evaluation of the Bishop Bar Disposal Site*).

The new material would occupy a 23-acre footprint and would form a uniform, gently sloping area along 750 linear feet of shoreline. The top of the disposal area would be 20 feet below MOP and would slope down at 15% to the river bottom (approximately 63 feet below MOP).

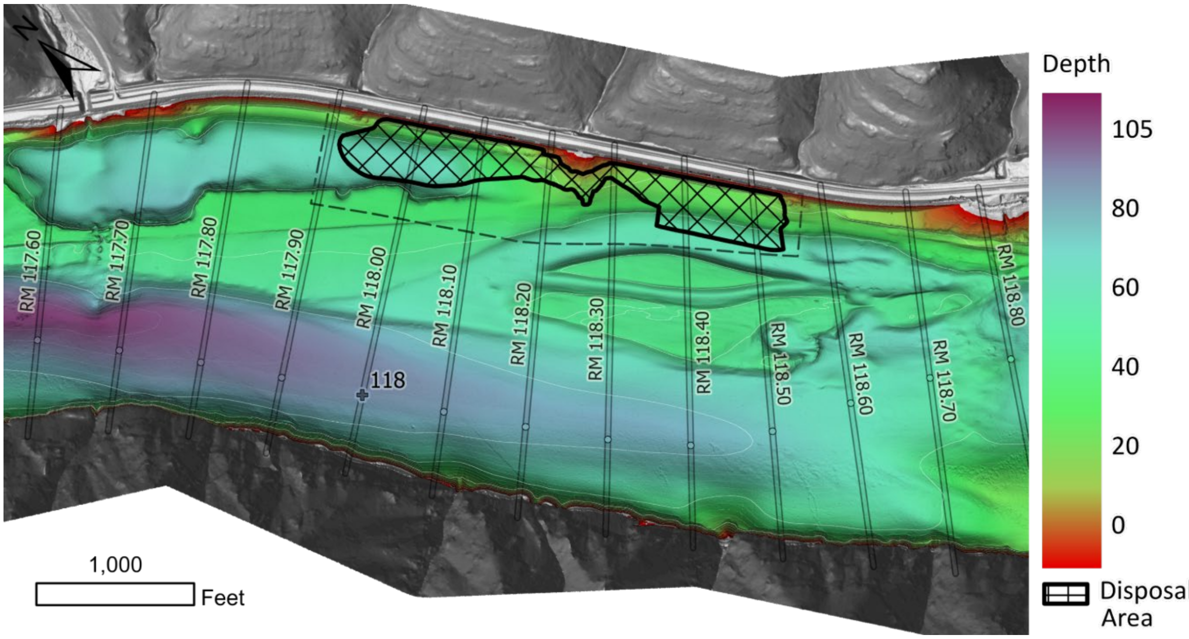

Figure 2-8. Depth Map of Proposed RM 118 in-water Disposal Site.

2.2.4 Sequence of Proposed Action Construction Elements

Construction activities would occur in the following order:

1. Mobilization of equipment to the Ice Harbor Dam navigation lock approach
2. Dredging of the lock approach
3. Water quality monitoring at the dredging and disposal sites
4. Movement of equipment and dredged material up to the disposal site at RM 118
5. Placement of the dredged material at the disposal site
6. Movement of equipment to lower Snake River/Clearwater River confluence dredging sites
7. Dredging the federal navigation channel, access channels, the Port of Lewiston, and the Port of Clarkston
8. Transport and placement of dredged material at RM 118
9. Demobilization of equipment when all dredging and disposal is complete
10. Monitoring the new sediment in the disposal area for stability

2.2.5 Timing of the Proposed Action

All dredging would be performed within the established in-water work window, which is December 15 through March 1. Multiple-shift dredging workdays would be used when necessary to ensure that dredging is completed within this window. Dredging would begin at the Ice Harbor navigation lock then move upriver to the lower Snake River/Clearwater River confluence sites. It would take about 6 to 8 hours to fill a barge. The expected rate of dredging is 3,000 to 5,000 cy per 8-hour shift. The contractor could be expected to work up to 24 hours per day and 7 days per week in order to ensure all work is completed during the in-water work period.

2.2.6 Monitoring

The Corps, through its dredging contractor, would conduct turbidity and biological monitoring during dredging and disposal activities to ensure it is meeting applicable state water quality standards (for Washington and Idaho) and complies with the Endangered Species Act (ESA) while performing these activities. The Corps is anticipating turbidity monitoring requirements in the Biological Opinions from the Services - National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). The Clean Water Act Section 401 water quality certification received from the Washington State Department of Ecology on August 30, 2022 requires turbidity monitoring.

Monitoring the placed dredged material stability would be accomplished by hydrographic surveys soon after disposal is complete and periodically in the future to determine if the embankment slumped or moved. This information would inform any potential future sediment disposal efforts. See the Monitoring Plan (Appendix A).

2.2.6.1 Turbidity Monitoring

During the dredging and disposal activities, the Corps' contractor would monitor to ensure turbidity standards are met as per the Clean Water Act Section 401 water quality certifications issued by the Washington State Department of Ecology to the Corps and the Idaho Department of Environmental Quality issued to the Port of Lewiston. The Corps would monitor depth and turbidity before, during, and after all in-water work at each active dredging site and at the disposal site. The equipment would have the capability to transmit the data via satellite or cell phone telemetry rather than having to be downloaded at each station in the field (Figure 2-9). Turbidity would be evaluated by comparing 15-minute data recorded at two depths in the water column at the early warning and compliance boundary downstream of the dredging or disposal area with data recorded at the upstream background station.

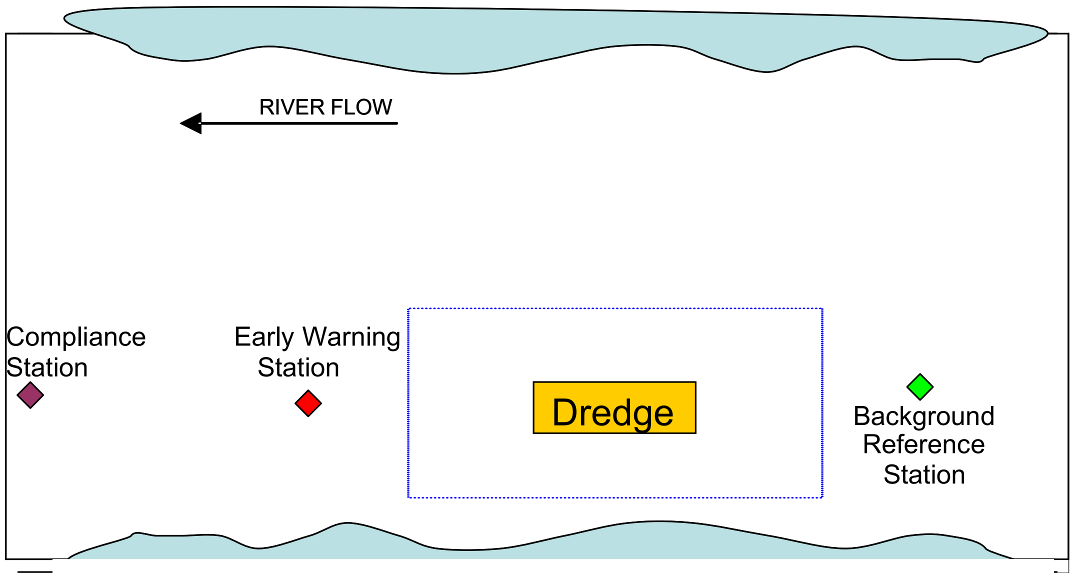

Figure 2-9. Conceptual Schematic of Turbidity Monitoring Locations During Dredging Activities.

2.2.6.2 Biological

Biological monitoring includes fish monitoring. The Corps' contractor would monitor for sick, injured, or dead fish. They would visually monitor the waters surrounding the dredging and disposal activities as well as visually observing the content of each clamshell bucket as it discharges in the barges. If a sick, injured, or dead specimen is encountered, it would be placed in a container of cold river water until it could be determined if it was a species listed under the ESA. If it is a listed species, the contractor would notify the Corps and the Corps would then contact the appropriate Service (USFWS or NMFS) as soon as possible for further instructions. If a healthy fish gets entrained by the dredging operations, the Corps would make every reasonable attempt to return the specimen safely back to the river.

2.2.7 Surveys

2.2.7.1 Bathymetric

A pre-dredging hydrographic survey of the navigation channel, the access channels, the port facilities, and the disposal area would be conducted immediately prior to (within a few weeks of) dredging to establish an accurate volume of sediment that needs to be dredged. This survey would be used as the baseline for comparison with a post-dredging survey to verify the volume of sediment dredged. Post-dredging and disposal would also include hydrographic surveys to ensure the disposal site is constructed as planned. The Corps would perform follow up surveys within a few weeks of dredging and disposal to ensure the minimum dredging requirements were met.

2.2.7.2 Lamprey

The Corps proposes to survey for the presence of juvenile lamprey in areas to be dredged several weeks prior to the start of dredging. The survey methods would likely include electro-fishing along the river bottom and video surveillance of juvenile lamprey that would be temporarily displaced from the sediment. Adult lamprey translocations have been occurring for several years and existing lamprey data may not reflect the results of these translocation efforts. Unlike juvenile salmonids in the lower Snake River, juvenile lamprey of various age classes are present in freshwater year-round; therefore in-water work windows that avoid all life stages of lampreys are not available.

If possible, freshwater mussel presence data would also be collected during the lamprey survey.

2.2.7.3 Salmon Redds (Ice Harbor)

Pre-dredging monitoring includes fall Chinook redd surveys within the Ice Harbor navigation lock approach. Based on multiple years of surveys since 1993, no fall Chinook redds have ever been found within the navigation lock approaches of any of the lower Snake River dams (Mueller and Coleman 2007, Mueller and Coleman 2008), but potential habitat does exist in these areas. Since potential spawning habitat exists within the footprint of the proposed dredging area of the Ice Harbor Dam tailrace, the proposed action may have the potential to disturb or harm eggs and alevins in redds if found to be present immediately prior to or during the proposed dredging activities. In an effort to avoid disturbing or harming fall Chinook redds, the Corps would conduct underwater surveys of the proposed dredging site at the Ice Harbor navigation lock in November and the first two weeks of December in 2022 prior to commencing dredging.

Techniques similar to those used by Battelle from 1993 to 2008 (Dauble et al. 1994-1997; Mueller and Coleman 2007, 2008) would be employed. This technique has used a boat mounted underwater video camera tracking system to look at the bottom of the river to identify redds. Results of the surveys would be transferred to the Corps within two days of the survey dates in order for compilation prior to December 15, at which time the Corps can communicate results to NMFS for appropriate action. If no redds are located, then the Corps would proceed with proposed dredging within the boundaries of the surveyed template. If one or more redds are located within the proposed dredging template and such redds are verified with video, then the Corps would coordinate with NMFS to determine what the appropriate avoidance and protection actions should be prior to dredging the affected location. Please see the monitoring plan (Appendix A) for further details.

2.2.8 Timeline

Under the proposed action all dredging and disposal actions would occur during the in-water work window from December 15 to March 1. The proposed dredging work would take the entire in-water work window to be completed. This in-water work window was established through coordination with state and federal resource agencies as the time period in which in-water work could be performed with the least impact to ESA-listed salmonid stocks. The Corps would implement the current immediate need action during the first available in-water work period following completion of the NEPA process with the signing of a Finding of No Significant Impact (FONSI), if an EIS is not determined necessary, and funding is made available. The Corps is anticipating performing the maintenance dredging during the 2022/2023 in-water work window. Surveying and monitoring would occur at any time prior to, during, and after the in-water work window.

2.2.9 Impact Minimization Measures

The following impact minimization measures will be implemented:

1) Dredging will commence no earlier than December 15 and conclude no later than March 1.
2) Equipment will be inspected for leaks and cleaned prior to working. Any detected leaks will be repaired before the work begins.
3) A spill prevention and control plan will be developed and discussed with equipment operating personnel prior to work.
4) A survey for redds will occur below the Ice Harbor navigation lock prior to dredging. If Snake River Fall Chinook salmon redds are discovered within the dredging footprint, the Corps will notify NMFS. The two agencies will jointly determine the appropriate course of action.
5) Turbidity monitoring will be conducted at the dredging and disposal sites in near real-time so that operational changes can occur rapidly if water quality standards are exceeded.
6) Dredging and disposal activities will be concluded during a single in-water work window.

2.2.10 Best Management Practices

Typical best management practices (BMPs) depend on site-specific conditions but will generally include the following.

1) The Corps will minimize take of ESA-listed species from dredging and disposal operations by monitoring pre-dredging and during disposal.
2) In-water disposal will only occur at the Bishop Bar, RM 118 disposal site.
3) If the Corps or its contractor observes that a threatened or endangered species has been entrained by dredging operations, every reasonable attempt will be made to return the specimen safely back to the river. If a sick, injured, or dead specimen of a threatened or endangered species is observed, the finder must notify the Corps Contracting Officer or representative immediately. The Corps will then contact NMFS or USFWS.

3 Affected Environment and Environmental Consequences

This section describes the existing affected environment (existing condition of resources) and evaluates potential environmental effects to those resources for each alternative. Although only relevant resource areas are specifically evaluated for impacts, the Corps did consider all resources in the proposed project area and decided which ones to evaluate. The following resource areas were evaluated: Sediment, Water Quality, Aquatic Resources (including threatened and endangered species), Recreation, Terrestrial Resources (including threatened and endangered species), Socioeconomics and Environmental Justice, Historic and Cultural Resources, and Cumulative Effects. It was determined that it was not necessary to evaluate Noise, Land Use, Climate Change, Aesthetics/Visual Quality, or Air Quality as implementation of the proposed action would have only minimal, negligible impacts those resources (Table 3-1).

Table 3-1. Environmental Resources not evaluated further.

Environmental Component	Explanation
Noise	The proposed action is located within a rural area with relatively few noise sources. Sources may include boat and barge operation along the Snake River and trains, aircraft, and vehicle use.
Land Use	The proposed action would not change or alter the current land uses surrounding the navigation channel.
Climate Change	Climate change would not impact the proposed action nor would the proposed action impact climate change.
Aesthetics/Visual Quality	Proposed dredging and disposal would take place underwater and would not be visible. Dredging equipment on the water would be temporary and not significantly alter the aesthetics or visual quality of the landscape.
Air Quality	The project area meets ambient air quality standards and is in “attainment” in Washington and Idaho.

The following descriptors are used in the body of this chapter for consistency in describing impact intensity.

- No or Negligible Impact: The action would result in no impact, or the impact would not change the resource condition in a perceptible way. Negligible is defined as of such little consequences as to not require additional consideration or mitigation.
- Minor Impact: The effect to the resource would be perceptible; however, not major, and unlikely to result in an overall change in resource character.
- Moderate Impact: The effect to the resource would be perceptible and may result in an overall change in resource character. Moderate impacts are not significant due to their limited context (the geographic, biophysical, and social context in which the effects would occur) or intensity (the severity of the impact, in whatever context it occurs).
- Significant Impact: The effect to the resource would be perceptible and severe. The effect would result in an overall change in resource character and require the completion of an Environmental Impact Statement.

3.1 SEDIMENT

3.1.1 Affected Environment

3.1.1.1 *Sediment Transport*

Sediments are carried to the river through erosion. Erosion is caused by processes such as wind, rainfall, snowmelt, runoff, and channel migration. Naturally occurring events such as wildfires, large storms, and landslides can increase the potential for these processes to contribute higher sediment loads to watershed streams. Human disturbance of the land through activities such as development, timber harvesting, mining, agricultural activities, and construction of roads can expose or loosen soil and increase sediment loads. Agricultural activities are the major land use practices in the lower Snake River (LSR) subbasin. Agricultural areas contribute mostly fine-grained sediments (silts and clays) to the LSR. The river channels themselves may also erode and transport fine to coarse (sand and gravel) sediment by channel migration and by moving landslide and mass-wasting debris that makes its way into or near the channel. Most coarse sediment is derived from the actual erosive force of the river channels and their tributaries and from mass-wasting and landslides in the vicinity of the rivers.

Eroded sediment in a stream or reservoir moves when the moving water that contains it reaches a certain flow velocity. The flow velocity required to move sediment is higher for large particles and lower for fine particles. Most fine sediment that enters the tributaries of the Clearwater, Salmon, and Grande Ronde Rivers through erosion is eventually transported into the Snake River. Fine materials typically remain in suspension through the reservoirs. The fraction of sediment that is composed of larger particles, or the coarser-grained sediment (gravel, cobble), moves very slowly through the river system (years, decades, and centuries) and is not a major component of sediment deposition in the navigation channel. The finer-grained sediment fraction (sand and silt) is the more mobile portion of the sediment load that moves quickly through the river systems (days to months to years) and enters the navigation channel. A portion of the sediment that is eroded and enters streams within the watersheds of the Lower Snake River (LSR-Lower Granite, Little Goose, Lower Monumental, and Ice Harbor reservoirs) is conveyed to Lower Granite Reservoir and the reservoirs downstream. This is the portion of the accumulated sediment that sometimes interferes with navigation.

3.1.1.2 *Sediment Quality*

Agriculture and urban land cover accounts for most of the total study area (TetraTech 2006). Agriculture within the watershed study area and surroundings predominantly consists of dryland crop farming, for which fungicides, pesticides, and herbicides are typically used. Sediments from agricultural and urban land could potentially carry chemical constituents into the lower Snake River.

Sediment samples have been collected from various locations within the lower Snake River projects since at least 1985 (Crecelius and Gurtisen 1985; Pinza et al. 1992a, 1992b; Anatek 1997; HDR 1998; CH2M Hill 1997, 1999, 2000; Corps 1988, 2002a, 2002b, 2013b; Heaton and Juul 2003; Gravity Consulting 2013; SEE et al. 2014). Most of these studies were linked directly to the Corps dredging authorities and projects and focus predominantly on the Snake and Clearwater rivers confluence area. Sediment was sampled in 2019 from proposed dredging sites in the LSR and determined to be suitable for in-water disposal by the Dredged Material Management Office.

3.1.2 Environmental Consequences

3.1.2.1 *Alternative 1: No Action Alternative*

The No Action Alternative would not measurably affect sedimentation in the LSRP. This alternative would not directly affect the volume of sediment transported or accumulating in the LSRP. Sediment would continue to enter the LSRP system and would likely accumulate in the reservoirs, including areas where sediment would interfere with navigation. If the No Action Alternative was implemented, there would be no change (and therefore, no effect) to sediment. Pool levels would be maintained at the higher end of reservoir operating ranges to aid in navigation and other uses of the river.

3.1.2.2 *Alternative 2: Proposed Action – Immediate Need Dredging*

Sediment to be dredged has been determined to be suitable for in-water disposal and neither the dredging nor the disposal would affect sediment quality. There would be no impact on sediment quality. The proposed action would not affect sediment transport either due to the disposal location's slower water velocities.

3.2 WATER QUALITY

3.2.1 Affected Environment

The water quality in the Snake River Basin, to include the proposed dredging sites, is affected by many past and present influences, including human population growth and associated pollutants, water withdrawal for irrigation (and irrigation return flows), dam structures and operations (federal and non-federal), and land use practices including mining, domesticated livestock, agriculture, industry (pulp and paper mills), logging (silviculture and forest management), and recreation (e.g., shoreline erosion).

The State of Washington has designated the LSR and its tributaries to be protected for the following uses: salmon spawning, rearing, and migration; primary contact recreation; domestic, industrial, and agricultural water supply; stock watering; wildlife habitat; harvesting; commerce and navigation; boating; and aesthetic values (Washington Administrative Code 173-201A-600). The water quality of the Clearwater River near the Port of Lewiston is fully supporting biological beneficial use for bull trout and is not impaired.

The Clean Water Act requires states to perform a water quality assessment every two years to track how clean the rivers, lakes, and marine water bodies are. The Washington State Department of Ecology (Ecology) has placed reaches of the LSR in the proposed action area on the Clean Water Act Section 303(d) list due to impairment by temperature, dissolved oxygen, and total chlordane. Chlordane is an organochlorine compound used as a pesticide for termite-treatment until it was banned in 1988. Chemical contamination can become high in waterbodies due to agricultural runoff.

Water temperature is generally high in the summer months, though it is moderated by summer cold-water releases by the Corps from Dworshak Dam, which are used to reduce water temperatures downstream in the LSR where temperatures historically exceeded the current Washington State standard of 68°F (20°C). The cooling effect in the LSR diminishes at each successive downstream reservoir and the frequency of exceedances above the standard increases.

Water temperature is one of the most important characteristics of an aquatic system affecting dissolved oxygen levels. The solubility of oxygen decreases as water temperature increases, so cold water can hold more dissolved oxygen than warm water. In winter and early spring, when the water temperature is low, the dissolved oxygen concentration is higher. In summer and fall, when the water temperature is high, the dissolved-oxygen concentration is low which can be harmful to aquatic life.

3.2.2 Environmental Consequences

3.2.2.1 *Alternative 1: No Action Alternative*

Alternative 1 would not require construction or noticeably affect water quality in the target areas. Maintaining pool levels at the higher end of reservoir operating ranges is unlikely to affect temperatures and thermal stratification in the reservoirs, or otherwise affect water quality. The No Action Alternative would have no or negligible effects to water quality.

3.2.2.2 *Alternative 2: Proposed Action –Immediate Need Dredging*

This alternative could have minor to moderate, intermittent, short-term effects on water quality in both the Snake and Clearwater Rivers, primarily due to mobilizing sediments that could increase turbidity levels during dredging and dredged material management that utilize in-water placement of sediment. At dredging sites, minor water quality impacts would occur for a short distance downstream while the dredge is operating. At the in-water disposal site, moderate adverse effects would occur while dredged material is placed and up to a few hours afterwards. At dredging and disposal locations, only a small portion of the river would be affected.

Dredging and associated disposal is not anticipated to affect water temperature. Water temperatures would remain the same as the current condition, fluctuating daily and seasonally.

Increased turbidity in the lower Snake River is a naturally occurring condition, especially during higher flows and the spring freshet. Dredging and in-water disposal activities would be temporary and would cause minor, localized effects by increasing turbidity and suspended solids. Background turbidities in the lower Snake River generally do not exceed 10 Nephelometric Turbidity Units (NTUs). As early as the 1940s, Van Oosten (1945) concluded from a literature survey that average turbidities as high as 200 NTUs are harmless to fish. Newcombe and Jensen (1996) provide a more robust risk analysis of the effects of turbidity upon salmonids and show that prolonged exposure to turbidity levels greater than 100 NTU can affect long-term feeding success.

The material to be dredged at Ice Harbor is mostly cobble with no fine sediment. Most of the material to be dredged at the Snake River/Clearwater River confluence is sand. However, dredging in areas with finer sediments, such as the Ports of Lewiston and Clarkston, is likely to have the greatest effect due to increased turbidity levels, but still minor, on water quality, but effects would dissipate relatively rapidly once the dredging is complete.

The use of mechanized equipment in the river would increase the potential for a spill or release of hazardous materials such as oil, grease, fuels, or hydraulic fluids into the aquatic environment. If a spill were to occur, these chemicals could have toxic effects on water quality and aquatic organisms. Avoidance and minimization measures would be implemented to prevent spills and releases. Spills would be controlled by measures outlined in the Spill Prevention, Control, and Countermeasures (SPCC) Plan.

3.3 AQUATIC RESOURCES

3.3.1 Affected Environment

This section provides an overview of the aquatic resources present in the project area. Aquatic resources include plankton, benthic species, aquatic plants, and fish. Although most of the research on aquatic resources has focused on Lower Granite Reservoir, this information is also applicable to the Snake River below Ice Harbor Dam in the project area. This section includes information on threatened and endangered aquatic species. Plankton, benthic invertebrates, aquatic plants, and fish are described in Section 3.1 (Aquatic Resources) of the PSMP FEIS (USACE 2014), which is incorporated herein by reference.

3.3.1.1 *Plankton*

Zooplankton and phytoplankton occur throughout the LSRP and form an important part of the aquatic food chain. Both phytoplankton and zooplankton are food sources for larger aquatic organisms, and high concentrations of zooplankton in backwater areas can attract smaller prey species that feed on these organisms. In turn, high concentrations of prey fish can attract larger predatory fish species (Corps 1999, 2002a).

Zooplankton can compose an important component to the diet of rearing anadromous and resident fish species (Bennett et al. 1983). The times of year when zooplankton and phytoplankton are most active can be measured by assessing the primary productivity within the LSRP. This measure is used to describe the rate that plants and other photosynthetic organisms produce organic compounds in the ecosystem. Primary productivity in the lower Snake River reservoirs has been measured at its lowest during December and highest from March through May (Seybold and Bennett 2010).

3.3.1.2 *Benthic Species*

Benthic organisms contribute significantly to the diets of many riverine and reservoir fish species. The benthic invertebrate community consists of organisms such as aquatic worms, insects, crayfish, and mussels that live on the river bottom. These benthic organisms, also referred to as macroinvertebrates, significantly contribute to the food chain by providing a food source for fish and other aquatic species. Where reservoirs are established, the invertebrate species composition and abundance convert from flowing riverine species typically found in the shallower and higher velocity environments of the pre-dam river to still water or open water reservoir invertebrate species found in deeper and slower velocity environments of the post-dam reservoir.

Species diversity of macroinvertebrate communities at shallow sites can increase with downstream movement or colonization of drifting organisms scoured from upriver habitats (Bennett et al. 1983). Some of these organisms "drift" in the upstream portion of the reservoirs primarily in the seasons of higher flow, which increases their availability to rearing and downstream-migrating juvenile salmonids and resident fishes.

Studies from the 1980s indicate that shoreline areas less than 15.5 feet deep generally had the highest invertebrate abundance, species diversity, and species evenness (similar number of individuals for each species) in the Lower Granite Reservoir (Bennett and Shrier 1986, Bennett et al. 1988). These studies also found that annual and seasonal population abundance was more variant for species exhibiting seasonal emergence as they pupated into adults and left the aquatic environment (e.g., chironomids) than species that are aquatic through all life stages (e.g., aquatic oligochaetes – worms).

Chironomids, a type of fly that resembles mosquitoes, can make up a substantial portion of the diets of juvenile salmonids and other local fish species. Chironomids are most likely located in sandy silt sediments and decrease in both finer and coarser sediment-type environments. The chironomid communities within the LSRP are composed of several different species, thus resulting in chironomids being readily susceptible to predation by rearing salmonid smolts across the duration of the smolt migration season.

Crayfish are an important component to the diet of smallmouth bass, northern pike minnow, channel catfish and white sturgeon, and predominantly inhabit shallow water riprap areas from which they forage riverward for oligochaetes and other soft-substrate inhabitants (Bennett et al. 1983; Zimmerman 1999). Crayfish were found in the Lower Granite Reservoir during the physical drawdown test in 1992 (Bennett et al. 1995a; Curet 1994), and in the unimpounded Snake River between Lower Granite Reservoir and Hells Canyon Dam (Nelle 1999). The important role of crayfish in resident and predatory fish diets is extensively documented in both Lower Granite Reservoir (Bennett et al. 1988; Zimmerman 1999) and in the unimpounded Snake River upriver of Lower Granite Reservoir (Nelle 1999; Petersen et al. 1999; Zimmerman 1999).

Surveys for and experiments on mollusks in the early 2000s, focusing on listed, rare, or sensitive species in reservoirs, tributaries and mainstem the Snake River in Hells Canyon Idaho and Oregon. The most important result of this study was documentation of the undescribed *Taylorconcha sp.* throughout the Snake River in Hells Canyon, although *Taylorconcha sp.* was not found within 12 miles downstream of Hells Canyon Dam, most likely due to river armoring. Additional results included: 1) the mollusk community was similar throughout the Snake River, except where the Salmon River entered the Snake River; 2) *Taylorconcha sp*. abundance was directly related to the abundance of *Potamopyrgus antipodarum*, a highly invasive snail, and with moderate abundance of detritus; 3) hand-picking cobbles was more efficient than suction dredging for snails and limpets but not for bivalves, 4) the most abundant mollusks were two invasive species, *P. antipodarum* and *Corbicula fluminea;* and 5) only one live small colony of native *Gonidea angulata* (*Unionidae*) and no live *Anodonta californiensis* (*Unionidae*) were found in the survey (Lester et al. 2005). High numbers of nonnative *Corbicula* were also found.

Mollusc diversity in the lower Snake River has been greatly reduced by the impoundment of the Snake River. Prior to impoundment, the lower Snake River likely supported 34 species of molluscs, 33 of which were native to the river. Limited sampling done during the test drawdown produced only seven mollusc species. The current mollusc fauna is dominated by the Asian clam (*Corbicula fluminea*), which became established in the Columbia River in the 1940s. The California floater (*Anodonta californiensis*), a Washington State species of concern, was also found in the sampling. The shortface lanx (*Fisherola nuttallii*) as well as three other snails (western floater *A. kennerlyi*, knobby rams horn *Vorticifex effusa*, and creeping ancylid *(Ferrissia rivularis*), and the bivalve, western ridged mussel (*Gonidea angulata*) were also found in small numbers. All other native species have likely been extirpated.

3.3.1.3 *Fish*

Anadromous salmonids and trout are seasonally present within the project area, with juveniles of some stocks present year-round. Such species include Chinook salmon (*Oncorhynchus tshawytscha*), Coho salmon (*O. kisutch*), sockeye salmon (*O. nerka*), and steelhead trout (*O. mykiss*). Pacific lamprey are also present in the project area. Coho salmon and Pacific lamprey *(Entosphenus tridentatus)* are not listed under the ESA, but are considered a culturally significant resource to local tribes.

Coho salmon were historically abundant in the LSR Basin, but were declared extinct in 1986 (Cichosz et al. 2001 and HSRG 2009). In 1995, in cooperation with the U.S. Fish and Wildlife Service (USFWS), the Nez Perce Tribe initiated a Coho salmon reintroduction program in the Clearwater River subbasin. Reintroduction efforts from this program have been met with marginal success in portions of the watershed. Coho salmon reintroduced in the Clearwater subbasin are considered out-of-Evolutionarily Significant Unit (ESU) and are not listed as threatened or endangered (HSRG 2009).

Coho salmon from the reintroduction program first returned in 1997 when 92 Coho passed over Lower Granite Dam. Coho counts at Lower Granite Dam averaged over 1,730 (Columbia Basin Research 2020). From 2009 to 2019, Coho counts at Lower Granite Dam averaged over 1,730 (Columbia Basin Research 2020). Adult Coho return to the Clearwater subbasin to spawn and typically pass the Lower Granite Dam between September and November (Corps 2002b). After rearing in their natal tributaries for a year, juvenile Coho migrate downstream through the Snake River to the ocean from April and May (Seybold and Bennett 2010 and Arntzen et al 2012).

Pacific Lamprey are anadromous, spawning in freshwater where eggs incubate and larvae rear for several years. Pacific lamprey pass upstream through the project area as adults when returning to spawn in tributaries and downstream as juveniles when migrating to the ocean. Adult Pacific lamprey enter freshwater to spawn (Kan 1975) between April and June and migrate to spawning areas by September (Close et al. 1995). Peak upstream dam passage typically occurs from July through September (Corps 1980-2000).

Pacific lamprey have been observed in small tributaries entering the LSR reservoirs (Wydoski and Whitney 2003), but there are no small tributaries in the proximity of the proposed dredging-disposal action. After hatching, ammocoetes (larval juvenile lamprey) drift downstream to burrow into the substrate sand or mud. Ammocoetes rear in the substrate for 5 to 6 years until they metamorphose into migratory juvenile lamprey. During metamorphosis, they move from low-velocity areas with fine substrates to gravel in moderate current, then finally to gravel and boulder substrates where the currents are stronger (Luzier et al. 2011). Juvenile lamprey habitat use in the LSR is largely unknown, but it is known that migratory juvenile lamprey move downstream after completing metamorphosis in late fall through spring and become parasitic on soft-scaled fish.

3.3.1.4 *Threatened and Endangered Aquatic Species and Sturgeon*

Four anadromous species populations and one resident trout population present in the project area are listed as threatened or endangered under the ESA (Table 3-2). These include Snake River sockeye, Snake River spring/summer-run Chinook, Snake River fall-run Chinook, Snake River Basin steelhead, and Columbia River Basin bull trout. Table 3-2 below lists the populations within the project area as either threatened or endangered. Descriptions of the life histories and use of the project area are provided below.

Table 3-2. Endangered Species Act-Listed Fishes

Population	Designation
Snake River Spring/Summer-run Chinook Salmon	Threatened
Snake River fall-run Chinook Salmon	Threatened
Snake River Sockeye Salmon	Endangered
Snake River Basin Steelhead	Threatened
Columbia River Basin Bull Trout	Threatened

Snake River Spring/Summer-Run Chinook Salmon

Snake River spring/summer Chinook salmon were listed as threatened on April 22, 1992 and include all natural-origin populations in the Tucannon, Grande Ronde, Imnaha, Salmon, and mainstem Snake Rivers. Adult and juvenile spring/summer Chinook salmon generally only migrate through the project area. Spring-run adult upstream migration begins in March and ends in May, while summer-run adult Chinook salmon migration starts later in June through July (Figure 3-1). Juvenile outmigration for both runs occurs from mid-April through mid-June. Spring- and summer-run Chinook salmon spawn in July and August mostly in tributaries to the Snake River, but can use shallow water habitat in the mainstem river channel.

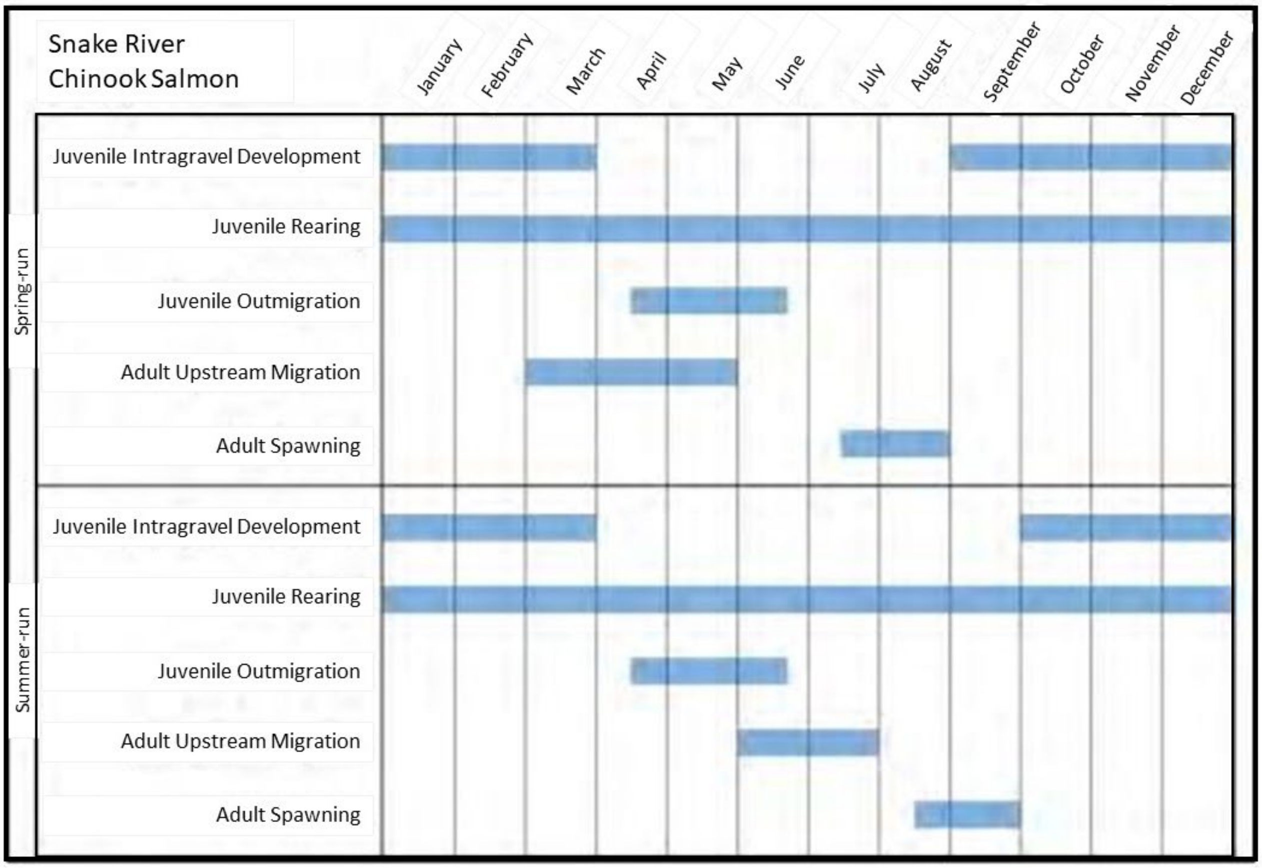

Figure 3-1. Freshwater Life Phases of Snake River Spring/Summer-Run Chinook Salmon Evolutionarily Significant Unit.
Source NMFS 2017a

Snake River Fall Chinook Salmon

Snake River fall-run Chinook salmon were listed as threatened on June 28, 2005 and reaffirmed April 14, 2014 (79 Federal Register 20802). Historically, the lower and middle Snake River populations formed the two major population groups. However, the construction of Hells Canyon Dam extirpated the middle Snake River population. Spawning populations presently occur in the mainstem Snake River below Hells Canyon Dam, Lower Granite Dam, and in the lower reaches of the Clearwater, Grande Ronde, Tucannon, Salmon, and Imnaha Rivers between October and December (Figure 3-2). Fall-run Chinook salmon mostly migrate through the project area. Adult fall-run Chinook salmon migrate through the project area between August and October, while juveniles outmigrate from mid-May through mid-July.

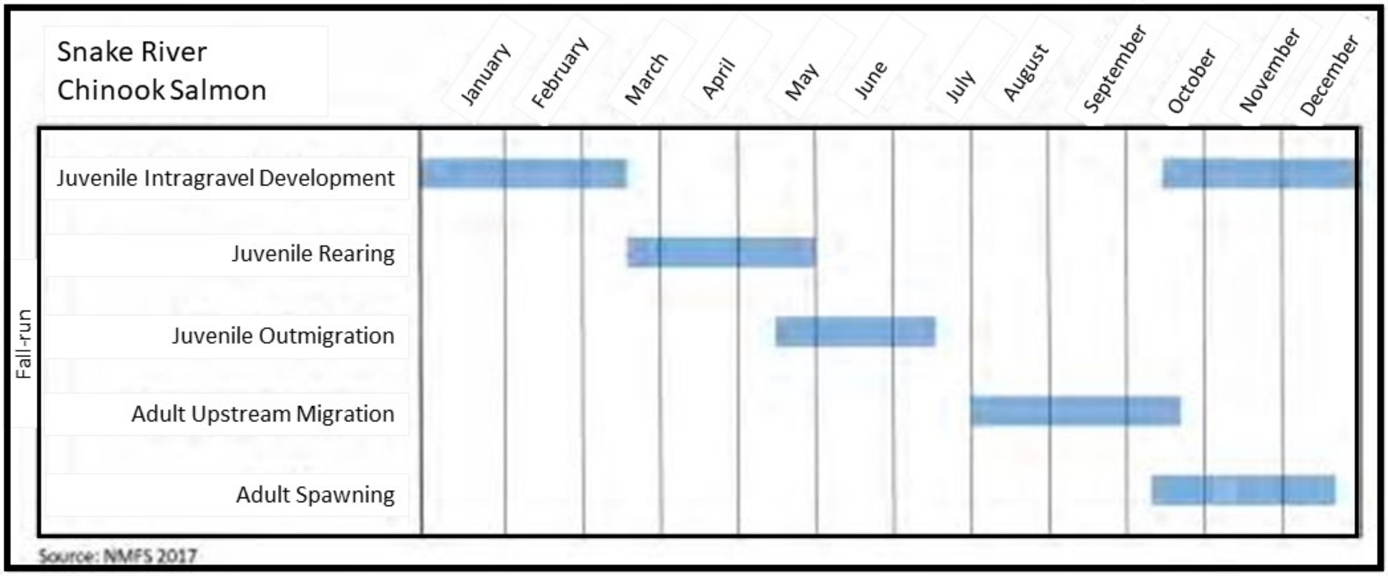

Figure 3-2. Freshwater Life Phases of Snake River Fall-Run Chinook Salmon.
Source NMFS 2017b

Snake River Sockeye Salmon

Snake River sockeye salmon were listed as endangered on November 20, 1991. Adult sockeye generally only migrate through the project area between September and October (Figure 3-3), but adults have been known to delay below Lower Granite Dam in the summer when high water temperature impedes migration. Spawning occurs in September and October, but not in the mainstem Snake River.

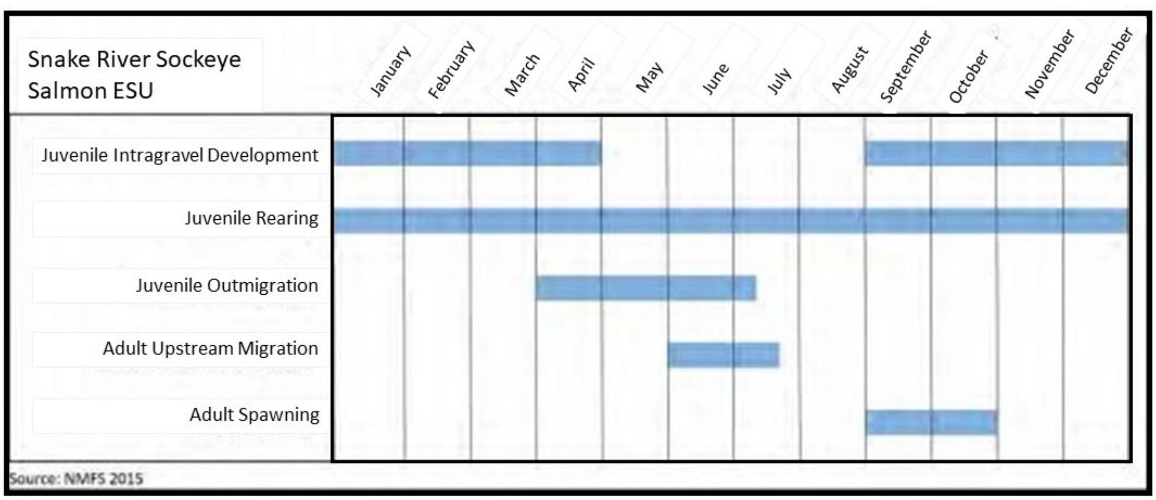

Figure 3-3. Freshwater Life Phases of Snake River Sockeye Salmon Evolutionarily Significant unit.
Source NMFS 2015

Snake River Steelhead

Snake River steelhead were listed as threatened on August 18, 1997, and protective regulations were issued under Section 4(d) of the ESA on July 10, 2000. Their threatened status was reaffirmed on January 5, 2006, and again on April 14, 2014. This Distinct Population Segment (DPS) includes populations below natural and manmade impassable barriers in streams in the Snake River basin of southeast Washington, northeast Oregon, and Idaho. Adult steelhead typically only migrate through the project area between June and August (Figure 3-4).

Steelhead spawning occurs between March and June, but not in the mainstem Snake River.

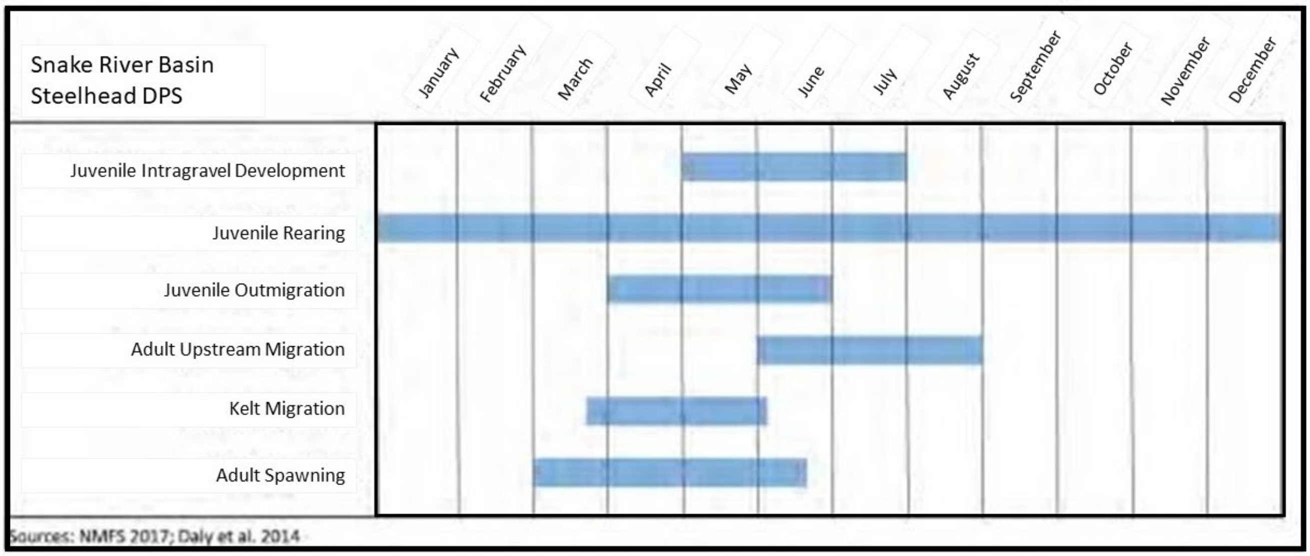

Figure 3-4. Freshwater Life Phases of Snake River Basin Steelhead Distinct Population Segment. Daly et al. (2015) and NMFS (2017c)

Bull Trout

The USFWS issued a final rule listing the Columbia River Basin population of bull trout (*Salvelinus confluentus*) as a threatened species on June 10, 1998. Bull trout are currently listed throughout their range in the western United States as a threatened species. Historically, bull trout were found in about 60 percent of the Columbia River Basin. They now occur in less than half of their historic range. Populations remain in portions of Oregon, Washington, Idaho, Montana, and Nevada (USFWS 2014).

Lower Snake River fish passage is necessary for migratory bull trout from core areas in the Walla Walla River and Tucannon River subbasins to interact with migratory bull trout from core areas in the Asotin Creek, Grande Ronde River, or Imnaha River subbasins. The Tucannon River is the most likely origin of many of the bull trout observed at Lower Snake River Dams because of its relatively healthy migratory population and its proximity (Barrows et al. 2016). Bull trout occur in the Lower Snake River, but distribution is limited due in part to their need for very cold-water habitats.

Sturgeon

Sturgeon are not ESA-listed, but landlocked populations of white sturgeon in the Snake River basin are classified as a species of special concern (Mosley and Groves 1990) for the states of Washington and Idaho. Upstream of Bonneville Dam in the Columbia River basin, white sturgeon are considered nonanadromous (ODFW and WDFW 1998). In the Snake River basin, white sturgeon historically made extensive seasonal migrations in response to changing habitats (Bajkov 1951). Today, however, they occur as residents, and do not migrate extensively due to blockage by dams (Corps 2005). This species is considered relatively abundant in the Snake River upstream of Lower Granite (Corps 2002a). The area upstream of Lower Granite is diverse with approximately 53 miles of reservoir habitat and approximately 160 miles of free-flowing habitat in the Snake and Salmon Rivers. Between the confluence with the Columbia River and Lower Granite Dam white sturgeon migrations are short and limited to within the reservoirs between dams.

Studies in the Columbia River basin have shown that juvenile white sturgeon diets are highly dependent on benthic invertebrates, particularly the amphipod *Corophium salmonis* (McCabe et al. 1992a; McCabe et al. 1992b). Sprague et al. (1993) indicated that white sturgeon may be feeding on organisms in the water column rather than exclusively on organisms associated with the substrate. *Corophium* species (river drift organisms) were the predominant prey item eaten by young-of-the-year and juvenile white sturgeon in two Columbia River impoundments and the Lower Columbia River (Sprague et al. 1993; McCabe et al. 1992a; Muir et al. 1988). *Corophium* species abundance in Lower Granite Reservoir appear low (Bennett et al. 1991). Crayfish and chironomid species were dominant food items identified from white sturgeon stomachs in the middle Snake River (Cochnauer 1981); crayfish and chironomid species are abundant near the upper end of the Lower Granite Reservoir (Bennett et al. 1991). The presence of these food species may explain the high density of juvenile white sturgeon in the upper section of Lower Granite Reservoir relative to lower areas of the reservoir.

Presence of young-of-the-year and high abundance of juvenile white sturgeon in Lower Granite Reservoir indicate recruitment has been occurring in the Lower Granite to Hells Canyon population. The high abundance of juvenile and young-of-the-year fish near the upper end of Lower Granite Reservoir also suggests that the reservoir may serve as rearing habitat. McCabe and Tracy (1993) suggested that wide dispersal of white sturgeon larvae allowed more use of feeding and rearing habitats while minimizing competition. Lepla (1994) assumed no spawning occurred in Lower Granite Reservoir as velocities measured in the reservoir (0.0 to 1.96 fps) are below threshold levels perceived to elicit spawning (3.28 fps) (Anders and Beckman 1993). However, white sturgeon may spawn in higher-velocity habitats with sandy substrate in the unimpounded, free-flowing reach of the lower Snake River above the river/reservoir pool transition zone of Lower Granite near RM 147 (Lepla 1994).

Seasonal changes in distribution of white sturgeon occur in Lower Granite Reservoir (Lepla 1994). Relative numbers of white sturgeon in the upper section of the reservoir increased from May through November, implying upriver redistribution/movement as the season progressed from summer to fall. However, multiple comparison tests indicated seasonal use of mid- and lower reservoir transects was not significant, with the exception of RM 116.8 (1.6 RM upriver of Knoxway Canyon). The number of white sturgeon sampled at RM 116.8 was highest (0.31 fish/hr) during April-July 1991 and declined sharply as summer progressed. Catch rates at RM 116.8 in 1990 were low and were also similar in 1992 (Bennett et al. 1994, 1995b). Catch rates at remaining mid- and lower reservoir locations were low regardless of season. Movements from 0 to 16 miles were observed from recaptured white sturgeon with the majority of fish traveling 0.6 to 3.1 miles. Differences in fish size did not appear to affect distance traveled in the reservoir. Approximately 65 percent of the fish recovered were collected within the upper 6.2 miles of Lower Granite Reservoir where densities of white sturgeon were highest.

3.3.2 Environmental Consequences

3.3.2.1 *Alternative 1: No Action Alternative*

Effects on Plankton and Benthic Species

Reservoir operation under the No Action Alternative would have no measurable effect on plankton and the benthic community within the LSR. The abundance, distribution, and diversity of benthic and planktonic organisms would not change from the current condition under this alternative. Plankton communities would not be negatively affected by maintaining reservoir levels near the higher elevations of their operating ranges. Under this alternative, the Corps would maintain the reservoir level above MOP, as needed, and even at the upper end of the operating range year-round to maintain the congressionally authorized 14-foot navigation channel depth.

Effects on Fish (Including Threatened and Endangered Species)

Reservoir operation under the No Action Alternative may result in minor adverse effects on listed salmonid species by potentially affecting juvenile passage survival by slowing through reservoirs due to maintenance of reservoir levels above MOP. Raising the operating pool above MOP would have less direct potential adverse effects for out-migrating juvenile anadromous fish further upriver as upstream pool elevations are already higher, but these fish may still experience outmigration delays.

3.3.2.2 *Alternative 2: Proposed Action – Immediate Need Dredging*

Implementation of this alternative would have moderate effects on aquatic resources. Effects would be from dredging operations and dredged material disposal. In-water work associated with dredging would have temporary, localized effects on turbidity and increased suspended sediment, as well as noise and possible *entrainment* of fish. These changes would cause a temporary loss of benthic habitat and organisms at the dredging location.

In the areas where the material is deposited for in-water disposal, the riverbed elevation would be raised and cause temporary loss of benthic habitat and organisms at the dredged material disposal site. In-water disposal of dredged material could potentially create moderate effects to fishes, cause turbidity-related effects, and create noise disturbances. Some of these effects would be minimized by adhering to the winter in-water work window when many fish species are present at lower densities and primary productivity is lower.

Effects on Plankton and Benthic Community

There would be direct moderate effects to benthic and epibenthic organisms at the dredge sites as many would likely suffer some level of mortality due to the dredging activity. Recovery of the benthic invertebrates would occur within a few months (Bennett et al. 1990).

Benthic species with planktonic larval stages or species that move into the water column from the substrate (e.g., Corophium species and chironomids) are expected to rapidly recolonize an in-water dredged material disposal site within a few weeks. Less mobile species such as oligochaete worms would be expected to recolonize within a few months (Seybold and Bennett 2010; Bennett et al. 1990). Studies have determined that the dredged material placement site at Knoxway Canyon (RM 116) was quickly colonized by benthic macroinvertebrates, and the total density of invertebrates was consistently high during both fall and spring (Seybold and Bennett 2010).

There would be indirect moderate effects to plankton and benthic organisms immediately downstream of the dredging sites. These effects would be due to increases in local turbidity and redeposition of suspended sediment. Increased suspended sediment can affect feeding of benthic and pelagic (open river) filter feeding organisms (Parr et al. 1998), and the settling of the suspended particles can cause local burial, affect egg attachment, and modify benthic substrate. Adverse effects would be minor and localized. Some minor changes in the species composition and relative abundance of the benthic fauna are likely, because of combined effects of changes in substrate conditions as well as water currents from increasing the depth in the dredged area.

For in-water disposal of dredged material, benthic invertebrates inhabiting the placement area would be displaced and/or overlain by sediment during the dredged material placement.

Effects on Aquatic Plants

Dredging would occur primarily in the deeper areas where aquatic plants are not present. Therefore, this alternative would have a minor indirect impact on aquatic plants that inhabit shallow waters. Temporary and localized increases in turbidity and resettlement of suspended solids during dredging operations may have direct moderate effects on aquatic plants. A large quantity of suspended sediment can reduce light penetration, which in turn reduces primary production of both pelagic and benthic algae and rooted plants (macrophytes). Because the typical dredged material is primarily composed of sand, the suspended sediments would settle quickly and therefore are not likely to reduce light penetration for an amount of time that would affect aquatic plants. Although dredging operations may create a detectable plume extending up to 1,000 feet downstream, the Corps would modify the dredging operation until turbidity levels become lower and within the acceptable range (Corps 2002a; Corps 2005; PSMP Appendix J).

Placement of dredged material within shallow water areas could directly affect aquatic plants by burying them if they are present. Any aquatic plants present at the dredged material disposal site would be buried and die. However, the deep-water placement proposed would have minimal effect on existing aquatic plants, as it is outside of the photic zone and aquatic plants would not likely be present. The potential future in-water disposal of dredged material at Bishop Bar, on the other hand, would enlarge this shallow water area that could be colonized by aquatic plants.

Direct effects from in-water placement of dredged material would be short term, minor, and localized with no long-lasting effects to the populations of benthic plants if present. These populations are capable of replacement and recolonization of lost abundance by a large source of adjacent and upriver drifting segments of populations. Most research and monitoring on large river systems has shown that disturbance to habitat is a natural process and can be beneficial (Corps 2002a).

Effects on Fish (Including Threatened and Endangered Species)

Direct and moderate effects on fish from dredging are generally localized and include possible entrainment, increased turbidity, noise, and changes to habitat such as substrate and depth.

Anticipated dredging activities would use a barge-mounted clamshell bucket to excavate and remove sediment. Due to the characteristics of this equipment, it is generally accepted that clamshell buckets have a low potential to entrain fish in comparison to other dredging methods (Corps 2002a). Specifically, the clamshell bucket descends to the substrate in an open position. During the descent, the bucket cannot trap or contain a mobile organism because it is open on top and bottom. The force generated by the descent drives the jaws of the bucket into the substrate, which “bites” the sediment upon retrieval, thus filling the empty bucket with sediment. The bucket bottom then closes as it is retracted from the dredged area. Clamshell dredging operations would proceed slowly and would present reasonable opportunity for fish, including adult and juvenile salmonids, to escape from a dredge area prior to commencement of the actual dredging operation.

In addition to the type of equipment used for dredging, the time of year would also reduce the possibility of affecting ESA-listed fish. Juvenile or adult coho, spring and summer Chinook, steelhead, and sockeye salmon are likely to be at the lowest densities during the winter in-water work period than other times of the year.

The winter in-water work period (December 15 through March 1) is the time of year when the fewest ESA-listed salmonids are found in the LSR (Tiffan and Connor 2012). Migrating salmonids are pelagically oriented fish (i.e., present in the water column above the bottom) that do not typically occur in the benthic environment (i.e., in the sediment at the bottom of the reservoir). The subyearling Chinook that rear and overwinter in the lower Snake River and associated reservoirs also prefer shallow water habitat over deeper water habitats during the spring and summer (Corps 2010a, Tiffan and Connor 2012) and are generally pelagically oriented near the surface during the winter (Tiffan and Connor 2012). These characteristics greatly reduce the risk of entrainment of either juvenile or adult salmonids. Furthermore, the disturbance from dredging activities is likely to encourage fall Chinook salmon and steelhead to avoid the vicinity of the dredging operations altogether.

Dredging and in-water dredged material disposal would not affect water temperature or dissolved oxygen because activity would typically take place in cold weather during the in-water work window. Cold water holds more dissolved oxygen, therefore there would be no change in dissolved oxygen levels as a result of the dredging and disposal action. Dredging activities are temporary, and would cause indirect and minor short-term effects by increasing turbidity and suspended solids.

Although dredging operations may create a detectable plume extending up to 1,000 feet downstream, operations causing a 5-NTU increase over background (or a 10 percent increase when background is over 50 NTUs) at a point 300 feet downstream would result in actions to reduce the plume. Given the relatively large size of the LSR reservoirs, the turbidity plume caused by dredging would be localized around the area of dredging, and ample space remains for fish to move away from the turbidity plume. Based on the disparity between the turbidity increases anticipated as part of the dredging and dredged material placement operation and the levels reported to be harmful to fish, dredging and dredged material placement operations would not adversely affect salmon and steelhead as a result of increased turbidity. In addition, although turbidity may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity (35 to 150 NTU) accelerate foraging rates among juvenile Chinook salmon.

Although low-to-moderate turbidity levels can enhance survival by providing cover from predation (Gregory and Levings 1998), excessive levels of turbidity can reduce feeding efficiency and food availability, and damage gills (Bruton 1985; Gregory and Northcote 1993). In the immediate vicinity of dredging or in-water dredged material placement, short-term turbidity could be high enough to interfere with predation success of vertebrate sight feeders (animals that use their sight to locate food), including juvenile salmonids. The disturbance would be limited to the duration of the proposed action. Although the sight feeders may move out of the disturbed area during dredging and/or disposal, it is expected they would return on completion of the action. These interferences, if they occur, would be of limited duration, and would not coincide with any major migration timeframe of anadromous fish during the allowed winter in-water work period. Adequate area exists to allow sight feeders to move out of the turbid zone for feeding purposes.

Dredging activities would also generate underwater sound-pressure levels that could elicit responses in some fish (Hastings and Popper 2005). The intensity of the sound-pressure levels from dredging activities can be quite variable. However, sound-pressure levels are generally in the range of 112 to 160 decibels (dB). These sound intensities may influence organism behaviors or perceptions, but would be unlikely to cause physiological damage (Hanson et al. 2003). Increased sound levels would have minor, direct effects on fish that may be present close to where the work is occurring.

Fall Chinook

The habitats directly affected by navigation channel dredging are generally deeper than the shallow habitats preferred by fall Chinook (depths less than 10 feet) and dredging effects would occur for a relatively short period of time. These sandy and silty portions of the riverbed would retain essentially their same characteristics after dredging. Because the area is used as a migratory corridor for ESA-listed anadromous salmon species, there is potential to modify designated critical habitat. However, dredging would not substantially change the cross-sectional areas of the river and, therefore, velocities would not change in areas used for salmon migration or degrade salmon migratory habitat. In addition, dredging would occur for a relatively short period of time during the period of lowest salmonid abundance (Tiffan and Connor 2012). The most substantial indirect and minor effect would be a short-term (1 year or less) localized reduction in available food items. Based on previous investigations disturbed substrates would be rapidly recolonized by macroinvertebrates (Mackay 1992). Additionally, most of the dredging would occur in mid-channel areas during the winter that are used much less extensively by juvenile salmon than shallower, near-shore areas (Gottfried et al. 2011).

Adult steelhead and juvenile fall Chinook salmon are likely to be disturbed as a result of dredging operations, since it is expected that noise and activity would encourage fish to move to other areas. However, given the relatively small footprint of the operation at any given time, this disturbance is not expected to reach levels that would temporarily or permanently disrupt essential behaviors of fall Chinook or steelhead.

Subyearling fall Chinook salmon use the shallow-water rearing habitat (i.e., submerged bars less than 20 feet deep) created with in-water placement of dredged material that surrounds Centennial Island (Lower Granite Reservoir, near RM 120) (Seybold and Bennett 2010). Subsequent sampling has indicated that in some years, as many as 10 percent of the total sample of subyearling Chinook salmon from the Lower Granite Reservoir originated from the habitat created by in-water placement of dredged materials and that fall Chinook salmon were most commonly collected over lower gradient shorelines that have low velocities and sandy substrate (Seybold and Bennett 2010; Tiffan and Connor 2012; Tiffan and Hatten 2012).

A recent analysis of juvenile fall Chinook salmon use of shallow-water habitats in the lower Snake River reservoirs found that fall Chinook used these habitats, including the Corps' shallow-water dredged material placement site at Knoxway Canyon (located on the lower Snake River between RM 116.5 and 117.5), which was created using dredged materials in 2006 (Naughton et al. 2009) and 2014/2015. The Knoxway Bench site has been quickly colonized by benthic macroinvertebrates, and the total density of invertebrates was consistently high during both fall and spring (Seybold and Bennett 2010).

Substrate material and depth are important to the use of habitat created with dredged material. Traditionally, a depth of 20 feet was determined as the boundary between mid-elevation depth and shallower water, based on typical limits of the photic zone conducive for primary and secondary productivity of food web constituents. The 20-foot demarcation was also selected because the shallower zone represents preferred depths of open sandy bench habitat important for juvenile fall Chinook salmon rearing (Curet 1994; Connor et al. 1994; Rondorf and Miller 1994). Studies within the Lower Granite Reservoir captured subyearling Chinook salmon over low-gradient, low-velocity, sandy substrates in the shallow zone indicating their preference for this habitat (Bennett and Shrier, 1986; Bennett et al. 1988, 1990). In addition, subyearling Chinook salmon rearing along the shoreline of Lower Granite Reservoir during the spring exhibit a strong selection for substrata consisting of primarily sand and a moderate avoidance of cobble/sand and talus/sand (Curet 1994).

Tiffan and Connor noted that while a sizeable portion of juvenile fall Chinook salmon remained in the lower Snake River after the spring and summer migrations, their use of shallow water habitat during fall and winter 2010 was limited. Furthermore, radio-tagged fish located were pelagically oriented, and generally not found over shallow water or close to shore during winter months. This provides evidence for shallow water habitat use by natural subyearlings during spring and summer, and evidence against large-scale use of shallow water habitat by salmonids during fall and winter.

Disposal of dredged material (that is, deep-water dumping of dredged material as opposed to beneficial use) would cause temporary localized increases in turbidity and suspended solids, as well as noise disturbance. These factors can affect fish in the immediate area, but their mobility would allow them to temporarily escape the disturbance and return later after the effects of the dredged material placement have dissipated. Both resident and anadromous fish could use the area upstream and downstream of the sites for refuge when dredging and placement activities would occur. The in-water dredged material placement activities would not be a continuous activity confined to a single location and fish would return to the activity areas shortly after completion of the action. Potential effects of the dredged material placement operation on downstream migrating salmonids would be expected to vary depending on the timing of the downstream migrations, the amount of time the migrants spend in the affected areas, and their use of the affected areas. Both adults and juveniles of other salmon species would most likely be present within the lower Snake River reservoirs at low densities during the in-water work window and therefore would not be affected by the temporary increases in turbidity, suspended solids, and noise from in-water disposal of dredged material.

Bull Trout

Bull trout adults only intermittently inhabit areas of the lower mainstem of the Snake River where dredging would occur. These fish may enter the LSR during migrations from the tributaries that they inhabit during the remainder of the year (Faler et al. 2008). These are fish that can actively avoid the dredging operations when noise and other disturbances associated with dredging operations occur. Spawning and juvenile rearing occurs in the upstream reaches of tributaries; therefore, dredging in the mainstem of the Snake River would not affect these life stages for bull trout.

The mainstem of the Snake River is part of designated critical habitat for bull trout. Dredging operations may cause bull trout to temporarily avoid the area, but dredging operations would not permanently alter the ability of the river to provide adult rearing and migration habitat.

Sturgeon

Dredging and associated dredge material placement can disturb foraging habitat for sturgeon resulting in moderate direct effects. White sturgeon juveniles and adults would be temporarily displaced into potentially less desirable foraging habitat, which could adversely affect their health and viability. Additionally, there is potential for dredging to disturb some spawning areas which can occur within the navigation channel in areas below the tailrace of dams (Parsley and Kappenman 2000). However, the timing of the in-water work window in the mainstem (December - March) should prevent dredging effects to the sturgeon eggs since spawning occurs during mid-May through mid-July after the dredging operations would have ceased. White sturgeon spawning occurs in fast-flowing sections of the Snake River below dam tailraces (Parsley and Kappenman 2000) and at the upstream reach of Lower Granite Reservoir, so any dredged material placement in the deeper, slower-flowing reservoirs would not affect white sturgeon spawning habitat.

Pacific Lamprey

Pacific lamprey may potentially be present during navigation dredging operations. The USFWS (2010) suggested Best Management Practices (BMPs) to minimize adverse effects to lamprey from several actions, including dredging. The BMPs for lamprey are:

> • *Avoid these activities where ammocoetes [young lamprey] are known to exist. Where this is not possible, salvage efforts using methods outlined in Attachment A [of USFWS 2010] should be attempted prior to activity.*
> • *Sift through the removed substrate and salvage any ammocoetes within and return them to the stream away from the construction activity.*

However, the Corps determined that these BMPs cannot be implemented for this Snake/Clearwater confluence dredging because while some lamprey could reside in the dredging area, the material needs to be removed. The Corps is not aware of any feasible method to salvage juvenile lamprey in water that is approximately 15 feet deep. In addition, sifting through thousands of cy of dredged sediment would not be feasible.

Although ammocoetes settle out downstream from spawning riffles, the distance downstream that ammocoetes would drift before settling out and burying into the substrate has not been determined. If drift potential includes a substantial distance and ammocoetes migrate slowly downstream with flow, rearing Pacific lamprey could potentially be present in some of the areas proposed for dredging. Because the ammocoetes settle out in backwater areas, most areas that would be dredged or where dredged material may be placed are not likely to be heavily populated. Ammocoetes metamorphose into juveniles and migrate to the ocean during March through July of the year following their metamorphosis (Wydoski and Whitney 2003). Pacific lamprey lack a swim bladder and are believed to typically occupy the lower portion of the water column and tend to drift downstream with the current during migrations (Luzier et al. 2011; Wydoski and Whitney 2003). This behavior makes them susceptible to entrainment or burial by dredging activities. However, both the juveniles and adults are mobile and could actively avoid dredging activities and the winter in-water work window occurs outside the time frame when the majority of adult and juvenile migration occurs. The placement of dredged material could have a direct and moderate negative effect on Pacific lamprey ammocoetes by burying them if they are present.

Other Threatened and Endangered Species

Some adult steelhead could be present within the work areas. They could be affected in a similar manner as fall Chinook.

There would be no spring/summer Chinook or sockeye in the work areas during the in-water work window.

3.4 RECREATION

3.4.1 Affected Environment

Recreational facilities adjacent to the LSR reservoirs provide opportunities such as picnicking, camping, boating, swimming, hiking, wildlife viewing, fishing, and hunting. Virtually the entire length of the project area is designated as part of the Northwest Discovery Water Trail, a 367-mile recreational boating route on the region's defining waterways. It begins at Canoe Camp on the Clearwater River in Idaho, follows the Snake River down to the Columbia River, and ends at Bonneville Dam in the Columbia River Gorge. The trail connects nearly 150 sites to launch your boat, picnic, or camp along these rivers when you travel by motorboat, canoe, sailboat, or kayak.

Recreation activities take place throughout the year, with the most use occurring during the late spring, summer, and early autumn when fair weather is typical. Most recreation is related to the water resources provided by the Snake River and boating is the primary activity for many visitors. Much of the boating is related to fishing; however, waterskiing, tubing, wake boarding, jet skiing, sailing, kayaking, and canoeing are also important boating activities. Additionally, boating provides an efficient means of transportation and allows hunters to gain access to more remote wildlife habitat areas. Recreational opportunities within each reservoir are described in Section 3.3 (Recreation) of the PSMP FEIS (USACE 2014).

3.4.2 Environmental Consequences

3.4.2.1 *Alternative 1: No Action Alternative*

Under the No Action Alternative, the reservoir operation would have direct minor benefits to recreation. Reservoir operation may provide some benefits to recreational boating by alleviating the difficult or hazardous access to recreation areas that may experience interference with boating activities due to sediment deposition. While the recreation sites were designed to operate within the full range of pool elevations, some recreation areas/boat ramps experience sedimentation problems that limit boat usage or are at least an inconvenience at MOP. Swim beaches and recreation areas/ramps would generally benefit from operation at pool levels at the higher end of a reservoir's operating range, until the maximum pool level is reached. Maintaining the reservoir operations would have no direct or indirect effects on land-based recreation or water-based recreation not associated with problem recreation areas.

3.4.2.2 *Alternative 2: Proposed Action – Immediate Need Dredging*

Recreational users of park and recreation facilities along the lower Snake River may be disturbed by navigation dredging activities and the presence and use of large mechanical equipment. Dredging activities would have direct and minor, short-term, adverse effects on aquatic recreation, such as fishing and boating, in the vicinity of the dredging locations and dredged material placement sites. Direct, minor temporary effects (e.g., noise, aesthetics) on land-based recreation would result from dredging in the lower Snake River adjacent to recreation areas. Dredging would occur during the approved winter in-water work period (December 15 through March 1) when recreation use is generally low, which would also minimize any effects on recreation.

Disposal of dredged material is not expected to result in changes to recreational visitation rates. In-water placement of dredged material would have indirect, minor, short-term effects on any recreational activities that may be occurring in the vicinity of the dredged material placement. In-water disposal of dredged material would have minimal effects on recreation due to the timing of the work and remote area where the disposal would occur.

3.5 TERRESTRIAL RESOURCES

3.5.1 Affected Environment

3.5.1.1 *Wildlife*

Land adjacent to the proposed action area provides habitat for numerous birds, mammals, amphibians, and reptiles. Much of the wildlife in the area is dependent on tree-shrub riparian habitat associated with the reservoirs and river systems (Lewke and Buss 1977). The reservoirs and river systems provide food, water, and cover for numerous wildlife species and are especially important in a region where moisture is extremely limited.

Habitats associated with the river generally support trees/shrub or dense hydrophytic emergent grass-forb cover, which provide more structurally complex habitat and more abundant forage resources than adjacent uplands. Habitats associated with water, e.g., riparian and wetland areas, support higher population densities and species numbers than dry grassland and shrub community habitat. Wildlife species present in the project areas are described in Section 3.2.2 (Terrestrial Wildlife) of the PSMP FEIS (USACE 2014).

3.5.1.2 *Vegetation*

The Snake River corridor exists within the high desert steppe and shrub-steppe communities of the Columbia Basin. Vegetation communities are dominated by a variety of grasses with greater or lesser amounts of sagebrush and other semiarid shrub species (Franklin and Dyrness 1973). There is a thin band of upland riparian vegetation along some reaches of the river. A variety of native bunchgrasses, herbaceous plants, moss and crust-forming lichens dominate groundcover. Vegetation present in the project areas including invasive species are described in Section 3.2.1 (Vegetation) of the PSMP FEIS (USACE 2014).

3.5.1.3 *Threatened and Endangered Terrestrial Species*

Table 3-3 lists both species designated as threatened under the ESA that could occur on lands surrounding the area. The yellow-billed cuckoo (*Coccyzus americanus*) is a bird and Spalding's catchfly (*Silene spaldingii*) is a perennial plant. Descriptions of the life histories and use of lands surrounding the area are provided below; however, it is unlikely either of these species would be present.

Table 3-3. Endangered Species Act-Listed Terrestrial Species

Population	Designation
Western Yellow-billed Cuckoo	Threatened
Spalding's Catchfly	Threatened

Yellow-billed Cuckoo

The western distinct population segment (west of the continental divide) of the yellow-billed cuckoo was listed as threatened under the ESA on October 3, 2014. Critical habitat has been proposed; however, Washington is not included in the critical habitat designation, nor is the part of the proposed action area located in Idaho.

These birds prefer open woodlands with clearings with a dense shrub layer. They are often found in woodlands near streams, rivers, or lakes, but yellow-billed cuckoos occur most frequently and consistently in cottonwood forests with thick willow understory (Taylor 2000). They typically require an understory of 75 percent cover over a minimum of 10 acres. In winter, yellow-billed cuckoos migrate to tropical habitats with similar structure, such as scrub forest and mangroves. Individuals may be on breeding grounds between May and August. In the Pacific Northwest, the species was formerly common in willow bottoms along the Willamette and Columbia Rivers in Oregon, and in the Puget Sound lowlands and along the lower Columbia River in Washington. The species was rare east of the Cascade Mountains. It may now be extirpated from Washington (USFWS 2008).

Lands surrounding the proposed action area lack the required plant cover density to support yellow-billed cuckoos and no yellow-billed cuckoos have been documented in the around the area; given the lack of required habitat, none are expected.

Spalding's Catchfly

Spalding's catchfly was listed as threatened in 2001. It is an herbaceous perennial in the pink family (*Caryophyllacea*). All green portions of the plant (foliage, stem, and flower bracts) are covered in dense sticky hairs that frequently trap dust and insects, giving this species the common name 'catchfly'. Plants emerge in mid- to late May. Flowering typically occurs from mid-July through August, but may occasionally continue into October. Above-ground vegetation dies back at the end of the growing season and plants either emerge in the spring or remain dormant below ground for one to several consecutive years. Spalding's catchfly reproduces solely by seed.

The species is endemic to the Palouse region of southeast Washington and adjacent Oregon and Idaho, and is disjunct in northwestern Montana and British Columbia, Canada. This species is found predominantly in the Pacific Northwest bunchgrass grasslands and sagebrush-steppe, and occasionally in open-canopy pine stands. The plant is found at elevations ranging from 420 to 1,555 meters (1,380 to 5,100 feet), usually in deep, productive loess soils (fine, windblown soils). Plants are generally found in swales or on north or east facing slopes where soil moisture is relatively higher (USFWS 2005). Spalding's catchfly occurs in Asotin, Whitman, and Garfield Counties (Figure 3-5), though this plant has not been found on Corps-managed property.

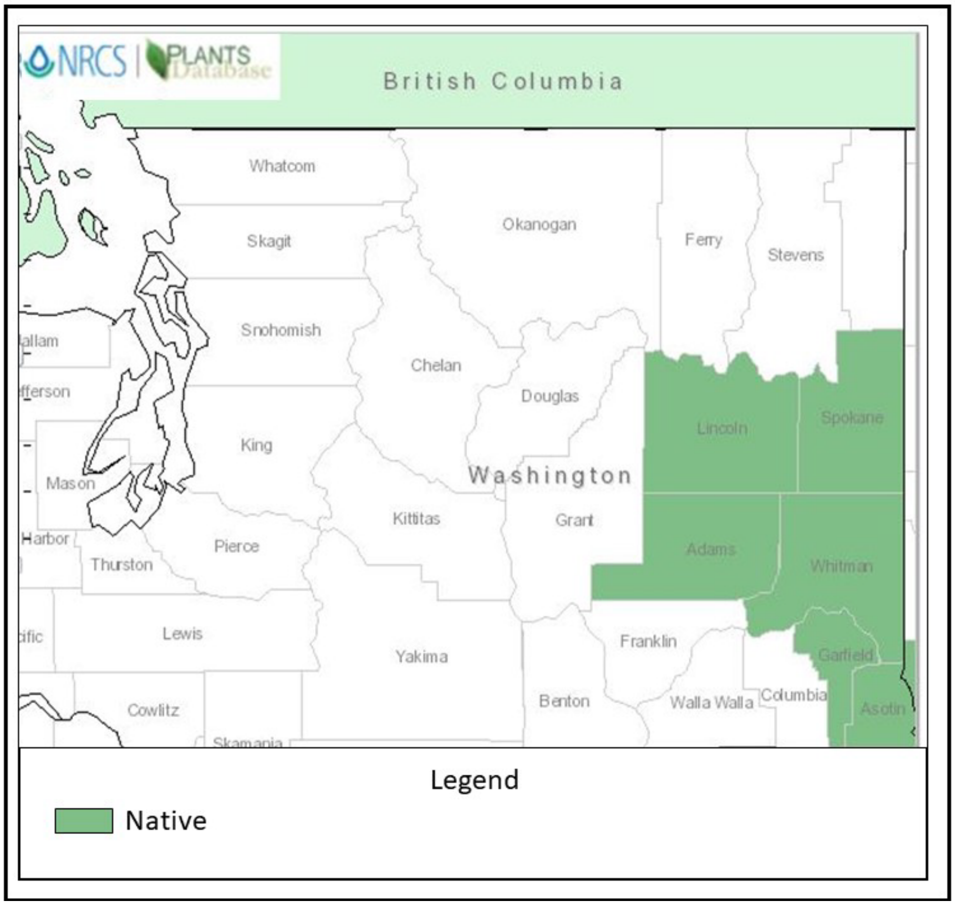

Figure 3-5. Distribution of Spalding's Catchfly (*Silene spaldingii*) in Washington State.

3.5.2 Environmental Consequences

3.5.2.1 *Alternative 1: No Action Alternative*

Reservoir operation would be used to address navigation and would result in a continuation of normal operation of the pools. This includes changing pool elevations 3-5 feet depending on time of year. Raising and lowering the pools annually leads to a riparian strip that is heavily disturbed and dominated by invasive plant species such as false indigo, reed canary grass and poison hemlock. The indirect, minor effect to native riparian vegetation is expected to be high competition from invasive species that are suited to thrive in disturbed areas.

Most wetlands affected by the raising and lowering of the pools for navigation would be considered perennial because of the seasonal inundation and desiccation due to fluctuating pool levels. The indirect, minor effects to these wetlands would be the same as what has happened for the last 40 years of reservoir operation. When the water level is lowered annually, invasive plant species become more dominant in these areas and out-compete native vegetation.

Direct effects on terrestrial wildlife due to reservoir operations to maintain navigation would remain the same as under normal pool operation which are negligible. Wildlife that use riparian areas during a portion of their lives have adapted to the rise and fall of river levels. There would be no increase in effects to vegetation, wetlands, or terrestrial wildlife due to navigation maintenance under the No Action alternative.

3.5.2.2 *Alternative 2: Proposed Action – Immediate Need Dredging*

Dredging would result in intermittent and temporary disturbance or displacement of wildlife species from the operation of construction equipment. These activities are not expected to prevent wildlife from obtaining food or otherwise using the areas adjacent to the dredging. Riparian forest and shrub habitat for raptors and other birds would not be affected. Waterfowl, birds, aquatic furbearers, and other wildlife could be temporarily disturbed or displaced by activities; however, they would likely use areas upstream and downstream of the sites where dredging activities occur.

Most activities associated with dredging would be performed in deeper water away from any terrestrial habitat, so no direct effects to terrestrial habitat are expected. It is assumed that existing entry and exit points and staging areas for work would be used and would not result in effects to existing riparian habitat and wetlands.

In-water disposal of sediment would occur primarily in deep water and mid-depth areas of the Snake River where terrestrial species are not present. As a result, in-water disposal would have no impact on terrestrial resources.

As discussed in the section above, “Threatened and Endangered Terrestrial Species Affected Environment”, federally listed or other protected wildlife species have the potential to be present near the dredging sites under this alternative. However, given the proposed dredging that would occur within the river, no direct effects are expected to ESA-listed or other protected terrestrial wildlife species or plants. This alternative could cause temporary displacement of individuals; however, species are expected to leave the area of impact as there are multiple alternate places for species to relocate.

3.6 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

3.6.1 Affected Environment

The proposed action area includes parts of six counties in Washington State (Asotin, Columbia, Franklin, Garfield, Walla Walla, and Whitman) and one county in Idaho (Nez Perce). The population has grown continually over the last 20 years, with a trend of migration from rural areas into urban centers. The area population is predominantly white and educational levels generally match state averages.

The following sections describe the current socioeconomic conditions of the communities in the watershed study area. Socioeconomic conditions that are considered include population demographics, employment and income, and environmental justice concerns. This section also presents information on transportation, including commercial navigation, and its role in the regional economy.

3.6.1.1 *Population and Demographics*

Population for each county in the area is presented in Table 3-4 below. The area is generally rural in nature with generally low population densities. The main population centers are the Lewiston-Clarkston area, near the confluence of the Clearwater and Snake Rivers in Nez Perce County, Idaho and Asotin County, Washington, and the Tri-Cities area, near the confluence of the Snake and Columbia Rivers in Franklin County, Washington. The area population generally increased between 2010 and 2021, with the exception of Columbia County, Washington.

Table 3-4. Proposed Action Area Populations by County (US Census Bureau 2021).

State	County	2010	2020	2021	Change 2010 – 2021 (%)
Idaho	Nez Perce	39,265	42090	42454	8%
State of Idaho		1,567,582	1,839,106	1,900,923	21%
Washington	Asotin	21,623	22,285	22,397	4%
Washington	Columbia	4,078	3,952	4,042	-1%
Washington	Franklin	78,163	96,749	98,268	26%
Washington	Garfield	2,266	2,286	2,346	4%
Washington	Walla Walla	58,781	62,584	62,682	7%
Washington	Whitman	44,776	47,973	47,873	7%
State of Washington		6,724,540	7,705,281	7,738,692	15%
United States		308,745,538	331,449,281	331,893,745	7%

The majority of the population in the proposed action area is white as shown in Table 3-5 below. Hispanic or Latino origin varies considerably across the proposed action area, reaching a high of 54.1% in Franklin County. Median household income by county ranges from $42,288 in Whitman County to $66,904 in Franklin County.

Table 3-5. Median Household Income, Race, and Hispanic Origin of the Proposed Action Area by County in 2020 (US Census Bureau 2021).

State	County	Household Income	Race and Hispanic Origin							
			White Alone	Black or African American Alone	American Indian Alone	Asian Alone	Native Hawiian and P.I. Alone	Two or More Races	Hispanic or Latino	White Alone, not Hispanic or Latino
Idaho	Nez Perce	$57,099	89.5%	50.0%	6.1%	0.9%	0.2%	2.8%	4.6%	86.3%
State of Idaho		$58,915	92.8%	90.0%	1.7%	1.6%	0.2%	2.7%	13.3%	81.1%
WA	Asotin	$53,941	92.5%	90.0%	1.9%	1.1%	0.5%	3.1%	4.7%	88.8%
WA	Columbia	$61,779	89.8%	1.0%	1.7%	1.6%	2.3%	3.6%	8.5%	82.5%
WA	Franklin	$66,904	89.5%	2.9%	1.9%	2.5%	0.5%	2.8%	54.1%	39.3%
WA	Garfield	$56,923	91.6%	0.2%	0.9%	3.8%	0.0%	3.4%	5.7%	87.1%
WA	Walla Walla	$60,615	91.1%	2.2%	1.5%	1.9%	0.4%	3.0%	22.6%	70.3%
WA	Whitman	$42,288	83.9%	2.5%	1.0%	8.0%	3.0%	4.4%	6.8%	78.3%
State of WA		$77,006	77.5%	4.5%	2.0%	10.0%	0.8%	5.2%	13.7%	66.0%
United States		$64,994	75.8%	13.6%	1.3%	6.1%	0.3%	2.9%	18.9%	59.3%

3.6.1.2 *Environmental Justice Communities*

As outlined in Executive Order 12898, federal agencies must evaluate environmental justice (EJ) issues related to the implementation of any proposed action. This evaluation includes identification of minority and low-income populations, identification of any negative impacts that would disproportionately affect these low-income or minority groups, and proposed mitigation to offset the projected negative impacts, if identified.

Given the vast scale of the proposed action area, and the risk of losing sight of smaller groups within a larger, averaged, dataset, focused evaluation of potential environmental justice communities was conducted for the three primary areas to be dredged within the larger proposed action area – within one mile of the Port of Clarkston, the Port of Lewiston, and four miles of the Ice Harbor Dam navigation lock approach.

Near the Port of Clarkston, no EJ Indices were greatly elevated compared to State of Washington, EPA Region 10, or the nation as a whole, with the exception of the EJ Index for Wastewater Discharge, which is in the 91st percentile for the state and 90th percentile for the region (EPA 2022). There are five National Pollutant Discharge Elimination System (NPDES) permit holders at the Port of Clarkston. As the index measures pollutant concentration in the discharge and proximity to the discharge, it would be expected that this variable would be elevated at the Port. Socioeconomic indicators reveal a concentration of low-income households near the Port of Clarkston, with the indicator in the 93rd percentile for the state.

Near the Port of Lewiston, no EJ Indices were greatly elevated compared to the State of Idaho, EPA Region 10, or the nation as a whole. Socioeconomic indicators were also not elevated when compared to the State of Idaho, EPA Region 10, or the nation (EPA 2022).

Near the Ice Harbor Dam navigation lock approach, no EJ Indices were greatly elevated compared to State of Washington, EPA Region 10, or the nation as a whole, with the exception of the EJ Index for Wastewater Discharge, which is in the 94th percentile for the state and 92nd percentile for the region (EPA 2022). There are many NPDES permit holders in Burbank, Washington, approximately five miles from the lock. Ice Harbor Dam is also a NPDES permit holder. Socioeconomic indicators are not elevated near the Ice Harbor navigation lock approach.

3.6.1.3 *Commercial River Navigation*

The Snake River federal navigation channel extends approximately 140 miles, from the confluence of the Columbia and Snake Rivers at Pasco, Washington to the confluence of the Clearwater River with the Snake River at Lewiston, Idaho. The Snake River channel is the eastern end of the Columbia-Snake River shallow-draft channel, which extends 330 miles from Portland, Oregon and Vancouver, Washington to Lewiston, Idaho, and allows for commercial navigation between the Pacific Ocean and Lewiston, Idaho. Deep-water ports on the Lower Columbia River are major international export terminals and are the destination of most of the barge traffic originating on the Snake River.

Approximately 8.6 million tons of commercial cargo is shipped on the inland portion of the Columbia-Snake River system each year with an annual value of between $1.5 and $2 billion. Downbound movements (i.e., movements from upstream ports toward the Columbia River) of grain account for most of this cargo, of which the largest share is wheat. Approximately half of all the wheat exported from export terminals on the Lower Columbia River arrives by barge.

3.6.2 Environmental Consequences

3.6.2.1 *Alternative 1: No Action Alternative*

Under the No Action Alternative, the reservoir operation would have direct minor adverse effects to socioeconomics. It would help maintain economic activity in the region and would not change employment, income, or other socio-economic conditions in the area.

Sediment accumulation interferes with commercial navigation and creates the potential for navigation hazards and property damage when the depth of the federal navigation channel and Port access and berthing areas becomes less than the authorized dimensions. The grounding of vessels on sediment shoals can cause damage to vessels, which can lead to sinking or capsizing due to holes or rips in hulls, and puts crews and passengers at risk. On commercial barges, grounding also can result in leakage or loss of cargo into the river. Reservoir operation would provide a temporary solution to sedimentation that impedes commercial navigation. However, since pool levels can only be raised to a maximum operating pool elevation, the capacity to raise pool levels would ultimately be used up and commercial navigation would be impeded, having a moderate detrimental effect on commercial navigation, as well as cruise ship operations.

3.6.2.2 *Alternative 2: Proposed Action – Immediate Need Dredging*

Implementation of Alternative 2 would have minor, short-term, beneficial direct effects on income and employment through construction activities associated with the proposed dredging action. Alternative 2 would have no long-term direct effects to population, employment, and income. Dredging would re-establish the navigation channel dimensions and therefore no adverse effects would result to transportation and related sectors. Additionally, no direct socioeconomic or other effects would be disproportionately borne by areas with high percentages of minority or low-income populations; therefore, no environmental justice issues would result from this alternative.

Alternative 2 would have a long-term beneficial impact on river navigation by providing adequate depths in the navigation channel and access channels to the ports, and the Ice Harbor Dam navigation lock. The short-term impact of dredging could include minor disruption of barge, cruise, or recreational traffic as dredge equipment works in the navigation channel or at the ports. Disruptions at port facilities would potentially also affect highway and railroad connections to the ports. In-water placement of dredged material would not affect river navigation.

Alternative 2 would maintain the commercial navigation authorized purpose of the LSRP. Farms and businesses that ship products by barge on the lower Snake River would continue to have access to markets and transportation options provided by the inland navigation system, which would be a positive economic effect.

3.7 HISTORIC AND CULTURAL RESOURCES

3.7.1 Affected Environment

Cultural resources are usually identified as the remnants of past human lifeways, such as archaeological sites, artifacts, graves, historic buildings, trails, and other inanimate objects or areas. However, cultural resources also include areas of ongoing importance and use by Tribes and the public.

Archaeological Resources

There is ample evidence that the Nez Perce and Palus people lived along the Snake River area for thousands of years. Their ongoing presence is indicated through oral history provided by descendants of the Native American inhabitants, allotment and homestead records, ethnographic study by tribal and non-tribal researchers, museum collections, and from archaeological site investigations.

Numerous archaeological sites were identified during early archaeological surveys conducted under the auspices of the Smithsonian Institution's River Basin Survey Program, as part of pre-inundation salvage efforts, and as a result of ongoing management of archaeological resources by the Corps. Sites include those that are on lands adjacent to the rivers, as well as a number of sites that were subsequently inundated after construction of the LSRP. The archaeological sites found around the project area and throughout the region represent a full range of lifeways, including plant, animal, and tool stone procurement, food processing and storage, rock imagery, ceremonial aspects, and habitation sites ranging from small camps to large villages. These areas not only represent long ago activities, but they are also still of living importance today to multiple Tribes, including the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Colville Reservation, the Nez Perce Tribe, and the Wanapum Band.

Archaeological sites and districts located along the lower Snake River in and close to the proposed dredging areas have been documented, and many have been found eligible for listing (or have been listed) on the National Register of Historic Places (NRHP). Sites that overlap or are close to the dredge Area of Potential Effect (APE) include precontact villages, camps, burials, and a historic trail, railroad, and trash dump sites.

Traditional Cultural Properties

Traditional Cultural Properties (TCPs), which include Historic Properties of Religious and Cultural Significance to Indian Tribes, are areas tied to beliefs, customs, and practices of a living community. TCPs have been identified in the project area by the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Colville Reservation, and the Nez Perce Tribe. The Tribes have prepared documentation for many of these historic properties, noting their importance to ongoing cultural practices, and link to archaeological sites, ceremonial use, natural resource gathering, fishing, hunting, and trails.

Historic Properties

The Corps has a responsibility to document and evaluate archaeological sites, historic building, structures, objects, and districts for listing on the NRHP. Historic built resources, including buildings, structures, and objects, have been documented to a very limited extent within the project area. Most structures were removed prior to or during dam construction, but additional historic built resources may be present, and could be identified during future surveys. The four lower Snake River Dams have been found eligible for listing on the NRHP, including Ice Harbor Lock and Dam and Lower Granite Lock and Dam. The levee system in Lewiston, Idaho has also been found eligible for listing. The nearby towns of Lewiston, Idaho and Clarkston, Washington have numerous listed or eligible buildings and structures, including businesses, residential structures, municipal buildings, and bridges. More details on the types of cultural or historic resources are included in Section 3.4 (Cultural Resources) of the PSMP FEIS (USACE 2014).

3.7.2 Environmental Consequences

3.7.2.1 *Alternative 1: No Action Alternative*

Under the No Action Alternative, maintaining pool levels at the higher end of the reservoirs' operating ranges to maintain the reservoir operations may cause shoreline archaeological sites or portions of sites to be inundated for longer periods of time than when not maintaining higher pool levels. This can provide some protection for sites; however, the more likely outcome is that longer exposure to high water levels could lead to increased erosion and loss of portions of archaeological sites. Long-term direct effects can include erosion and loss of portions of a site and/or contributing elements of archaeological districts. Materials exposed through erosion lose their scientific context and are also exposed to potential looters. However, operating above MOP has occurred in the past (and currently) and the Corps is not aware of any specific instance of such erosion/loss. Under the No Action Alternative, changes in water levels would not be substantial, but do have the potential to have a minor adverse effect on shoreline archaeological sites when higher water levels are maintained. Historic buildings, including the dams, would not be affected by maintaining pool levels.

3.7.2.2 *Alternative 2: Proposed Action – Immediate Need Dredging*

Dredging and disposal activities carried out near shorelines, confluences, alluvial fans, islands or channel bars, and in the area of recorded archaeological sites have the potential for ground disturbance that can bury, damage, or destroy archaeological sites.

Dredging and the disposal of dredged material also have the potential to have a minor direct effect to sites of religious and cultural significance to Indian tribes, including those that may have been inundated when the reservoirs associated with the LSRP were filled. One other aspect of dredging that has the potential to have a minor direct effect to historic properties is the disturbance of secondary deposits of archaeological material that may occur within sediments identified for dredging including, potentially, human remains. Although the secondary deposition of the archaeological material likely means it retains no archaeological value, it may have traditional religious and cultural significance, especially in the case of human remains. For this reason, in-water disposal of dredged material is preferred as it ensures that the material remains in the river, in a secondary depositional environment.

Please see Sections 5.1, 5.2.9, and Section 6.1 for information regarding the Corps' consultation and coordination with the Idaho and Washington State Historic Preservation Officers and the area Tribes.

3.8 CUMULATIVE EFFECTS

The Council on Environmental Quality (CEQ) regulations implementing NEPA require agencies to consider the cumulative effects of their actions though the NEPA process. Cumulative effects are defined as effects "on the environment which result from 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. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time" (40 CFR § 1508.7).

The primary goal of a cumulative effects analysis is to determine the magnitude and significance of the environmental consequences of the proposed action in the context of the cumulative effects of other past, present, and reasonably foreseeable future actions.

3.8.1 Resources Considered

The Corps used the technical analysis conducted for this EA to identify and focus on cumulative effects that are "truly meaningful" in terms of local, regional, or national significance (CEQ 1997). While the EA addresses the effects of alternatives on the range of resources representative of the human and natural environment, not all of those resources need to be included in the cumulative effects analysis – just those that are relevant to the decision to be made on the proposed action. The Corps has identified the following resources that are notable for their importance to the region and potential for substantial cumulative effects. Those resources are:

- Aquatic resources
- Water quality

The Corps determined that the resources identified for cumulative effects analysis are of local, regional, or national significance. Environmental concerns regarding aquatic resources, particularly threatened and endangered fish, are on a national level, as well as local and regional levels. The concerns about threatened and endangered fish (especially salmon) are based not only on the economic aspects of commercial and recreational fishing, but also on the important role that these fish have for the Pacific Northwest and in the culture of Native American groups. Also, there are regional concerns about water quality, especially as it relates to the effects on human health and on threatened and endangered fish species.

Resources are discussed in terms of their cumulative effect boundary (spatial and temporal), the historic condition and impacts to the resources, present condition and impacts to the resources, reasonably foreseeable future actions that may affect the resources, and the effects to the resources when added to other past, present, and future actions.

This section evaluates the cumulative effects of actions that could potentially affect the same environmental resources as those discussed earlier in this EA. The scope of this analysis extends beyond the LSR to other areas that sustain the resources of concern. A resource may be differentially impacted in both time and space. The significance of those impacts depends on the characteristics of the resource, the magnitude and scale of the project's impacts, and the environmental setting (EPA 1999).

The resources assessed have experienced various impacts since the mid-1800s. Actions such as river modification for navigation, fish harvest, mining, development of cities, construction and operation of dams and associated levee systems, flood control projects, agricultural development including irrigation, road building, grazing, and logging have all contributed to the current state of the resources in the area. These actions have negatively and positively affected the resources.

3.8.2 Geographic and Temporal Scope of Cumulative Effects Analysis

Guidance for setting appropriate boundaries for a cumulative effect analysis is available from CEQ (1997) and EPA (1999). Generally, the scope of cumulative effects analysis should be broader than the scope of analysis used in assessing direct or indirect effects. "Geographic boundaries and time periods used in cumulative impact analysis should be based on all resources of concern and all of the actions that may contribute, along with the project effects, to cumulative impacts" (EPA 1999). The analysis should delineate appropriate geographic areas including natural ecological boundaries, whenever possible, and should evaluate the time period of the project's effects. The analysis should also include all potentially significant effects on the resources of concern (EPA 1999).

The term "cumulative effects area" is used in this section to describe the geographic area analyzed for cumulative effects for each resource. The geographic area of the cumulative effects analysis can be broader than the LSR, which was the area defined for the assessment of direct and indirect environmental effects of the plan alternatives and is determined by the characteristics of each resource (CEQ 1997). The geographic scope of the cumulative effects analysis includes the LSRP and its sediment-contributing watershed (see Section 1.2 Project Location). For aquatic resources, the cumulative effects area is expanded beyond the LSRP and the sediment-contributing watershed to include the Columbia River from the confluence with the Snake River to the Pacific Ocean.

A temporal or time boundary is the duration that impacts from the proposed project or other actions affecting the resources would last. The boundary can vary per resource. Predicting the effects of future actions can be difficult and highly speculative. In the 2014 PSMP EIS (Corps 2014), the Corps identified a general timeframe of 40 years based on the history of the Lower Granite project and reservoir at that time and the ability to use the observed conditions within that period to predict future conditions. Based on that methodology (and given the time since that analysis), for this EA the Corps used 50 years as the timeframe for analysis of cumulative effects.

The temporal scope of the analysis includes past actions that have substantially altered the environmental conditions in the cumulative effects area, including the wide-scale settlement and development of the area by Euro-Americans beginning in the 1800s, federal ownership and management of large portions of the area, and substantial alteration of land and water resources for multiple purposes.

Discussed below are the past, present, and reasonably foreseeable future actions that were considered for the cumulative effects analysis, the effects of those actions on the resources assessed, and a summary of the cumulative effects of the alternatives. Table 3-6 summarizes the geographic and temporal boundaries used in the cumulative effects analysis.

Table 3-6. Geographic and Temporal Boundaries of the Cumulative Effects Area

Resource	Geographic Boundary	Temporal Boundary
Aquatic Resources	LSRP, sediment contributing watershed, and Columbia River to Pacific Ocean	50 years
Water Quality	LSRP and sediment contributing watershed	50 years

3.8.2.1 *Threatened and Endangered Fish Species*

The geographic boundary for the cumulative effects analysis for threatened and endangered fish includes the Snake River watershed and the Columbia River from the confluence with the Snake River to the Pacific Ocean. The cumulative effects analysis considers effects of both the proposed current immediate need action and reasonably foreseeable future actions.

3.8.2.2 *Water Quality*

The geographic boundary for the cumulative effects analysis for water quality includes actions taking place in the Snake River watershed downstream to the Columbia River. Snake River tributary headwaters were identified as the upstream boundary because actions in the tributaries can have impacts that are transferred downstream to the proposed action area. Areas upstream of Dworshak Dam and the Hells Canyon dam complex were not considered because these dams essentially block most of the downstream sediment transport. The downstream boundary was selected as the area where an effect to the resource from any of the identified alternatives would affect the authorized purposes of the LSR Projects. The timeframe of 50 years was identified based on the history of the Lower Granite project, the most recently completed of the LSR Projects.

3.8.3 Past, Present, and Reasonably Foreseeable Future Actions and Implications for Resources

The following sections present summaries of past, present, and reasonably foreseeable future actions considered in this cumulative effects analysis, and the effects of those actions on the resources considered.

3.8.3.1 *Past Actions*

Settlement and Development by Euro-Americans

Euro-American influence in the cumulative effects area began in the late 1700s (Corps 2014). By the mid-1800s, new settlements were being established and the cumulative effects area was being increasingly populated by Euro-American settlers migrating from the eastern United States. Prior to the arrival of new settlers, human-caused changes to the land and rivers were generally limited in comparison to methods employed following settlement by Euro-Americans (Corps 2014). By the late 1800s, commercial harvest of salmon and steelhead in the Columbia-Snake River basin began to quickly deplete fish populations.

Concurrent with increased fishing, dramatic changes in the landscape were taking place. Farming, grazing, mining, and timber harvest were practiced throughout the cumulative effects area. These land use changes, in turn, spurred development of a transportation network throughout the region. Railroads and road networks developed through the 19th and 20th centuries. Beginning in the 1800s rivers throughout the cumulative effects area were modified for navigation, as well as for mining and shoreline grazing, and later for power, irrigation, and water storage. Improvements in transportation systems spurred further development of agriculture, timber, livestock, and mining in the region. Railroads shipped materials produced in the cumulative effects area, as well as those produced from outside the area bound for markets and ports in larger cities such as Portland, Seattle, and Tacoma. With increased development, the scope of human-caused impacts on natural and cultural resources increased (Corps 2014).

Public Land Management

Federal land comprises more than 60 percent of the sediment-contributing watershed of the LSR, and additional public lands are present in the Columbia River Basin. National Forests in the cumulative effects area were established in the early 20th century and created large areas managed for multiple uses. During the mid-20th century, timber management became an emphasis for the Forest Service management of National Forests. Timber production generally increased in the 1970s. The Multiple-Use Sustained-Yield Act, passed by the U.S. Congress in 1960, gave recreation, fish, wildlife, water, wilderness, and grazing enhanced management status, along with timber management (USFS 2015). The Wilderness Act of 1964 provided additional protection for designated areas within National Forests and other federal land. Management of National Forests, as well as other federally managed lands, has defined the use of large portions of the cumulative effects area that are public lands. National Forest and public land management has had notable and varied effects on natural resources in the cumulative effects area. Wilderness designation, for instance, has preserved large portions of the cumulative effects area in a relatively natural state, which benefits wildlife, aquatic resources, and other natural resources. Timber harvest, grazing, mining, road building, and other activities on public land have had socioeconomic benefits in the region, but have also historically had adverse effects on sediment, water quality, and fish.

Dams and Waterway Modifications

Development in the cumulative effects area has included building numerous dams on streams and rivers throughout the Columbia River basin. Early dams were built for irrigation, logging, and mining (Corps 2014). Beginning in the early 1900s, larger dams were constructed on the Snake River and major tributaries for water storage, irrigation, and power-generation purposes. The Federal Reclamation Act of 1902 provided the impetus for construction of larger dams on the Snake River system.

From the 1930s through the 1970s, the federal government and others constructed dams on the Snake River system for multiple purposes that included hydropower, navigation, recreation, water storage, and irrigation. Federal dams in the cumulative effects area are part of the Federal Columbia River Power System. Dam building on the Snake River system has resulted today in 17 dams on the mainstem of the Snake River and more than 20 dams on tributaries, though most are outside the cumulative effects area (Corps 2014). Of those dams, four are on the mainstem Snake River within the cumulative effects area (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite). All four were designed and constructed by the Corps and are dams that impound sufficient water for navigation, and also generate power based on available flow in the river. Each dam has fish passage facilities. In addition to these four dams, other dams have been constructed throughout the Columbia River basin, including the McNary, John Day, The Dalles, and Bonneville dams on the mainstem Columbia between the Snake River and the Pacific Ocean, all operated by the Corps.

Dams on the Columbia-Snake River system have contributed to declines in anadromous fish runs. Since the 1950s, the combined consequences of dams, increased ocean fishing, changing ocean conditions, and lessened quality and availability of aquatic habitats have adversely affected Columbia-Snake River aquatic resources and, in particular, anadromous fish. Since the 1970s, the catch of salmonids has declined, with hatchery-raised species making up more than 80 percent of commercially caught salmon in the Columbia-Snake system (Anderson 2020). Fish hatcheries began operation in the Columbia River basin in 1877 and have offset some salmon and steelhead declines. Nonetheless, reduced salmonid populations resulted in the listings of multiple Snake and Columbia River species under the ESA.

The development of dams has also created substantial economic benefits to the cumulative effects area and the surrounding region. Dams on the lower Snake River and middle and lower Columbia River create an inland commercial navigation system that stretches 465 miles from the Pacific Ocean to Lewiston, Idaho, and is an integral part of a transportation network that moves products to and from the area. They also provide hydropower and limited storage for irrigation.

Since the development of dams on the Lower Snake River, the Corps has periodically dredged portions of the river to maintain authorized purposes (primarily navigation and flow conveyance) of the river system. The last navigation maintenance dredging took place in fall of 2015 at the Ice Harbor Dam lock approach.

3.8.3.1.1 Effects of Past Actions on Resources

Aquatic Resources

Section 3 of this EA describes current conditions of aquatic resources that have resulted from past actions. Salmon and steelhead runs adapted to habitat conditions over thousands of years. In many areas of the Columbia and Snake River basins, these conditions have been significantly changed, or no longer exist. All native salmonid species in the Snake River Basin have decreased from historical levels as a consequence of hydropower development, harvest management, hatchery development, and habitat degradation. Before the mid-1870s, annual runs of salmon and steelhead returning to the Columbia River were roughly estimated to be greater than 8 million fish (Chapman 1986). Since 1938, when Bonneville Dam was constructed, the estimate of minimum total salmon and steelhead returning to the river has ranged from 0.2 to 3.2 million fish (University of Washington 2022). A variety of ocean conditions including currents, pollution, temperatures changes, and nutrient base also affect salmon survival.

Fish harvest has affected anadromous fish in the Columbia River basin for over 150 years. In 1875, the United States Commission of Fish and Fisheries began researching why Columbia River salmon catches were declining (U.S. Commission of Fish and Fisheries 1878). Their report indicated that 10 to 20 million pounds of canned salmon were taken from the Columbia River annually.

Fall Chinook salmon currently have access to approximately 100 miles of mainstem Snake River habitat, which is roughly 16 percent of the 610 miles of historic habitat available prior to completion of Swan Falls Dam. Even before mainstem dams were built, habitat was lost or severely damaged in small tributaries by construction and operation of irrigation dams and diversions, inundation of spawning areas by impoundments, and siltation and pollution from sewage, farming, logging, and mining (Fulton 1968). Artificial propagation of Chinook salmon in the Columbia River basin began as early as 1877 (Pratt et al. 2001) with expansion by the states around 1912-1917 when fish liberation (survival through release) became more successful. Artificial propagation began with egg collection efforts at stations on the Snake River near Ontario, Oregon. In the 1900s, large hatchery programs were implemented throughout the Columbia and Snake River basins as mitigation for loss of habitat and to enhance anadromous fish runs. These programs have been in maximum production operation for many decades. In recent years, however, the use of hatcheries has been extensively questioned in terms of fish quantity versus fish quality (i.e., genetics). Issues include hatchery practices and high hatchery-fish harvest rates that may be detrimental to wild runs; potential loss of desirable wild fish genetic characteristics through interbreeding with hatchery fish in the wild; competition between hatchery and wild fish for habitat and food; and predation by hatchery fish on wild fish. Many of these issues are subjects of ongoing research but may contribute to the overall decrease in wild fish populations (NMFS 2004).

Listing of several salmonids under the Endangered Species Act has created a framework and goals for recovery of fish populations.

Water Quality

Water quality conditions of the Snake River prior to modern-day settlement of the region in the mid-1800s are generally unknown; however, it is likely that conditions for most of the year were more suitable to most of the native fish and wildlife than the existing conditions. Some of the chemical constituents identified in the river today would have been absent. Naturally occurring compounds, such as metals and ammonia, were present in the water, but the concentrations of some elements may have been lower. Negative impacts to water quality have been caused by sources such as industrial and municipal waste, mining, logging, and other actions.

Historically, the water temperature of the Snake River likely varied more than it does today. High temperatures during the hottest part of summer may have been higher than current conditions, but the high temperatures probably did not last as long and additional cooling may have occurred during the night. The diverse temperatures between backwater areas and deep pools likely provided suitable habitat for a wider range of native fish and wildlife species than the existing conditions. Water temperatures have been affected by the clearing of streamside vegetation (an action that removes shade), channel straightening and widening for flood control, removal of irrigation water, urban development, and dams. The total dissolved gas (TDG) levels probably exceeded 100-percent saturation below natural waterfalls. However, elevated TDG levels would have quickly returned to saturation if the river were shallow and turbulent downstream. Today, spilling water over large dams is the main cause of high TDG levels.

Historic turbidity conditions likely exceeded today's regulatory thresholds during high flow events but were likely lower than existing conditions in tributary streams. In the Snake River, average turbidity levels may have been higher than the present average turbidity condition because much of the fine sediment that contributes to turbidity levels now settles out in the reservoirs. Agriculture, overgrazing of livestock, road building, logging, flood control, mining, and other sources contributed to the increased erosion that increased turbidity levels in tributary streams. Environmental regulations like the Clean Water Act have addressed several factors that historically affected water quality, such as discharges from point sources like municipal and industrial wastewater discharges and, to some degree, non-point sources of pollution.

Many of the same factors that have historically affected water quality have also affected sediment quality. Agriculture, industrial waste, and urban development create conditions that can add contaminants to sediments that enter the Snake River and its tributaries.

3.8.3.2 *Present Actions*

Many past actions described above continue through the present. The scope and location of land uses that affect the environment have changed over time, with resulting shifts in how the environment is affected. For example, wilderness designations in large portions of the Salmon and Clearwater subbasins have reduced the extent of uses such as logging, roads, mining, and grazing in those areas, and have allowed the wildfire processes to shift toward more natural cycles.

Multiple resource management plans provide guidelines for land management on public lands. As noted in the previous section, management practices that reduce erosion and sedimentation have been, and continue to be, implemented on public lands and have reduced loads of sediment to streams in the cumulative effects area. Similarly, current levels of implementation of agricultural conservation practices on private lands contribute to reducing erosion and sediment loads from cropland.

Current actions by the Corps and other agencies that manage dams on the Snake and Columbia Rivers include the operation and maintenance of existing facilities. Corps operation of the dams and reservoirs must comply with the terms and conditions of the 2020 Columbia River System Biological Opinion (NMFS 2020a). In addition, numerous plans and programs exist throughout the cumulative effects area and surrounding region that aim to improve water quality, habitat, and ecosystem functions to benefit the recovery of endangered fish. These include, but are not limited to:

- Tribal programs and partnerships in watershed planning and ecosystem restoration efforts.
- State watershed plans and programs, including the Oregon Plan for Salmon and Watersheds, the Washington Watershed Planning Act and Shoreline Management Act, and recovery efforts by state fish and wildlife/game departments.
- The Lower Snake River Fish and Wildlife Compensation Program.
- Interagency efforts such as the Northwest Power and Conservation Council's (NWPCC's) Columbia River Basin Fish and Wildlife Program.
- Actions by local governments and nongovernmental agencies to improve water quality and habitat.

The effects of recovery efforts on aquatic resources are illustrated by the existing conditions of these resources described in Section 3.3. Recovery efforts have helped restore local ecosystems and have had benefits to water quality and habitat in portions of the cumulative effects area. The present actions described above contribute to the environmental conditions for the resources described below, and do not change any of the condition or trends described.

3.8.3.2.1 Effects of Present Actions on Resources

Aquatic Resources

Present activities in the cumulative effects area would largely continue the effects to threatened and endangered fish that have resulted from past actions. Continued operation of dams and other water resource development projects, along with other present actions, would perpetuate the effects on populations and habitat of listed species in the LSR.

Water Quality

Current water quality conditions range from fair to exceptional. Ecology has placed reaches of the LSR on the Clean Water Act Section 303(d) list due to impairment by temperature, dissolved oxygen, and total chlordane. The lower Snake River is water-quality-limited for temperature and TDG. This limitation reflects both historic and current activities (Corps 2014).

Ongoing operation of water resource development projects modifies natural hydrologic and water temperature regimes throughout the Columbia River basin. Heat exchange characteristics in the lower Snake River are influenced by water residence times and river channel geometry and thus would be impacted by an increase in operating pool level. Dworshak Dam, on the North Fork of the Clearwater River, is routinely operated to manage flows and water temperatures (provide cooling water) in Lower Granite Reservoir between July through mid-September when peak water temperatures occur in the Snake River.

Present actions include activities that result in sediment loading to the lower Snake River, as well as actions that can resuspend sediment in the lower Snake River and its tributaries. Typically, the turbidity levels within the project area range from <1 to 40 NTUs. Turbidity levels can be much higher during high flow events.

Water quality can be adversely affected by spills from existing land uses and activities around the LSRP, such as from port and industrial operations, commercial navigation, and recreation boating.

Sediment quality can be affected by present activities that include agriculture, urban land uses, and industrial activities. Effects of present activities on sediment quality can add to past actions' effects on sediment quality.

As noted above, construction of the Snake River dams has had an effect on sediment transport downriver. Ongoing operation of the Snake River dams still traps sediment, even though they are run-of-the-river projects. Flow regulation by storage projects upstream of the LSR Projects also has reduced the amount of sediment that would have been transported during high flows. Storage projects, such as Dworshak Dam, will trap more sediment than run-of- river projects such as the lower Snake River projects. In addition, some of the fine-grained sediments do not settle out behind the dams and are carried downstream.

3.8.3.3 *Reasonably Foreseeable Future Actions*

Cumulative effects analyses must consider the effects of "reasonably foreseeable future actions regardless of what agency…or person undertakes such…action" (40 CFR §1508.7). Future actions that are speculative are not considered reasonably foreseeable (EPA 1999). Documented planned and permitted or funded actions by local, state, or federal government agencies, private entities, or individuals are considered "reasonably foreseeable." Similarly, the Corps considerers the continuation of existing programs, without major changes in policy, law, regulations, or funding, reasonably foreseeable.

Based on the CEQ guidance (CEQ 1997), the Corps has identified several reasonably foreseeable future actions, including the continuation of existing actions, within the geographic and temporal scope of this cumulative effects analysis. These actions, when considered together with the past and present actions summarized in the preceding sections, may have cumulative effects on the resources analyzed.

The Corps reviewed adopted plans and policies to identify the reasonably foreseeable future actions. An overview of reasonably foreseeable future actions is presented in Table 3-7 below.

Table 3-7. Reasonably Foreseeable Future Actions

Reasonably Foreseeable Future Action (Responsible Party)	Location within Cumulative Effects Area
LSR Operations - continuing (Corps) • Continued operation of dams and reservoirs (consistent with CRSO biological opinion) • Monitoring of sediment transport	Lower Snake River
Non-Corps Dredging - by ports and others • Periodic maintenance dredging by ports or managers of recreation facilities	Lower Snake River
Hydropower Operations (Corps, Reclamation, Idaho Power, BPA) • Continued operations of hydropower dams	Columbia and Snake River system
Public Land Management – continuing (USFS, BLM) • Implementation of resource management plans • Multi-use management • Timber harvest and associated activities at or near current levels • Continued road decommissioning at current levels • Continued fire management and suppression	Public lands throughout the cumulative effects watershed study area
Urban Land Uses - maintain and redevelop existing urban areas • Minimal expansion of urban land uses, consistent with adopted plans • Planned industrial facilities • Port development, including industrial and shipping-related development	Throughout the cumulative effects area, focused on main transportation routes and urban centers.
Transportation Infrastructure • Maintenance of existing transportation infrastructure.	Snake and Columbia Rivers; Integrated Transportation System in the Northwest
Agricultural Land Management (private landowners and conservation districts) • Continued agricultural conservation practices at or near current levels.	Throughout the cumulative effects area, focused on lower Snake River subbasin

Reasonably Foreseeable Future Action (Responsible Party)	Location within Cumulative Effects Area
Fisheries Management and Recovery Plans (and associated activities) for ESA-Listed Fish (NMFS, USFWS, tribes, state departments of fish and wildlife/game) • Terms and conditions of 2020 biological opinions • Planned habitat restoration, fish passage improvements to benefit listed fish	Columbia and Snake River systems

Substantial modification of existing publicly funded programs noted in Table 3-5 does not appear reasonably foreseeable. As such, the Corps has assumed the continuation of the programs and associated actions at or near their current levels into the future. Legislative actions may affect current programs; however, making assumptions about specific legislative changes in this analysis would be speculative and not appropriate.

Continuation of existing programs at current levels would essentially effect no change to the present environmental conditions and trends identified for environmental resources in Section 3.

3.8.3.3.1 Effects of Reasonably Foreseeable Future Actions on Resources

Aquatic Resources

Reasonably foreseeable future activities in the cumulative effects area would generally continue the effects on threatened and endangered fish that have resulted from past and present actions. Continued operation of the LSR Projects and other water resource development projects would perpetuate the effects on populations and habitat of listed species in the LSR. Reasonably foreseeable future actions, like land development or redevelopment for industrial, commercial, and residential uses, would have localized effects on water quality and other environmental resources that could indirectly affect threatened and endangered fish. Implementation of recovery plans are intended to improve habitat and populations for listed species but are dependent on a wide variety of factors. Predictions about the future effects of recovery plans would be speculative at this time.

Water Quality

Reasonably foreseeable future operation of the LSR Projects and water resource projects, including hydropower, would be likely to have the same effects on water quality as described for present actions above. Dworshak Dam, on the North Fork of the Clearwater River, is routinely operated to manage flows and water temperatures (provide cooling water) in Lower Granite Reservoir between July through mid-September when peak water temperatures occur in the Snake River. Without maintaining the federal navigation channel at its congressionally authorized dimensions, commercial and recreational vessels would stir up sediment where it accumulates in the navigation channel and around recreational areas, causing localized temporary increases in turbidity. Shoaling in the navigation channel would increase the risk of groundings by commercial vessels, which could result in the release of chemicals or petroleum into the LSR. Spills related to groundings would have adverse effects on water quality. Reasonably foreseeable actions to dredge port and recreation facilities are minor in scale and would be done in accordance with applicable permits, including CWA Section 401 water quality certification, and as such would not noticeably change water quality conditions or change the water quality effects of past and present actions.

Reasonably foreseeable future management of public and agricultural lands would be likely to result in a continuation of existing water quality conditions in the cumulative effects area. Reasonably foreseeable future urban development and population growth could include the expansion of urban areas and increased stormwater and municipal and industrial wastewater discharges. These future actions could have localized effects on temperature, nutrients, and other water quality parameters. The scope of reasonably foreseeable future development and population growth is not of a scale that would substantially change the area and type of past and present development over 50 years; therefore, no substantial changes to water quality would be expected. In addition, compliance with National Pollutant Discharge Elimination System (NPDES) requirements and other environmental regulations would minimize water quality effects of future land use changes and population growth.

3.8.4 Summary of Cumulative Effects of Past, Present, and Reasonably Foreseeable Future Actions on Resources

The cumulative effects analysis requires consideration of past and present actions, as well as reasonably foreseeable future ones. It is apparent that for most of the environmental resources covered by this analysis, historic actions have resulted in significant impacts. The level of impact to a resource from past and present actions has led to the present condition of each resource. However, to evaluate the cumulative impacts, it is also necessary to look forward in time. Future actions and ongoing present actions will continue to affect resources. However, future actions will take place in a dramatically different regulatory and political climate than most historic actions. Future actions are subject to detailed review at the federal, state, and/or local level. As appropriate, this review could include NEPA, ESA, CWA, NHPA, state wetlands and growth management regulations, and local protections for critical resources. Accordingly, unlike historic actions, future actions will be more apt to avoid and minimize detrimental effects to key resources.

Aquatic Resources

The cumulative effects of past, present, and reasonably foreseeable future actions have resulted in environmental conditions that have led to the threatened or endangered status of anadromous fish species in the Snake and Columbia Rivers. Continued recovery efforts would incrementally improve conditions for anadromous fish, having a cumulative beneficial effect on anadromous fish populations, including threatened and endangered species. However, fish would continue to be faced with multiple environmental factors that present challenges, such as predation, genetic weakness, and degraded habitat.

Water Quality

The cumulative effects of past, present, and reasonably foreseeable future actions on water quality are that modification of the Snake River and its tributaries has, and will have, substantially changed flow regimes, water temperature, turbidity and suspended sediments, and other water quality characteristics. Sediment quality has been affected by past actions and could be affected by current or future actions.

3.8.5 Cumulative Effects of Alternatives

The cumulative effects analysis considers how the direct and indirect effects of the alternatives would contribute to the cumulative effects of past, present, and future actions and change the conditions that have and are expected to result from those actions.

3.8.5.1 *Alternative 1: No Action*

Aquatic Resources

The No Action Alternative would not change fish passage or habitat conditions from their current states or likely future states that would result from past, present, and reasonably foreseeable future actions. The Corps would continue operating the LSR Projects within current operating ranges.

Reservoir operation under the No Action Alternative could result in minor adverse effects on listed salmonid species by affecting juvenile passage survival through reservoirs due to maintenance of reservoir levels above MOP. Raising the operating pool above MOP would have a greater effect in the areas near the dams than it would further upriver due to the normal change in elevation moving upstream. These effects on threatened and endangered fish, when combined with past, present, and reasonably foreseeable future actions, would not change current conditions of the resource, including the listing status of threatened and endangered fish. The No Action Alternative would not noticeably contribute to a change in the conditions of threatened and endangered fish, or the trend of the condition of the resource. Therefore, the No Action Alternative would have a minor cumulative effect on threatened and endangered fish species.

Water Quality and Sediment Quality

The No Action Alternative would not require construction or noticeably affect water quality in the target areas. Maintaining pool levels at the higher end of reservoir operating ranges is unlikely to affect temperatures and thermal stratification in the reservoirs, or otherwise affect water quality. The No Action Alternative would have minor effects to water quality and, when combined with the effects of past, present, and reasonably foreseeable future actions, would not contribute substantially to cumulative effects on water quality.

3.8.5.2 *Alternative 2: Proposed Action –Immediate Need Dredging*

Aquatic Resources

The cumulative effects of past actions have resulted in environmental conditions that have led to the threatened or endangered status of anadromous fish species in the Snake and Columbia Rivers. The major changes to the Columbia-Snake River system have adversely affected the habitat and populations of listed fish species. Present and reasonably foreseeable future actions are expected to continue this pattern of environmental impacts. Immediate need dredging operations in the LSR would not significantly change the regional conditions that have adversely affected listed fish species. Continued recovery efforts could incrementally improve conditions for anadromous fish, having a cumulative beneficial effect on anadromous fish populations, including threatened and endangered species. However, fish would continue to face multiple environmental factors that present challenges, such as predation, genetic weakness, and degraded habitat. The effects of Alternative 2 on aquatic resources, when combined with past, present, and reasonably foreseeable future actions, would not change current conditions in the cumulative effects area, including the listing status of threatened and endangered fish. Therefore, Alternative 2 would only have minor cumulative effects on past, present, and reasonably foreseeable actions on threatened and endangered fish species.

Water Quality

Alternative 2 would have intermittent, temporary adverse water quality effects of increased turbidity from periodic dredging. In-water placement of dredged material as a base for future shallow water habitat would cause similar intermittent and temporary increases in turbidity. Effects would be confined to the dredging and dredged material placement areas within the lower Snake River. The water quality effects of Alternative 2 when combined with the effects of past, present, and reasonably foreseeable future actions would only have minor cumulative effects on water quality.

4 Preferred Alternative

The Corps has selected Alternative 2, Immediate Need Dredging as the preferred alternative for managing current sediment accumulation in the lower Snake River. This alternative best meets the purpose and need for the action.

The Preferred Alternative includes the dredging below the Ice Harbor Dam navigation lock and near Clarkston, Washington and Lewiston, Idaho and in-water disposal of approximately 257,910 cy of sediment at Bishop Bar at RM 118 on the lower Snake River in Washington State. Using this new area for disposal is the primary difference between this proposed channel maintenance effort and the one performed in 2014/2015. The disposal site is located outside of the federal navigation channel, and experiences lower velocities than the main thalweg (the deepest part of the river, typically in the middle of the river channel). The new material would occupy a 23-acre footprint and would form a uniform, gently sloping area along 750 linear feet of shoreline. The top of the disposal area would be 20 feet below MOP and would slope down at 15% to the river bottom (approximately 63 feet below MOP).

5 Compliance with Applicable Treaties, Laws, and Executive Orders

5.1 Treaties

Treaties are legally binding contracts between sovereign nations that establish those nations' political and property relations. Treaties between Native American Tribes and the United States confirm each nation's rights and privileges. In most of these treaties, the Tribes ceded title to vast amounts of land to the United States but reserved certain lands (reservations) and rights for themselves and their future generations. It is important to be clear that "the rights of sovereign Indian Tribes pre-existed their treaties; they were not granted them by treaties or by the United States government. Rather, the treaties gave their rights legal recognition" (Hunn et al. 2015:58). Like other treaty obligations of the United States, Indian treaties are “the supreme law of the land,” and they are the foundation upon which Federal Indian law and the Federal Indian trust relationship is based.

Treaties with area Tribes, including Treaties with the Nez Perce (Treaty of June 11, 1855, Treaty with the Nez Perces, 12 Stat. 957 (1859); Treaty of June 9, 1863, Treaty with the Nez Perces, 14 Stats.647 (1867)), the Confederated Tribes of the Umatilla Indian Reservation (Treaty of June 9, 1855 with the Walla Walla, Cayuse, etc, 12 Stat. 945 (1859)), and the Confederated Tribes and Bands of the Yakama Nation (Treaty of June 9, 1855, Treaty with the Yakama, 12 Stat. 951) established reservations and explicitly reserved unto the Tribes certain rights, including the exclusive right to take fish in streams running through or bordering reservations, the right to take fish at all usual and accustomed places in common with citizens of the territory, and the right of erecting temporary buildings for curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed lands. These reserved rights include the right to fish within identified geographical areas.

The project area is within the ceded lands of the Tribes mentioned above. The Corps will continue to honor treaty obligations. The Corps consulted with the tribes having treaties, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes and Bands of the Yakama Nation, and the Nez Perce Tribe. The Corps received comments about Treaty rights and resources from the Nez Perce Tribe in August 2022, during the public review period, and the Corps' responses to their comments are included in the comment response document attached to the FONSI. In addition, the Nez Perce Tribe requested formal government-to-government consultation with the Corps to review pre-dredge lamprey survey results and discuss mitigation actions. The Corps will accommodate their request and government-to-government consultation will be conducted prior to the start of any dredging or disposal activity. The proposed action is not anticipated to adversely affect treaty resources, rights, or obligations.

5.2 Federal Laws, Regulations, and Executive Orders

5.2.1 National Environmental Policy Act

The National Environmental Policy Act requires federal agencies to use a systematic interdisciplinary approach to evaluate the environmental effects of a proposed federal action prior to implementing that action. This is usually accomplished through preparation of a statement, either an Environmental Impact Statement (EIS) if the action is a major federal action significantly affecting the quality of the human environment, or an Environmental Assessment (EA) if the federal agency has not yet determined the significance of the effects.

This EA tiers from the Corps' August 2014 Lower Snake River PSMP FEIS. This EA was prepared pursuant to regulations implementing NEPA, (42 United States Code [U.S.C.] 4321 et seq. and 87 FR 23453) and identifies and considers the potential environmental effects of the proposed dredging and disposal action in the lower Snake River. The draft Finding of No Significant Impact (FONSI), this EA and all supporting appendices were made available to other federal and state agencies, Tribes, and the public for a 30-day review and comment period from July 18, 2022 to August 18, 2022. While preparing the EA and in the public review period, the Corps did not identify any impacts that would significantly affect the quality of the human environment. Therefore, compliance with NEPA would be achieved upon the signing of the FONSI. If significant impacts had been identified during public review, a Supplemental EIS would be required. Completion of a Supplemental EIS and the signing of a Record of Decision would then achieve compliance with NEPA.

5.2.2 Clean Water Act

The Federal Water Pollution Control Act (33 U.S.C. §1251 et seq., as amended) is more commonly referred to as the Clean Water Act (CWA). This act is the primary legislative vehicle for federal water pollution control programs and the basic structure for regulating discharges of pollutants into waters of the United States (WOTUS). The act was established to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." The CWA sets goals to eliminate discharges of pollutants into navigable water, protect fish and wildlife, and prohibit the discharge of toxic pollutants in quantities that could adversely affect the environment.

Section 404 of the CWA established a program to regulate the discharge of dredged or fill material into WOTUS and Section 401 requires that any federal activity that may result in a discharge to WOTUS must first receive a water quality certification from the state in which the activity would occur.

For the proposed current immediate need action to reestablish the navigation channel dimensions, which includes the disposal of dredged material into waters of the U.S., and therefore requires the associated Section 404 compliance, the Corps prepared a CWA Section 404(b)(1) Evaluation, attached to this EA as Appendix B. The letter to the interested public, Tribes, and agencies announcing the start of the 30-day review and comment period of the Draft FONSI, EA, and all supporting appendices also serves as CWA Public Notice stating the 404(b)(1) Evaluation available for review and comment.

For Section 401 compliance, the Corps began coordination early with the certifying authority, the Washington State Department of Ecology (Ecology), and requested Section 401 water quality certification (WQC) on May 24, 2022. The Corps received Section 401 WQC from Ecology on August 30, 2022. EPA, by email dated September 9, 2022, informed the Corps a neighboring jurisdiction determination would not be issued, in accordance with 40 CFR 121.12 (a) meaning EPA did not believe that the Corps' proposed dredging/disposal action would affect water quality in a neighboring jurisdiction, such as Oregon or Idaho.

Because the Corps would not be disposing of any dredged material in waters of the U.S. in Idaho, CWA Section 401 WQC from the Idaho Department of Environmental Quality (IDEQ) is not required. However, the Corps communicated and coordinated with the IDEQ for the dredging activity that would occur in Idaho and IDEQ was given the opportunity to comment during the 30-day review period.

Due to the fact that berthing areas at the Port of Clarkston and the Port of Lewiston, (together - Ports) have also been impacted by accumulated sediment and would be dredged as well, the Ports must also apply for CWA permits. Therefore, the Port of Clarkston submitted a Joint Aquatic Resources Permit Application (JARPA) and received a Section 404 permit from the Seattle District Corps of Engineers Regulatory Office on or about September 28, 2022. The Port of Clarkston requested Section 401 WQC from Ecology on June 24, 2022 and received it on September 7, 2022. EPA, by email dated September 7, 2022, informed the Seattle District Corps of Engineers Regulatory Office a neighboring jurisdiction determination associated with port permitting would not be issued, in accordance with 40 CFR 121.12(a). The Port of Lewiston submitted a Joint Application for Permit and received a Section 404 permit from the Walla Walla District Corps of Engineers Regulatory Office in Idaho on or about September 28, 2022. On August 8, 2022, the Port of Lewiston received Section 401 WQC from IDEQ and in compliance with CWA 40 CFR 121.12, the Walla Walla District Corps of Engineers Regulatory Office notified EPA of the Port of Lewiston's receipt of WQC and requested EPA to provide their determination for a neighboring jurisdiction. EPA did not respond within the required 30 days, therefore it is assumed that there are no concerns or issues with neighboring jurisdiction associated with the proposed action.

The Port of Lewiston was not required to obtain Section 401 WQC from Ecology in Washington State.

5.2.3 Rivers and Harbors Act

The Rivers and Harbors Act (RHA) refers to a conglomeration of many pieces of legislation and appropriations passed by Congress since the first such legislation in 1824. The Rivers and Harbors Act of 1899 was the first federal water pollution act in the U.S. It focuses on protecting navigation, protecting waters from pollution, and acted as a precursor to the CWA. Section 10 of the RHA of 1899 regulates alteration of and prohibits unauthorized obstruction of navigable waters of the U.S. Original construction of the federal navigation channels was authorized under the RHA, and nationwide, the Corps' maintenance dredging maintains the navigability of the channels in accordance with their authorized dimensions.

Because the Corps prepared a Section 404(b)(1) evaluation and because it issued a Public Notice that provided an opportunity for interested parties to review and comment on the proposed action, the Corps met the requirements of the River and Harbor Act (RHA) Section 10. Additionally, the four lower Snake River dam and reservoir projects were originally authorized under the RHA of 1945 (PL 79-14) and, therefore, do not require a separate Section 10 permit for operation and maintenance actions.

The Port of Clarkston submitted their JARPA and applied for the RHA Section 10 Permit from the Seattle District Corps of Engineers Regulatory Office which they received on or about September 28, 2022. The Port of Lewiston submitted their Joint Application for Permit and applied for the RHA Section 10 Permit from the Walla Walla District Corps of Engineers Regulatory Office in Idaho which they received on or about September 28, 2022.

5.2.4 Endangered Species Act

The ESA established a national program for the conservation of threatened and endangered fish, wildlife, and plants and the habitat upon which they depend. Section 7(a)(2) of the ESA requires federal agencies to consult with the USFWS and the NMFS, as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their critical habitats. Section 7(c) of the ESA and the federal regulations on endangered species coordination (50 CFR §402.12) require that federal agencies prepare biological assessments of the potential effects of major actions on listed species and critical habitat.

The Corps has determined that the proposed action may affect and is likely to adversely affect ESA-listed fish species including Snake River spring/summer and fall Chinook, Snake River steelhead, Snake River sockeye, and bull trout. The proposed action may also affect designated critical habitat for these species. Formal consultation with the NMFS and the USFWS was conducted. The Corps prepared a biological assessment (BA) (Appendix D) which was sent to the Services on April 25, 2022. The USFWS provided their biological opinion (Appendix F) on August 24, 2022. They concluded the proposed action would not jeopardize the continued existence of bull trout or adversely modify their critical habitat. The NMFS provided their biological opinion on September 26, 2022. They concluded the proposed action would not jeopardize the continued existence of any of the ESA-listed anadromous salmonids covered in the Corp’s biological assessment.

5.2.5 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions, primarily for Native American Tribes. Take under this Act includes both direct taking of individuals and take due to disturbance.

Bald and golden eagles are known to nest throughout Corps managed lands in the Walla Walla District. While all nest sites have not been documented, locations of some are known. None are known to occur in or near the proposed action area, therefore, there would be no effect or take (to include disturbance) of either bald or golden eagles.

5.2.6 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703-712, as amended) prohibits the taking of and commerce in migratory birds (live or dead), any parts of migratory birds, their feathers, or nests. Take is defined in the MBTA to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof.

There would be no take of migratory birds from this action. The work would be performed during winter, outside of the nesting season. Commercial navigation activities would also not cause take to birds protected by the MBTA. There would be no effect to birds under the MBTA.

5.2.7 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) of 1934, as amended (16 USC 661 et seq.) requires consultation with USFWS when any water body is impounded, diverted, controlled, or modified for any purpose. The USFWS and state agencies charged with administering wildlife resources are to conduct surveys and investigations to determine the potential damage to wildlife and the mitigation measures that should be taken. The USFWS incorporates the concerns and findings of the state agencies and other federal agencies, including the NMFS, into a report that addresses fish and wildlife factors and provides recommendations for mitigating or enhancing impacts to fish and wildlife affected by a federal project.

The proposed dredging-disposal action is intended to support operation and maintenance of an existing Corps Civil Works project and will not result in the new diversion or modification of a waterbody. A Coordination Act Report (CAR) is, therefore, not required under the Act (16 USC 661-666c), as confirmed in a Memorandum of Agreement with USFWS (USFWS 2003) and NMFS (NMFS 2020b).

5.2.8 Fishery Conservation Management Act of 1976

The Fishery Conservation and Management Act of 1976 (16 USC 1801-1882; 90 Stat. 331; as amended), also known as the Magnuson-Stevens Fishery Conservation and Management Act, established a 200-mile fishery conservation zone, effective March 1, 1977, and established the Regional Fishery Management Councils consisting of federal and state officials, including the USFWS. The fishery conservation zone was subsequently dropped by amendment and the geographical area of coverage was changed to the Exclusive Economic Zone, with the inner boundary being the seaward boundary of the coastal states. Columbia River salmon and steelhead are found in this zone.

The potential effects of the alternatives on the fisheries in this zone have been examined in Section 3.3 (aquatic Resources) of this EA. The project BA (Appendix D) documents the essential fish habitat effects of the proposed action. The proposed action may result in short-term adverse effects on water quality habitat parameters.

5.2.9 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) requires agencies to consider the potential effect of their actions on properties that are listed, or are eligible for listing, on the National Register of Historic Places (NRHP). The NHPA implementing regulations, 36 CFR Part 800, requires that the federal agency consult with the State Historic Preservation Officer (SHPO), Tribes and interested parties to ensure that all historic properties are adequately identified, evaluated and considered in planning for proposed undertakings. The consulting parties for this undertaking included the SHPOs in Idaho and Washington, and five tribes – the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Colville Reservation, the Confederated Tribes and Bands of the Yakama Nation, the Nez Perce Tribe, and the Wanapum Band.

The potential effects of the alternatives on cultural resources have been examined in Section 3.6 (Historic/Cultural Resources) of this EA and were examined in a separate Cultural Resources Review (Corps 2022) that was sent to consulting parties on May 12, 2022, for a 30-day review. The Cultural Resources Review documents the effects of the proposed action. The Corps determined that the proposed action would not have an adverse effect on Traditional Cultural Properties at Ice Harbor or Lower Granite as the proposed work is only maintenance of an existing facility (the navigation channel) and would not result in any changes to the use of that facility that might adversely affect historic properties. Letters of Concurrence from the Idaho (Appendix G) and Washington (Appendix H) SHPOs were received on June 9, 2022, and June 16, 2022, respectively. No comments were received from the Tribal consulting parties during the Cultural Resources review comment period. The Nez Perce Tribe provided comments on the draft FONSI and EA on August 18,2022, but comments pertaining specifically to NHPA compliance were not included.

5.2.10 Executive Order 11988, Floodplain Management

This Executive Order outlines the responsibilities of federal agencies in the role of floodplain management. Each agency must evaluate the potential effects of actions on floodplains and avoid undertaking actions that directly or indirectly induce development in the floodplain or adversely affect natural floodplain values.

There is no land use change associated with the proposed action. Dredging and disposal would occur in water. The proposed action would not interfere with floodplain function or lead to floodplain development.

5.2.11 Executive Order 11990, Protection of Wetlands

Executive Order 11990 requires federal agencies to take actions to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands when undertaking federal activities and programs.

It has been the goal of the Corps to avoid or minimize wetland impacts associated with their planned actions. The proposed action considers potential effects on wetlands, as well as opportunities to minimize effects and preserve and enhance wetlands and wetland values. The preferred alternative would have no effect on wetlands.

6 Consultation, Coordination, and Public Involvement

6.1 Tribal and Agency Consultation and Coordination

Tribal Consultation and National Historic Preservation Act Section 106 Coordination:

Tribal leadership for the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Colville Reservation, and the Nez Perce Tribe were formally offered government to government consultation regarding the proposed dredging and disposal action in a letter that also announced the start of the public review and comment period, dated July 13, 2022. The Wanapum Band also received a notification letter specific to the start of the public review and comment period but were not offered government to government consultation.

Pursuant to Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, the Corps analyzed the potential effects of the alternatives on cultural resources in the proposed action area in the EA and prepared a Cultural Resources Review that was sent to the Washington and Idaho State Historic Preservation Officers (SHPO) and five area Tribes on May 12, 2022 for a 30-day review. The Corps determined that the proposed action would not have an adverse effect on Traditional Cultural Properties at Ice Harbor or Lower Granite as the proposed work is only maintenance of an existing facility (the navigation channel) and would not result in any changes to the use of that facility that might adversely affect historic properties. Letters of Concurrence from the Washington and Idaho SHPO have been received. No other comments were received during the review of the Cultural Resources Report. The Nez Perce Tribe requested Government-to-Government consultation during the public review period.

Endangered Species Act Consultation:

Pursuant to Section 7 of the Endangered Species Act of 1973, as amended, the Corps determined that the preferred alternative may affect and is likely to adversely affect ESA-listed fish species. Formal consultation with the NMFS and the USFWS has been conducted. The Corps received the USFWS biological opinion on August 24, 2022 and received the NMFS biological opinion on September 26, 2022.

Clean Water Act Compliance and Coordination:

For the proposed current immediate need action to reestablish the navigation channel dimensions, which includes the disposal of dredged material into waters of the U.S., and therefore requires the associated Section 404 compliance, the Corps prepared a CWA Section 404(b)(1) Evaluation, attached to this EA as Appendix B. The letter to the interested public, Tribes, and agencies announcing the start of the 30-day review and comment period of the Draft FONSI, EA, and all supporting appendices also serves as CWA Public Notice stating the 404(b)(1) Evaluation available for review and comment. For Section 401 (state water quality standards), the Corps began coordination early with the certifying authority, the Washington State Department of Ecology (Ecology), and requested Section 401 water quality certification (WQC) on May 24, 2022. The Corps received Section 401 WQC from Ecology on August 30, 2022. EPA, by email to the Corps, dated September 9, 2022, informed the Corps a neighboring jurisdiction determination would not be issued, in accordance with 40 CFR 121.12 (a), meaning EPA did not believe that the Corps' proposed dredging/disposal action would affect water quality in a neighboring jurisdiction, such as Oregon or Idaho.

Because the Corps would not be disposing of any dredged material in waters of the U.S. in Idaho, CWA Section 401 WQC from the Idaho Department of Environmental Quality (IDEQ) was not required. However, the Corps communicated and coordinated with the IDEQ for the dredging activity that would occur in Idaho and IDEQ was given the opportunity to comment during the 30-day review period.

Due to the fact that berthing areas at the Port of Clarkston and the Port of Lewiston, (together - Ports) have also been impacted by accumulated sediment and would be dredged as well, the Ports must also apply for CWA permits. Therefore, the Port of Clarkston submitted a Joint Aquatic Resources Permit Application (JARPA) and received a Section 404 permit from the Seattle District Corps of Engineers Regulatory Office on or about September 28, 2022. The Port of Clarkston requested Section 401 WQC from Ecology on June 24, 2022 and received it on September 7, 2022. EPA, by email dated September 7, 2022, informed the Seattle District Corps of Engineers Regulatory Office a neighboring jurisdiction determination associated with port permitting would not be issued, in accordance with 40 CFR 121.12(a).

The Port of Lewiston submitted a Joint Application for Permit and received a Section 404 permit from the Walla Walla District Corps of Engineers Regulatory Office in Idaho on or about September 28, 2022. On August 8, 2022, the Port of Lewiston received Section 401 WQC from the Idaho Department of Environmental Quality and in compliance with CWA 40 CFR 121.12, the Walla Walla District Corps of Engineers Regulatory Office notified EPA of the Port of Lewiston's receipt of WQC and requested EPA to provide their determination for a neighboring jurisdiction. EPA did not respond within the required 30 days, therefore it is assumed that there are no concerns or issues with neighboring jurisdiction associated with the proposed action.

The Port of Lewiston was not required to obtain Section 401 WQC from Ecology in Washington State.

<u>Rivers and Harbors Act:</u>

Because the Corps prepared a Section 404(b)(1) Evaluation and because it issued a Public Notice that provided an opportunity for interested parties to review and comment on the proposed action, the Corps has also met the requirements of the River and Harbor Act (RHA) Section 10. Additionally, the four lower Snake River dam and reservoir projects were originally authorized under the RHA of 1945 (PL 79-14) and, therefore, do not require a separate Section 10 permit for operation and maintenance actions.

The Port of Clarkston submitted their JARPA and applied for the RHA Section 10 Permit from the Seattle District Corps of Engineers Regulatory Office which they received on or about September 28, 2022. The Port of Lewiston submitted their Joint Application for

Permits and applied for the RHA Section 10 Permit from the Walla Walla District Corps of Engineers Regulatory Office which they received on or about September 28, 2022.

6.2 Public Involvement

Scoping

Prior to beginning the preparation of this EA, the Corps announced a public scoping period would be open from February 7, 2022 to March 7, 2022. During this 30-day period, the Corps invited interested parties, Tribes, the Services, and other federal and state and local agencies to provide comments to help identify important issues to be analyzed in depth in the EA. The Corps received comments from 17 interested parties. Nine of the commentors wrote to express their support of the proposed action. Other comments were made in regards to potential impacts to ESA-listed species, aquatic resources including lamprey, and water quality which have all been thoroughly assessed in Section 3 of this EA. The remaining comments focused on the footprint of the proposed action, sediment disposal, and the need to consider a range of alternatives.

Public Review – Draft Finding of No Significant Impact and Environmental Assessment

In compliance with NEPA, the draft Finding of No Significant Impact (FONSI), EA, and all supporting appendices were made available for a 30-day review and comment period beginning on July 18, 2022 and concluding on August 18, 2022. Twenty-three comment documents were received. Fourteen of the commenters were in support of the proposed dredging action. Four commenters expressed opposition to the proposed dredging action. The remaining commenters provided recommended edits to the documents under review, or asked questions about some of the information in the documents. The comment response document is attached and incorporated into the FONSI and provides summaries of the comments received and the Corps' responses.

In compliance with and to complete the NEPA process, the Corps will sign the FONSI and proceed with the dredging and disposal action beginning in December 2022. This EA and the final FONSI and all supporting appendices are available on the Walla Walla District Corps of Engineers website at www.nww.usace.army.mil/Missions/Environmental-Compliance.

If significant environmental effects resulting from implementing the proposed action had been identified during the review period, the Corps would proceed to write a Supplemental Environmental Impact Statement and the dredging and disposal action would be delayed until the Corps completed the NEPA process with the signing of a Record of Decision.

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